

**APPROVED MINUTES**  
**ANSC C63® SC1: Techniques and Development**  
**Webex Meeting and In-Person Meeting**  
**Thursday, May 16, 2024**  
**UL Solutions, Research Triangle Park, NC**

**Members Present:**

Nicholas Abbondante (via Webex)  
Mark Arthurs  
David Chamberlain  
Zhong Chen  
Bob DeLisi  
Mac Elliott (via Webex)  
Andy Griffin (Chair) (via Webex)  
Tim Harrington (via Webex)  
Mike Heckrotte (via Webex)  
Harry Hodes (via Webex)  
Dan Hoolihan  
Greg Kiemel (via Webex)  
Jeff Klinger (via Webex)  
Doug Kramer (via Webex)  
Victor Kuczynski  
Randy Long  
Bob Mitchell (via Webex)  
Jason Nixon (Vice Chair)  
Janet O'Neil (Secretary)  
Nate Potts (via Webex)  
Tim Royer (via Webex)  
David Schaefer  
Jeff Silberberg  
Denys Shumakov

**Members Absent:**

Mike Antola  
Nima Molaei  
David Zimmerman

**Guests:**

Steve Anderson  
Allen Crum (via Webex)  
Henry Benitez  
Bill Graff  
Ken Gjerde  
David Maciel  
Megan McConnell (via Webex)  
Ernesto Mendoza  
Vignesh Rajamani  
Deanna Zakharia

**Employer:**

Intertek  
Sony  
ISED Canada  
ETS-Lindgren  
UL Solutions  
TUV Sud America  
Cisco  
FCC  
UL Solutions  
Consultant  
Hoolihan EMC Consulting  
Apple  
Cetecom  
Apple  
Vican Electronics  
ANAB  
TUV Rheinland  
ISED Canada  
ETS-Lindgren  
Keysight Technologies  
Timco Engineering  
Element Materials Technology  
FDA Center for Devices & Radiological Health  
ISED Canada

**Employer:**

UL LLC  
Element Materials Technology  
Spectrum EMC, LLC

**Employer:**

ARRL  
N/A  
IEEE EMC Society  
TCB Council  
Starkey  
Sony  
A2LA  
Signify  
Rohde & Schwarz  
Motorola Solutions

## 1.0 Call to Order: Chair

Chair Andy Griffin called the meeting to order at 10:00 am EDT. He noted that he would have to drop off the meeting early since he was on travel. At that point, Vice Chair Jason Nixon would take over and lead the meeting.

## 2.0 Approval of the Consent Agenda: Secretary

Secretary O'Neil presented the consent agenda. This includes the draft meeting agenda for May 16, 2024. The agenda was amended to add a new member application for review under New Business. The interpretation request on the LISN choke was amended to note it has been approved by the parent committee. 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 October 4, 2023. The consent agenda was approved as presented. (See Attachment A for the approved amended agenda. See Attachment B for the Approved Minutes of the October 4, 2023, 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). Harry Hodes is a member at risk of losing his membership by having missed three consecutive meetings. Since he was in attendance at the May 16, 2024, meeting, his membership is no longer at risk.

### 3.2 Consideration of New Members – Working Group Rosters

A new membership application was received from Denys Shumakov with ISED Canada. He is interested in joining SC1. His membership application and CV were distributed to the SC1 committee. A vote to approve this SC1 membership application will be taken 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.**

### 3.3 The SC1 Scope was confirmed as follows:

Subcommittee 1 provides the technical expertise and resources necessary for maintaining existing and newly proposed C63<sup>®</sup> and other standards documents. Subcommittee 1 addresses new and existing measurement methods, site qualification methods, calibration methods, associated instrumentation, and limits development as assigned by the Main Committee ANSC C63<sup>®</sup>. **SC1 approved the scope.**

**3.4 Approval of Duty** – The list of standards as currently appears on the C63 website, for which SC1 is responsible, were reviewed. **SC1 approved the list of standards.**

## 4.0 Working Group Reports

### **C63.2: Field Strength Measuring Instrumentation**

C63 Chair Bob DeLisi provided an update for Jens Medler, Working Group Chair. C63.2 was published in January 2024. There is a typo in the title of the standard; Bob will ask Jennifer Santulli with IEEE to correct this.

