Update on the Telecom Certification Body (TCB) Council Activity and ANSI Standards for testing Unlicensed Wireless Devices (ANSI C63.10) and Licensed Wireless Devices (ANSI C63.26)

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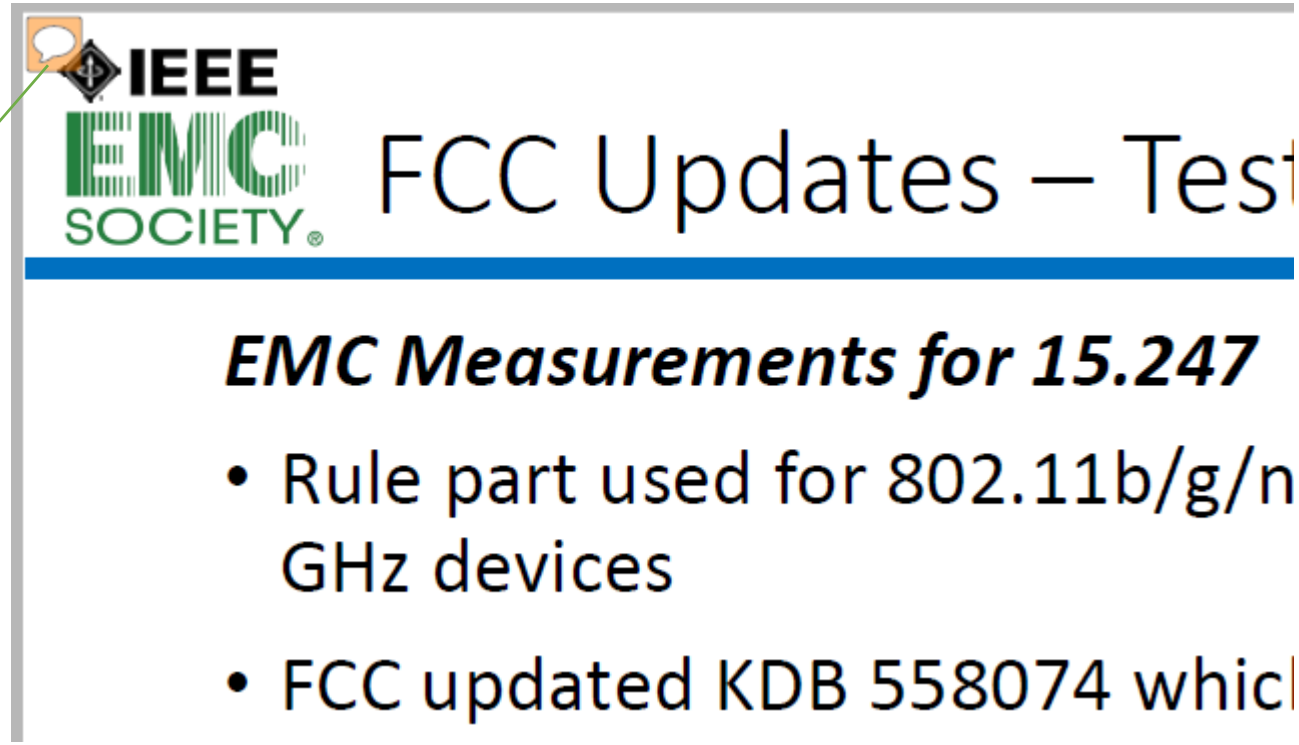
See this on a slide – mouse over to see comments



TCBC Workshop

- Held twice a year in Baltimore, MD
- Features presentations by/on:
  - NIST on status of current and future Mutual Recognition Agreements
  - Innovation, Science and Economic Development Canada (ISED)
    - Certification issues
    - Recently released and proposed revisions to Radio (RSS) and EMC (ICES) standards, certification procedures (RSPs)
    - Guidance on implementation of lab recognition programs
  - Federal Communications Commission (FCC)
    - Common certification issues
    - Recently released and proposed revisions Knowledge DataBase (KDB) publications and FCC rules
  - New technology and regulatory approvals, Global Market Access

Canada Updates – Lab Recognition

- In 2017 ISED announced major change to lab recognition
- Applies to all labs performing testing to support certification
- Previously facilities were listed for each OATS / Chamber
  - Only needed to show site(s) met NSA/sVSWR requirements for radiated emissions
  - Recognition under this scheme will expire March 14th 2019
- Starting **March 15th 2019** the test facility **must** be accredited
  - Scope to cover standards used, such as RSS 1xx and ANSI C63.26: 2017 / RSS 2xx and ANSI C63.10:2013, RF exposure (SAR, MPE and Nerve Stimulation)

Canada Updates – Lab Recognition

- Labs need to be working with their Accrediting Bodies (ABs) and Designating Authority **NOW** to make sure they will be registered correctly and on time
- Labs located in a country with MRA with Canada
  - AB located in MRA country, designated by MRA authority (NIST for USA)
- Labs in a country without MRA with Canada must use specific ABs
  http://www.ic.gc.ca/eic/site/mra-arm.nsf/eng/nj00157.html
- Accreditation to ISO/IEC 17025:2005 is acceptable until November 2020
  - Latest version is ISO/IEC 17025:2017

