

**APPROVED MINUTES - ANSI ASC C63® SC1: Techniques and Development
Underwriters Labs (UL)
Research Triangle Park, NC
Thursday, May 2, 2019**

Members Present:

Mike Antola (via WebEx)
Mark Arthurs
David Chamberlain
Zhong Chen (Chair)
Bob DeLisi
Mac Elliott
Andy Griffin
Tim Harrington (via WebEx)
Don Heirman
Harry Hodes (Vice-Chair) – (via WebEx)
Dan Hoolihan
Steve Jones
Jeff Klinger (via WebEx)
Doug Kramer
Victor Kuczynski
Rick Lombardi (via WebEx)
Randy Long
Jason Nixon
Michael O’Dwyer
Janet O’Neil (Secretary)
Nate Potts
Mits Samoto (via WebEx)
David Schaefer (via WebEx)
Jeff Silberberg
Dennis Ward

Members Absent:

Greg Kiemel
Werner Schaefer
Dan Sigouin
Khairul A. Zainal
David Zimmerman

Guests:

Henry Benitez
Jason Coder
Allen Crumm
Bruce Fagley
Bill Graff
Ed Hare
Chris Harvey
John Norgard
Jerry Ramie
John Repella
Yufei Xiong
Deanna Zakharia

Employer:

Residio
Sony
ISED Canada
ETS-Lindgren
Underwriters Laboratories Inc. (UL)
TUV Sud America
Cisco
FCC
Don HEIRMAN Consultants
Bay Area Compliance Labs
Hoolihan EMC Consulting
FCC
Compatible Electronics
ETS-Lindgren
Vican Electronics
Visteon
ANAB
ISED Canada
Apple
ETS-Lindgren
Keysight
Liberty Labs Asia
TUV Sud America
FDA Center for Devices & Radiological Health
PCTEST

Employer:

Element Materials Technology
Schaefer Associates
DHS
Laird Technologies
Spectrum EMC Consulting, LLC

Employer:

ElectroMagnetic Investigations
NIST
SSC Labs
TUV Rheinland
TUV Rheinland
ARRL
TCB Council
NASA/JSC
ARC Technical Resources
Washington Labs
CTTL
Motorola Solutions

1.0 Call to Order—Chair

1.1 Opening Remarks and Announcements: Chair

1.2 Meeting Logistics Announcements: Host

1.3 Introductions: Secretary

Chair Zhong Chen called the meeting to order at 3:00 pm. A round of introductions was made.

2.0 Approval of the Meeting Agenda and SC1 Scope: Chair

Zhong Chen presented the draft agenda for the May 2, 2019 meeting for review. The Scope of SC1 was revised. The topic “Transitional Period in ANSI C63 Standards” was added as Item 7.3 to New Business. **Don Heirman moved to approve the agenda as amended. The motion was seconded and approved.** (See Attachment A for the amended version of the agenda.)

3.0 Presentation of [patent slides](#): Chair

Zhong Chen gave a presentation to review the status of the meeting fees, the ANSI policy related to Intellectual Property (IP), inappropriate topics for IEEE working group meetings and the working group meeting slide template. (See Attachment B.) **Mr. Chen moved to confirm everyone present agreed to abide by the procedures outlined in the patent slides. The motion was seconded. All confirmed compliance.**

4.0 Approval of Minutes of Previous Meeting: Secretary

Secretary Janet O’Neil presented the minutes of the November 29, 2018 meeting held at NIST in Boulder, Colorado. There was one change to show the affiliation of Harry Hodes as Bay Area Compliance Labs. **Jeff Silberberg moved to approve the November 29 minutes with this amendment. The motion was seconded and approved.** The approved minutes are included in Attachment C.

