

**APPROVED MINUTES**

**ANSI ASC C63® SC1: Techniques and Development  
WebEx Meeting and In-Person Meeting**

**Wednesday, May 18, 2022  
ETS-Lindgren, Cedar Park, Texas**

**Members Present:**

Nicholas Abbondante  
Mark Arthurs (via WebEx)  
Zhong Chen (Chair)  
Bob DeLisi  
Mac Elliott (via WebEx)  
Andy Griffin  
Tim Harrington (via WebEx)  
Dan Hoolihan  
Steve Jones (via WebEx)  
Greg Kiemel (via WebEx)  
Jeff Klinger (via WebEx)  
Doug Kramer  
Randy Long (via WebEx)  
Nima Molaei (via WebEx)  
Jason Nixon (Vice Chair)  
Janet O'Neil (Secretary)  
Nate Potts (via WebEx)  
David Schaefer  
Jeff Silberberg (via WebEx)  
Dennis Ward (via WebEx)  
David Zimmerman (via WebEx)

**Members Absent:**

Mike Antola  
David Chamberlain  
Dan Sigouin

**Guests:**

Aurelian Bria  
Jeremiah Darden  
Ken Gjerde  
Craig Fanning  
Steve Freirson  
Jon Kanter  
Harry Hodes  
Megan McConnell  
Jens Medler  
John Norgard  
Ian Schroeder  
Pad Thao  
Yibo Wang

**Employer:**

Intertek  
Sony  
ETS-Lindgren  
Underwriters Laboratories Inc. (UL)  
TUV Sud America  
Cisco  
FCC  
Hoolihan EMC Consulting  
FCC  
Apple  
Cetecom  
ETS-Lindgren  
ANAB  
Element Materials Technology  
ISED Canada  
ETS-Lindgren  
Keysight  
Element Materials Technology  
FDA Center for Devices & Radiological Health  
Element Materials Technology  
Spectrum EMC, LLC

**Employer:**

UL  
ISED Canada  
Timco

**Employer:**

Ericsson  
Abbott  
Starkey  
Elite Electronic Engr.  
SGS  
Apple  
NASA  
A2LA  
Rohde & Schwarz  
NASA  
Dish  
Starkey  
ETS-Lindgren

## 1.0 Call to Order: Chair

Chair Zhong Chen called the meeting to order at 3:00 pm CDT.

## 2.0 Approval of the Consent Agenda: Secretary

Secretary O'Neil presented the consent agenda. This includes the draft meeting agenda for May 18, 2022, the acceptance of the terms contained in the [patent slides](#) by all attendees, and approval of the minutes from the last meeting held on March 18, 2022. The consent agenda was approved as presented. (See Attachment A for the approved agenda. See Attachment B for the Approved Minutes of the March 18, 2022 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). Dan Sigouin's membership is at risk since he has missed three consecutive meetings. Rick Lombardi and Mits Samato requested to be removed from membership.

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

A new membership application had been reviewed and approved for Noel Lim. However, he changed companies since his application was submitted so he has been removed from membership. Harry Hodes submitted a new membership application for SC1. Greg Kiemel indicated an interest in joining the C63.25.3 working group. The votes on these applications 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 – note the revisions presented in yellow highlights below. The revisions were moved and approved by SC1. (Hoolihan made the motion; DeLisi seconded the motion.)**

Subcommittee 1 provides the technical expertise and resources necessary for maintaining existing and newly proposed C63<sup>®</sup> **approved 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 ASC C63<sup>®</sup>.

**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, but agreed the list is out of duty.**

**ACTION ITEM: Zhong Chen (SC1 Chair) to update the list of standards currently on the C63 website so it aligns with the committee's duty.**

## 4.0 Working Group Reports

### C63.2: Field Strength Measuring Instrumentation – 9 kHz to 40 GHz

Working Group (WG) Chair Jens Medler presented his report. (See Attachment C.) His Working Group has 19 members as listed in his report. A new membership request was received from Deniz Demirci (with NTS in Silicon Valley, CA). In summary, regarding the revision of ANSI C63.2:2016, the last meeting of the WG was held on Dec 12, 2021. The final draft C63.2 (Rev 7) was sent to Jennifer Santulli with an invitation to ballot for C63.2 sent out on March 4, 2022. The closing date was April 5, 2022. The ballot group has been formed. With his activity, Jens noted the work on C63.2 is basically finished.

Zhong thanked Jens and his working group for their efforts on this standard.

### C63.4: Emissions Measurements

Working Group Chair: Andy Griffin

Status: C63.4: Current-2014. New PINS approved by WG, SC1 and C63 in Nov. 2017. The draft was considerably revised in late 2020; latest draft circulated to SC 1 in mid-2021. Publication timing will be dependent upon publication of C63.25.2 to make sure these documents are harmonized.

Andy Griffin presented his report. (See Attachment D.) A 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 last SC1 meeting, the working group has had monthly meetings to try and sort out the remaining issues.