**ACTION ITEM: Jennifer Santulli to ask IEEE to correct the typo in the title of this standard to read “Electromagnetic Interference and Field Strength Measuring Instrumentation in the Frequency Range 9 kHz to 40 GHz.”**

### **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 a verbal report. 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.

The Working Group continues to address the comments from the SC1/Task Force. Activity is problematic because of the many changes. The Working Group will focus on the significant issues to address moving forward and will no longer include new items since it will make the document too long. Because of the number of changes, SC1 must recognize that implementing this revision may take several years once approved.

### **C63.5: Antenna Calibration**

Working Group Chair: Nate Potts

Status: Current-2017

Nate Potts, Working Group chair, presented a verbal report. As a reminder, the main changes in the document include:

- How to deal with standard gain horn antennas (loss with the waveguide to coaxial adaptor)
- No GSCF's tables for bicons or LPA's will be used apart from G1 table to convert bicon ACF to free space.
- VSWR, return loss, impedance section for general S-parameters measurements of antennas.
- Added SCM procedure to obtain Site Insertion Loss (SIL) similar to RSM in CISPR16-1-6
- More details in separating SSM over ground plane below 1GHz and TAM in free space above 1GHz.
- RAM not only for calculable dipoles, but other antennas can also be “standards” if calibrated to SSM or TAM. All other antennas besides dipoles will have a new section for SAM (Standard Antenna Method).

- Added Annex for 1m antenna calibrations used for automotive testing, mirrored new edition of SAE ARP 958 2021.
- Section added for connector care specific to Type N connectors typically used for antennas 30MHz to 18GHz. Construction of Type N connectors causes more issues than other connectors due to the “shoulder” on the male pin that can bind against the female pin and damage one or both connectors.

At the last meeting, SC1 Chair Andy Griffin requested the Working Group to move forward with publishing C63.5 before the updated version of C63.4 is ready to ballot, since C63.25.2 has been published. SC1 had agreed with this plan to not wait to publish the updated C63.5 based on C63.4 being published. C63 Chair Bob DeLisi requested that the time between publication of C63.5 and C63.4 have a narrow window.

**ACTION ITEM: Potts to direct the C63.5 Working Group towards publishing C63.5 before the updated version of C63.4 is published, but time the publication to not to be too long between these two documents.**

Nick Abbondante asked about the distinction between ANSI C63.5 and ANSC C63.5. Will the ANSI C63.5 version be “retired” once ANSC C63.5 is published? Bob DeLisi will ask IEEE to confirm how this will work once ANSC C63.5 is published.

**ACTION ITEM: Bob DeLisi will ask IEEE to confirm how the ANSI C63 standards will be impacted with the publication of the ANSC C63 standards.**

**C63.7: Construction of Test Sites**

Working Group Chair: None – Candidate Requested

Status: Published update on March 9, 2015; Working Group disbanded. Nothing new to report.

This document needs basic revisions beyond adding chambers. For example, it states a ground plane is not necessary on an OATS. A three-page amendment was suggested to be added to the standard, but a Working Group chair is needed to initiate this work. Bob DeLisi noted there continues to be a lack of interest in this document to support the work required. After discussion, **Nick Abbondante moved to close the PINS for C63.7. The motion was seconded and approved.** Harry Hodes voted against the motion and asked that his negative vote be recorded.

Bob DeLisi advised that if there is interest in the future to work on the next edition of C63.7, a new PINS can be created.

**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.

**ACTION ITEM: Bob DeLisi to ask IEEE for assistance in finding a Working Group chair that is interested in drafting a new PINS for the revision of 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: Andy Griffin
- 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 – 40 GHz) – Future plan to address NSA above 18 GHz – WG Chair: Nick Abbondante

**On C63.25.1**, Zhong Chen volunteered to take over as chair of this Working Group from Andy Griffin. Zhong will create a new PINs for the updates to the document.

**ACTION ITEM: Zhong Chen to create a new PINS to update C63.25.1.**

*NOTE: At this point, SC1 Chair Andy Griffin left the meeting due to travel issues. SC1 Vice Chair Jason Nixon took over leading the meeting.*

**On C63.25.2**, this standard will be published in the near future. IEEE is running 12-16 weeks behind schedule so there has been a delay in publication.