5.0 Review of [Subcommittee Membership](#): Secretary

5.1 Review of membership – Members at risk. Janet O’Neil advised that Werner Schaefer’s membership is at risk since he has missed four consecutive meetings. He was contacted and advised he will attend the next meeting in November in Santa Rosa. The Chair noted Mr. Schaefer should remain as a member based on attendance at the November 2019 meeting. (See the Member Attendance Log included in Attachment A for the updated membership tracking record.) It was noted Grace Lin’s application to join the C63.4 working group was approved in April by the SC1 committee. Bob Hofmann was removed from the roster as an Honorary Member. Mike Antola requested his affiliation be changed from Honeywell to Resideo. (See Attachment D for the updated SC1 membership roster.)

5.2 Consideration of New Members – Working Group Rosters

The secretary noted that no new member applications have been received. She then reviewed the roster of working group members as shown on the C63 website. Some revisions were made. (See Attachment E for the updated roster of SC1 working groups.)

ACTION ITEM: All working group Chairs need to complete their rosters and indicate their officers (Vice-Chair and Secretary) and submit to SC1 Chair prior to the next meeting (November 2019).

6.0 Working Group Reports

C63.4: Emissions Measurements

Working Group Chair: Don Heirman

Status: C63.4: Current-2014. New PINS approved by WG, SC1 and C63 in Nov. 2017

Status: C63.4a: Published-2017. C63.4a amendment to C63.4-2014

Don Heirman presented his report. (See Attachment F.) He noted 44 people attended the three hour working group meeting held on Tuesday, April 30.

As a bit of background, at the November 2016 WG meeting, three teams were formed for amending certain clauses in C63.4-2014:

- Team 1 (Clauses 1 to 5) - Heirman leader
- Team 2 (Clauses 6 to 11) - Popovici leader
- Team 3 (Clauses 12 & annexes) - Harrington leader

The working group reviewed the standard to make sure that “shall” applied to requirements and that “should” is only for informative statements. This clarified the normative and informative aspects of the standard in all clauses in the standard now and being amended. The PINS was approved in November 2017.

The working group will continue its aggressive schedule and work by holding monthly webinars. In addition, teams will hold webinars approximately monthly. They have maintained a sequence of team and full working group webinars (roughly one week apart). A “master” document has been created so that all teams see the entire document in case changes also apply to other parts of the work. They have resolved the vast majority of major areas in standard and are synchronizing the new edition of C63.5 and C63.25.1 where possible noting that there are specific requirements in C63.4 as they apply to current emission measurement activity. Presently they are close to over 98 percent completed.

Highlights of the working group meeting discussion included:

- Clarified meaning of modal verbs (e.g. *shall*, *should*, *can*, *may*) and correction of their use
- Removed qualitative terms such as “small”, “large”, etc to be sure that requirements are clear
- Added normative tolerances on dimensional specifications (1.4 and Annex C)
- Updated LISN calibration requirements: addition of phase requirements and updated magnitude requirements for the LISN impedance and removal of the requirements to calibrate the LISN with the extension cord, when used (4.3 and Annex B)
- Reformatted the antenna tables (4.5.1) into more readable and frequency specific use tables
- Updated normative references to their latest editions, including ANSI C63.5, C63.2, and all CISPR references (clause 2) with non-C63 standards being dated.

- Clarified use and placement of the vertical coupling plane for conducted emissions on tabletop, floor-standing, and combination equipment (5.2.3, 6.4, and 7.3.1)
- Removed the site validation option consisting in temporarily placing absorbers on the ground plane in a specific array without application of any site validation criteria. All test sites for radiated measurements above 1 GHz must now meet the S_{VSWR} requirements up to 18 GHz (5.5)—Including C63.25.1 to allow Time Domain approach
- Added clear requirements for EUT cable termination and cable type (6.2.4.2 and 6.2.4.3[HP1])
- Added requirements for pole-mounted EUT (6.3.6)
- Updated requirements for EUT arrangement for radiated emissions to account for large systems, with multiple units. The EUT arrangement must be centered onto the turntable (6.3)
- Clarified how the radiated emissions measurement distance is defined, including clear definition of the antenna reference point and boundary of the EUT. Added restrictions on possible measurement distances (minimum and maximum), for each frequency range (8.2)
- Updated test method for radiated emissions above 1 GHz to account for the antenna beam-width relative to the EUT arrangement's width and height (8.2.5]
- Added requirements for testing EUT with HDMI input (12.2) and HDMI output (12.3[HP2])
- Replaced Annex D (NSA) with the new Annex D from ANSI C63.4a-2017, with small modifications, such as clarification of the antenna height-scan step size, and addition of website link to utility spreadsheet for calculating theoretical NSA values for an ideal site (Annex D)
- Updated guidelines on radiated emissions maximization procedures to support reduced test time (Annex E)