Following is a summary of the next steps:

**a) Site/Antenna Calibration C63.25.2** is going out for vote, fixed most of the technical issues raised. We will then remove the relevant parts from C63.4 if the progress is complete. We still have a dated reference to C63.5, so that will remain. C63.25.2, only includes the process for site attenuation, no normative requirements for size of the ground plane, minimum size of the ellipse (or circle) defining the obstruction-free area, etc.. If we need some normative requirements then we need to include them in C63.4.

**b) Above 1 GHz Test Method:** We agreed to align the requirements with the current version of CISPR 16 but with modifications based upon the beamwidth and the size of the EUT. We still need to clarify some of the requirements. There will be no boresighting or mandatory scanning from 1m to 4m. At higher frequencies, it needs to be a slicing function (for example every 10cm) because the turntable setting accuracy is not good enough, impossible to set at 'sub degrees', etc..

**c) Turntable rotation:** We agreed to align the requirements with the current version of CISPR 16, with an initial minimum azimuth step of 15 (or X) degrees. Then to do a small 'additional'  $\pm 15$  (or X) scan around the worst case azimuth. We need an assessment through 360 degrees.

Above 18 GHz, Andy noted we may need to do something different.

Discussion ensued about the boresight requirement and the manual turntable method. Harry Hodes noted he has serious reservations about removing the boresight requirement from a future edition of C63.4.

Andy noted timing is important to align the publication of the next C63.4 with the related C63 documents (C63.25.2 and C63.5) to make sure they are published in concert.

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

Working Group Chair: Doug Kramer

Status: Current-2017

Doug advised the working group hasn't met since the last SC1 meeting. There will be no real activity until C63.25.2 is ready. There is one outstanding interpretation request that the committee has addressed. This will be discussed later in the meeting per the agenda.

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

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

Working Group Chair: None – Candidate Requested

Nick said he was looking at the document and it needs basic revisions beyond adding chambers. For example, it states a ground plane is not necessary on an OATS. Harry suggested a three-page amendment to the standard.

The committee supported the idea of keeping C63.7 as a separate standalone document.

**ACTION ITEM: Anyone interested in Chairing the WG and drafting a new PINS for revision of C63.7 should contact Zhong Chen.**

#### **C63.23-2012: Guide for Computations and Treatment of Measurement Uncertainty**

Status: Reaffirmed on August 10, 2020; posted to IEEE Xplore in October 2020

Working Group Chair: None

SC1 wants to see this standard get updated, but no one is available to work on it. Bob DeLisi suggested that new SC1 members be required to actively participate on a working group. Jens Medler noted the activity on measurement uncertainty (MU) is picking up in CISPR. He expects new basic standards to include measurement uncertainty contributions. There is nothing about radio measurements in the CISPR documents so Zhong suggests C63.23 is needed to address this work.

Bob DeLisi noted that he would like to have a revision made of this document to address wireless measurements.

**ACTION ITEM: Bob DeLisi to see if a member of the C63.26 WG is interested in being the Chair of a new C63.23 WG.**

#### **C63.25: Time Domain Applications for Test Site Validation**

Working Group Chair: Dan Sigouin

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 Dec 2018 – WG Chair: Dan Sigouin
- o C63.25.2 (30 MHz to 1000 MHz) NSA – Work began in January 2019 – WG Chair: Dan Sigouin
- o C63.25.3 (18 GHz – 40 GHz) – Future plan to address NSA above 18 GHz – WG Chair: Nick Abbondante

Bob DeLisi presented the report for working group chair Dan Sigouin. (See Attachment E.) In summary, the C63.25.2 draft has been approved by the Main Committee. Four sets of comments were received and there was one negative vote. Comments were addressed to the extent possible; some items may be left for next edition. The draft will be sent to the IEEE Secretariat for IEEE MEC review and formation of a ballot group.

On C63.25.3, working group chair Nick Abbondante noted they last met on March 21. (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 GHz - 40 GHz. Existing site validation methods will be leveraged where possible.

Regarding SAC, OATS, and FAR test sites, the committee is exploring use of sVSWR, Time Domain sVSWR, and Mode Filtered sVSWR techniques. The Compact Antenna Test Range (CATR) and Reverberation Chamber are also being explored as test environments.

On recent meeting highlights regarding SAC/OATS/FAR/FSOATS, task group chair Martin Wiles noted his task group met on March 28 and April 25. Work is underway by group members on demonstrating and refining the mode filtered sVSWR method (Zhong Chen has further details). The task group is exploring antenna options; they are currently using an ETS-Lindgren 3185 prototype omnidirectional antenna, but looking at antennas from other vendors as well to provide multiple options. The plan is to develop a round robin as the mode filtered method matures. The task group is also looking at standard sVSWR (positioner issues) and TDsVSWR. The next meeting is tentatively set for June 13.

On the CATR test environment, Nick is currently filling the role of task group chair, but is looking for a longer term chair. Currently work is on hold while text is being developed. The task group has already reviewed background material sufficiently. Asad Bajwa from Keysight has volunteered to draft some CATR validation text. The last meeting was held on March 21; the next meeting will be scheduled once the text is available.