**On C63.25.3**, Working Group chair Nick Abbondante presented his report. (See Attachment C.) 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 GHz - 40 GHz. Existing site validation methods will be leveraged where possible. As an update, the Working Group will likely expand the frequency range for Reverb and CATR test environments in the future. In which case, this may become its own document and split from C63.25.3.

The test environments include:

- SAC/OATS/FAR/FSOATS
- 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. They are exploring use of sVSWR, Time Domain sVSWR, and Mode Filtered sVSWR techniques. Work 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. The task group continues to explore antenna options – past pre-RRT testing used the prototype ETS 3185. A number of antenna manufacturers are now participating, including ETS-Lindgren, Steatite, Schwarzbeck Mess, and Seibersdorf. The next meeting will be held on July 11.

**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 – group is aiming for a complete first draft in the next few months. The next meeting will be held on May 21.

**Reverberation Chamber:** Phil Miller is the task group chair. They are working on a demo for the upcoming IEEE EMC Symposium in Phoenix, Arizona and EMC Europe in Bruges, Belgium. The group is finalizing text methodically – right now the focus is on the relationship between measurement uncertainty and the number of independent samples taken during the measurement/validation; this has been tied to existing chamber uncertainty. The goal is to have a first draft of text in the next few months. Their last meeting was held on May 7.

In summary, 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 meeting regularly. The task groups are meeting roughly monthly, some are meeting every two weeks. The goal is to obtain first drafts of validation text for the standard, determine basic antenna requirements, and develop round robins to validate the methods and cross correlate results across chamber types. For a chamber that meets the 1-18 GHz requirements, we still need to fully prove FSOATS needs additional calibration above 18 GHz.

## 5.0 Old Business – Chair

There was no old business to discuss.

## 6.0 New Business – Chair

**New Member Consideration:** Denys Shumakov’s application to join SC1 and CV were reviewed and discussed. David Chamberlain, Horia Popovici, and Jason Nixon have endorsed his membership application. **Randy Long moved to approve the application of Denys Shumakov to join SC1. The motion was seconded and approved.**

**7.0 Interpretation Requests:** The secretary reviewed the following open interpretation requests since the last SC1 meeting on October 4, 2023:

**C63.4 (2014) Conducted Emissions LISN Choke** received from Henrik Nielsen, request dated November 18, 2022. The task group chair is David Zimmerman with members Nate Potts, Andy Griffin, and Nick Abbondante. *Interpretation response updated and sent to SC1 for approval to send to parent committee; approved by parent committee in February 2024. Closed.*

**C63.5 (2017) Annex F Delta Antenna Factors** received from Jeong Hwan Kim, request dated May 16, 2023. Nate Potts, task group chair and Mike Heckrotte, task group member, drafted a response that was approved by SC1 and sent to the parent committee. *Approved by parent committee In January 2024. Closed.*

**C63.4 (2014) Gaps in Ground Plane** received from Charles Wang, request dated October 20, 2023. Open.

**C63.4 (2014) Annex F Insulating Ground Plane** received from Brandon Hobbs, December 13, 2023. Open.

**ACTION ITEM: Secretary O’Neil to issue a call for task group chair and volunteers to be members of these task groups.** (NOTE: Immediately following the meeting, Secretary O’Neil sent the two open interpretation requests to SC1 members with a call for volunteers.)

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

Dan Hoolihan reminded the committee that responses to interpretation requests are informative, NOT normative, in nature.

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

On behalf of Jerry Ramie, Jason Nixon requested that SC1 members be specific with any requests for postings to the website. Jason 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 May 16, 2024, meeting to the committee.**

## **10.0 Time and Place of Next Meeting: Vice Chair**

Jason Nixon advised that SC1 would meet during the next C63 meeting series scheduled for the week of September 30, 2024, at Rohde & Schwarz near the Dallas Fort Worth airport. The host hotel will be located in Lewisville, Texas.

## **11.0 Closing Remarks and Adjournment: Vice Chair**

With no further business, Jason Nixon adjourned the meeting at 12:00 pm EDT. He thanked everyone for attending the meeting.

Minutes submitted by:



Janet O’Neil, Secretary, SC1

## **ATTACHMENTS**

- Attachment A: Approved Agenda for May 16, 2023, SC1 Meeting
- Attachment B: Approved Minutes from October 4, 2023, SC1 Meeting
- Attachment C: Abbondante Report on C63.25.3