Don noted the working group held focused discussion on two key areas: the “loop back” cable arrangement needed for various applications and the 2 dB rule to reduce the test time. Both of these subjects are in previous editions of C63.4.

Regarding the “loop back” cable arrangement, the discussion specifically addressed three applications as follows. Note there are drawings showing these test setups in the report (Attachment F); Harry Hodes commented that the “loop back cable arrangement” shown on slide 10 of the report needs a Styrofoam block.

1. Single drawer mounted in a rack on a tabletop with multiple plug-ins with cabling normally to another piece of equipment or to a remotely located drawer.
2. Multiple drawers mounted in a rack on a tabletop with multiple plug-ins with cabling normally to another piece of equipment or to a remotely located drawer.
3. Multiple overhead cabling from terminations on a floor-standing frame with similar or identical ports normally connected to another frame or remote frame.

Regarding the 2 dB rule, Don noted the original approach was to “clarify” what is in C63.4-2014 where use was a requirement. The working group discussed two options:

1. Fully populating EUT with plugs-ins and attached cabling to other devices and calling that “worst case” giving the highest emissions
2. If not fully populating, use a variant of the 2 dB rule adding cabling and plug-ins in an orderly manner to find the maximum emissions

The working group proposed that the manufacturer would indicate via preliminary testing the cable and plug-in configuration that should maximize emissions and then have performed a compliance test in a qualified test lab – OR – the manufacturer requests a test lab perform the test per the standard.

In summarizing the working group activity, Don reiterated that the document is estimated at 98% completion. On the timeline, the next working group meeting is on May 30, 2019. An updated draft will be provided to SC1 with a request to review and comment later this summer. They will request C63 go to ballot in early October, with resolution of comments expected in November. The target time for publication is by the end of 2019 or early 2020.

ACTION ITEM: Don Heirman to send the current draft of C63.4 to SC1 as soon as possible for review with comments due to Don Heirman within 30 days of distribution.

C63.5: Antenna Calibration

Working Group Chair: Doug Kramer

Status: Current-2006. Public notice appeared in ANSI Standards Action; publication delayed, expected by end of May 2017

Doug Kramer presented his report. (See Attachment G.) The working group meeting on April 30, 2019 included four members on line and six members in the meeting room with two observers (Yufei Xiong and Dheena Moongilan). The working group roster was updated to remove Mike Howard; Allen Crumm will send an email to Werner Schaefer, Greg Kiemel, and Dan Sigouin to confirm they are still interested in participating.

Due to the outstanding effort of Bob DeLisi, the corrigendum was published. Now work will focus on the next edition in defining requirements for sites, clarifying time gating in Annex K, addressing loops, and performing a general clean up/editing of the document. The goal is to send an updated draft to the working group to review by the end of November 2019.

Harry Hodes requested that a discussion of VSWR measurements of antennas is included in the next edition of C63.5.

ACTION ITEM: Kramer to send an updated draft of C63.5 to the working group by the end of November 2019.

ACTION ITEM: Crumm to confirm Werner Schaefer, Greg Kiemel, and Dan Sigouin are still interested in participating in the C63.5 working group.

ACTION ITEM: Parent Committee Chair (Hoolihan) to circulate the draft C63 schedule to the working group chairs for review and comment prior to publishing the schedule on the C63 website. (This came up to avoid scheduling the C63.4 working group meeting at the same time as the C63.5 working group meeting.)