On the reverberation chamber test environment, this task group is chaired by Phil Miller. Their last meeting was held on April 11. Garth D'Abreu with ETS-Lindgren is working on reverb text to supplement IEC 61000-4-21 with considerations for the 18 GHz - 40 GHz frequency range (loading, chamber size, etc.). The next meeting of this task group will be held on June 6.

The main working group for C63.25.3 is meeting every 2-3 months – the last meeting was March 14 and the next meeting is June 20. Task groups are meeting monthly and continue to develop validation text for the standard and create round robins to validate the methods.

In summary, Nick noted Draft 0.3 is developed and several task groups are currently developing text. Measurements are being performed and a call for a round robin will be made within at least the working group, possibly within ANSC. Demos of Mode Filtered sVSWR and reverb chamber testing have been

provided during the C63 meetings at ETS-Lindgren in Cedar Park, Texas on May 16-18, 2022. Completion of this effort is still a year or two away.

Zhong reminded SC1 of the continued coordination needed among the three standards C63.25.2, C63.5, and C63.4 regarding site validation requirements. The C63.25 standards will have the sole responsibility for site validation. New versions of C63.4 and C63.5 are supporting documents on this topic and will defer to C63.25.2 for site related requirements.

**5.0 Old Business – Chair**

There was no old business to discuss.

**6.0 New Business – Chair**

**6.1 C63.25.3 Working Group New Member Application:** A vote was taken to approve the application of Greg Kiemel to join the C63.25.3 working group. Nick Abbondante moved to approve Greg Kiemel’s application to join the C63.25.3 working group. Andy Griffin seconded the motion. SC1 voted to approve the motion.

**6.2 C63 SC 1 New Member Application:** A vote was taken to approve the membership application of Harry Hodes in SC1. The application has been endorsed by Nick Abbondante, Bob DeLisi, and Mac Elliott. Nick Abbondante moved to approve the application of Harry Hodes to join SC1. Tim Harrington seconded the motion. SC1 voted to approve the motion.

**6.3 Demonstration of the Mode Filtered SVSWR Technique for Qualifying Chambers in the mmWave Range per C63.25.3:** Chair Zhong Chen gave a presentation describing this new EMC site validation measurement technique. (See Attachment G.) Following the presentation, SC1 members viewed a live demonstration of the technique using the 3 meter semi-anechoic chamber at ETS-Lindgren.

**6.4 Coordination with SC3 for Harmonization:** In the past, before any working group draft was submitted to the subcommittee for approval, the document must have been provided to the SC3 chair [Ross Carlton](#) for evaluation and coordination of any harmonization effort. This requirement may change. The activities of SC 3 will be reviewed at a Steering Committee meeting at the November 2022 C63 meeting series in order to adapt to current needs.

RA #	Task	Responsible party	Due Date	Status
RA-5	Compare C63.5 to CISPR 16-1-6	Nate Potts	2/1/20	Open
RA-17	Compare C63.25 to CISPR 16-1-4 (two freq. ranges under C63.25.1 and C63.25.2)	Dan Sigouin	5/1/19	Open

**ACTION ITEM: Dan Hoolihan agreed to put a discussion of SC3 on the agenda for the next steering committee meeting in November 2022.**

**ACTION ITEM: Nate Potts said he would complete the comparison by the next SC1 meeting.**

**7.0 Review of Interpretation Requests:** Zhong Chen reviewed the following interpretation request:

**C63.5 (2017) Clause M.4 Uncertainty Contributors** from Jeong Hwan Kim, request dated Dec 21, 2021. Task group members included Doug Kramer (Chair), Dennis Ward, Victor Kuczynski, and Nate Potts. Response prepared by task group and sent to SC1 on March 18 for a one week comment period. A vote was planned at the May meeting to be taken in SC1 to approve sending the response to the parent committee. However, SC1 was not ready to vote.

**ACTION ITEM: Doug Kramer agreed to set up another meeting of the task force members noted above to prepare a revised interpretation response for review at the next SC1 meeting.**

[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, Zhong requested that SC1 members be specific with any requests for postings to the website. Zhong 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 18, 2022 meeting to the committee.**

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

Zhong Chen advised that SC1 would meet via on November 9, 2022 from 3:00 – 5:00 pm at Keysight Technologies in Santa Rosa, California.

**11.0 Closing Remarks and Adjournment: Chair**

With no further business, Zhong Chen adjourned the meeting at 5:00 pm CDT. He thanked everyone for attending the meeting.

Minutes submitted by:



Janet O'Neil, Secretary, SC1

## ATTACHMENTS

Attachment A: Approved Agenda for May 18, 2022 SC1 Meeting

Attachment B: Approved Minutes from March 18, 2022 SC1 Meeting

Attachment C: Medler Report on C63.2

Attachment D: Griffin Report on C63.4

Attachment E: Sigouin Report on C63.25.2

Attachment F: Abbondante Report on C63.25.3

Attachment G: Chen Presentation on Mode Filtered SVSWR Technique for Qualifying Chambers in the mmWave Range per C63.25.3