C63.22-2004: Guide for Automated EMI Measurements

This document is current and there are no plans for maintenance at this time. It was suggested that IEEE confirm the status of this document.

ACTION ITEM: Don Heirman to check with Jennifer Santulli of IEEE to confirm the status of this document.

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

Working Group Chair: Jason Nixon

It was noted that the parent committee reaffirmed this document at the May 2018 meeting. Reaffirmation at the IEEE level is ongoing as of April 2019. Harry Hodes questioned why this is taking so long at IEEE.

ACTION ITEM: IEEE (Jennifer Santulli) to provide update on reaffirmation of C63.23 at the November 2019 SC1 meeting.

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

Zhong Chen presented in the absence of Dan Sigouin. (See Attachment H.) Neither the chair (Dan Sigouin) nor vice-chair (Greg Kiemel) could attend the working group meeting. Zhong acted as chair with Doug Kramer assisting as secretary. There was an ad hoc meeting of the working group on April 30, 2019. Thirteen working group members attended the meeting as shown in the report. Zhong summarized the activity. This addresses the family of C63.25 standards, including:

- C63.25.1 (1 GHz to 18 GHz) TDR
- C63.25.2 (30 MHz to 1000 MHz) "NSA"
- C63.25.3 (>18 GHz)
- C63.25.4 (<30 MHz)
- C63.25.2 (30 MHz to 1000 MHz) PINS is current
- C63.25.1 published in March 2019 (C63.25.1-2018)

Zhong congratulated Dan Sigouin and the working group members on the publication of C63.25.1-2018.

Regarding C63.25.2 on site validation 30 MHz to 1000 MHz, the working group is addressing the C63.4/C63.4a test procedure with a height above 2 meters. On C63.5 (antenna calibrations for site validations), the working group will simplify the process to two methods for bicon antennas – numerical NSA and measurement site-to-site comparison.

Regarding C63.23.3 (>18 GHz) a new PINS-C was discussed. This addresses testing and calibration requirements that are extending beyond 18 GHz. There is no present document that defines site validation techniques. This effort will provide methods for the site validation process extending beyond 18 GHz, at least to 40 GHz. In addition, the PINS-C scope of work includes:

- Extending current TDR methods in C63.25.1 to above 18 GHz
- Examination of antenna pattern influences on the site validation
- Examination of other possible alternatives (free space VSWR, dipole and loop antennas)
- How to evaluate accessories in the test environment (towers, tables, other structures)

- Considerations for antenna calibration sites

Zhong moved to approve a new PINS-C for ANSI C63.25.3 to address this scope of work. (See Attachment I for the PINS-C on ANSI C63.25.3) The motion was seconded and approved. Harry Hodes voted against the motion.

Harry Hodes volunteered to help enlist working group members to support the new work described in Zhong’s presentation.

7.0 Old Business – Chair - There was no old business to discuss.

8.0 New Business – Chair

8.1 Discussion on Synchronizing Site Validation Requirements for C63.4, C63.5, C63.25.1, and C63.25.2 – This was presented as a request for consideration by the working group chairs.

8.2 Coordination with SC3 for Harmonization – The Chair noted that before any working group draft may be submitted to the SC1 for approval, the document must be provided to the SC3 Chair for evaluation and coordination of any harmonization effort. Doug Kramer requested that anyone who has comments on these CISPR document comparisons to the ANSI C63 equivalents to contact him. See the table below for updated activity:

Reviewer Actions

RA #	Task	Responsible party	Due Date	Status
RA-1	Compare C63.2 to CISPR 16-1-1	Harry Hodes	5/1/19	Closed per Harry Hodes
RA-2	Compare C63.4 to CISPR 16-2-X	Don Heirman	5/1/19	Open
RA-3	Compare C63.4 to CISPR 16-1-4	Don Heirman	5/1/19	Open
RA-5	Compare C63.5 to CISPR 16-1-6	Nate Potts	5/1/19	Open
RA-6	Compare C63.5 to SAE ARP 958 Rev D	Doug Kramer	5/1/19	Submitted
RA-7	Compare C63.5 to CISPR 16-1-4	Doug Kramer	5/1/19	Submitted
RA-14	Compare C63.23 to CISPR 16-4-2	Bob DeLisi	5/1/19	Open Record that if all the measurement uncertainty terms in the test procedure are not in CISPR 16-4-2, no MU can be calculated and hence MU does not apply, i.e. Ucispr cannot be fully computed to come up with the MU
RA-17	Compare C63.25 to CISPR 16-1-4 (two freq. ranges under C63.25.1 and C63.25.2)	Doug Kramer	5/1/19	Open

ACTION ITEM: Don Heirman to contact Horia for data to close RA-2 and RA-3.

ACTION ITEM: SC1 Members to contact Doug Kramer if they have comments on the CISPR document comparisons to the ANSI C63 equivalent standards.

8.3 Transition Period Discussion for ANSI C63 Standards

Harry Hodes suggested adding a paragraph to each standard that address transition periods since C63 standards contain undated references. The Chair agreed to take this matter to the parent committee for discussion since it involves all ANSI C63 standards, i.e. not just those in SC1.

ACTION ITEM: Dan Hoolihan to request C63 parent committee address transition periods in all C63 standards.

9.0 Review of Interpretation Requests: Zhong Chen reviewed the following open interpretation requests since the last meeting on November 29, 2018. Note Interpretation Requests have been suspended by the parent committee; however, it was requested these requests below remain on the agenda for now.

- a) **C63.4 (2014) “D3 NSA Vertical 3 Meters”** from Charles Wang, request dated 8-29-17. Subgroup members confirmed at the meeting included Don Heirman (chair) and Khairul Zainal. No update was provided. **ACTION ITEM: Don Heirman to follow up on this with Khairul Zainal.**
- b) **C63.4 (2014) Annex N.1 Antenna Symmetry** from Alexander Kriz, request dated 11-14-2017. Subgroup members include Zimmerman (chair), Heirman, Sigouin, DeLisi, Dickten, Potts, Waitt, Schaefer, Kuczynski, Hodes, and Chen. The response was circulated to SC1 on April 24, 2019. **It was moved and approved to send the response to the parent committee for further action. ACTION ITEM: Dan Hoolihan to obtain approval on the response from parent committee.**
- c) **C63.4 (2014) Annex N vs. C63.5 re Symmetry** from Nate Potts, request dated 3-7-2018. Subgroup members include DeLisi (chair), Harrington, Heirman, Hodes, Potts, W. Schaefer, and Zimmerman. The response was circulated to SC1 on April 24, 2019. **It was moved and approved to send the response to the parent committee for further action. ACTION ITEM: Dan Hoolihan to obtain approval on the response from parent committee.**

[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.

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

Jerry Ramie requested members be specific with any requests for postings to the website. He asked members to be sure to update or confirm they are correctly listed on the website.

11.0 Review of the 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 2, 2019 meeting to the committee.

12.0 Time and Place of Next Meeting: Chair

Zhong Chen noted the next series of C63® meetings would be held over November 18-21, 2019 at Keysight Technologies in Santa Rosa, CA. The SC1 meeting will be held on Wednesday, November 20, 2019.

13.0 Closing Remarks and Adjournment: Chair

With no further business, Zhong Chen adjourned the meeting at 5:30 pm. He thanked everyone for attending the meeting.

Minutes submitted by:



Janet O'Neil
Secretary, SC1

ATTACHMENTS

- Attachment A: Approved agenda for May 2, 2019 SC1 Meeting
- Attachment B: Patent Slides Required Meeting Template Slides for ASC C63®, IP Info
- Attachment C: Approved Minutes from November 29, 2018 SC1 Meeting
- Attachment D: SC1 Membership Roster
- Attachment E: SC1 Working Group Roster
- Attachment F: Heirman Report on C63.4 and C63.4a
- Attachment G: Kramer Report on C63.5
- Attachment H: Sigouin Report on C63.25 standards series
- Attachment I: PINS-C on ANSI C63.25.3