Canada Updates – Lab Recognition

- REC-LAB — Procedure for the Recognition of Foreign Testing Laboratories for detailed information (DES-LAB for Canadian Labs).
- US labs seeking ISED recognition must:
  1. Be assessed by a NIST-listed accreditation body

  and

  2. Apply to NIST for designation to ISED
- Recognition is valid until your 17025 accreditation expires
  - If you have your 17025 re-assessment due before the end of the year suggest you wait until your certificate has been renewed before applying to get maximum
  - If not – apply now and renew your recognition as soon as you complete your reassessment
  - DO NOT LEAVE this to the last minute
  - Check your scope of recognition on the ISED site

Canada Updates – Standards

- Recognized labs will be listed on ISED's Website – EMC + RF exposure

Organization	CAB identifier	Recognition Date (mm/dd/yyyy)	Scope of Recognition	Expiration Date (mm/dd/yyyy)
ULTRATECH ENGINEERING LABS INC. 3000 Bristol Circle Oakville, ON, L6H 6G4 CANADA Website: http://www.ultratech-labs.com/ Contact: Mike Tom mike@ultratech-labs.com	CA0001	09/20/2018	RSS-102	10/08/2019
		09/20/2018	RSS-GEN	
		09/20/2018	RSS-111	
		09/20/2018	RSS-112	
		09/20/2018	RSS-117	
		09/20/2018	RSS-119	
		09/20/2018	RSS-123	
		09/20/2018	RSS-127	
		09/20/2018	RSS-131	
		09/20/2018	RSS-132	
		09/20/2018	RSS-133	
		09/20/2018	RSS-134	
		09/20/2018	RSS-135	
		09/20/2018	RSS-137	
		09/20/2018	RSS-139	
		09/20/2018	RSS-141	
		09/20/2018	RSS-142	
		09/20/2018	RSS-170	
		09/20/2018	RSS-181	
		09/20/2018	RSS-182	
		09/20/2018	RSS-191	
		09/20/2018	RSS-192	
		09/20/2018	RSS-194	
		09/20/2018	RSS-195	
		09/20/2018	RSS-196	
		09/20/2018	RSS-197	
		09/20/2018	RSS-199	
		09/20/2018	RSS-210	
		09/20/2018	RSS-211	
		09/20/2018	RSS-213	
		09/20/2018	RSS-215	
		09/20/2018	RSS-216	
		09/20/2018	RSS-220	
		09/20/2018	RSS-222	
		09/20/2018	RSS-236	
		09/20/2018	RSS-238	
		09/20/2018	RSS-243	
		09/20/2018	RSS-244	
		09/20/2018	RSS-247	
		09/20/2018	RSS-251	
		09/20/2018	RSS-287	
		09/20/2018	RSS-288	

Canada Updates – Standards

- Recognized labs will be listed on ISED's Website – RF Exposure

Organization	CAB identifier	Recognition Date (mm/dd/yyyy)	Scope of Recognition	Expiration Date (mm/dd/yyyy)
RF EXPOSURE LAB, LLC 802 N. Twin Oaks Valley Road Suite 105, San Marcos, CA United States Site web: http://rfexposurelab.com/ Contact: Jay Moulton jmmoulton@rfexposurelab.com	US0194	10/15/2018	RSS-102	11/30/2019

FCC Updates

- Equipment Authorization System (EAS) Overhaul
- Product Labeling
- PAG List
- Test Procedures
  - Part 30 (mmWave) and Part 95M (Radar) Test Procedure
  - EMC Measurements for 802.11ax
  - FCC Part 15.247 Digital Transmission and Frequency Hopping Systems
  - CBSD (Part 96 / band 48)
- New Spectrum Allocations
- Modular approval

FCC Updates

- FCC – RF Exposure
  - Averaging area for power density
  - Averaging time
  - Sensor Array Systems
  - mmWave Measurements
  - LTE SAR – Carrier Aggregation
  - Power Reduction Mechanisms – Dynamic Time Averaging
  - Wireless Power Transfer (WPT)

FCC Updates – Test Procedures

Part 30 (mmWave) and Part 95M (Radar) test Procedures)

- ANSI C63.26 working on test methods for the total radiated power requirements of Part 30 (more later)
- Challenges associated with measurements of FMCW radar - KDB to be released soon.

FCC Updates – Test Procedures

EMC Measurements for 802.11ax

- PSD and power measurements to be made on:
  - Fully loaded channel
  - Partially loaded channel (2 contiguous RUs at center of the channel)
  - Partially loaded channel (non-contiguous RUs at either end of the channel)
- Test band edges for both Fully Loaded and Partially Loaded channels
  - For partially loaded case the PSD measurements should show worst case for contiguous versus non-contiguous RU allocation
- If the partially loaded PSD is the same or lower than the fully loaded PSD then all remaining measurements can be made on the fully loaded RU allocation, otherwise both need to be verified.

FCC Updates – Test Procedures

EMC Measurements for 15.247

- Rule part used for 802.11b/g/n/ax, Bluetooth, Zigbee and many other 2.4 GHz devices
- FCC updated KDB 558074 which previously just covered DTS devices to cover both DTS and FHSS devices.
- Included in this revision is the procedures described in April's workshop to address the average measurement for spurious emissions when a device operates with a firmware or protocol limited duty cycle.
- For FHSS systems the KDB points to ANSI C63.10:2013.
  - FCC provided clear notice after the workshop that DA 00-705 must no longer be used
  - Allowed use of dwell time per channel to determine average value

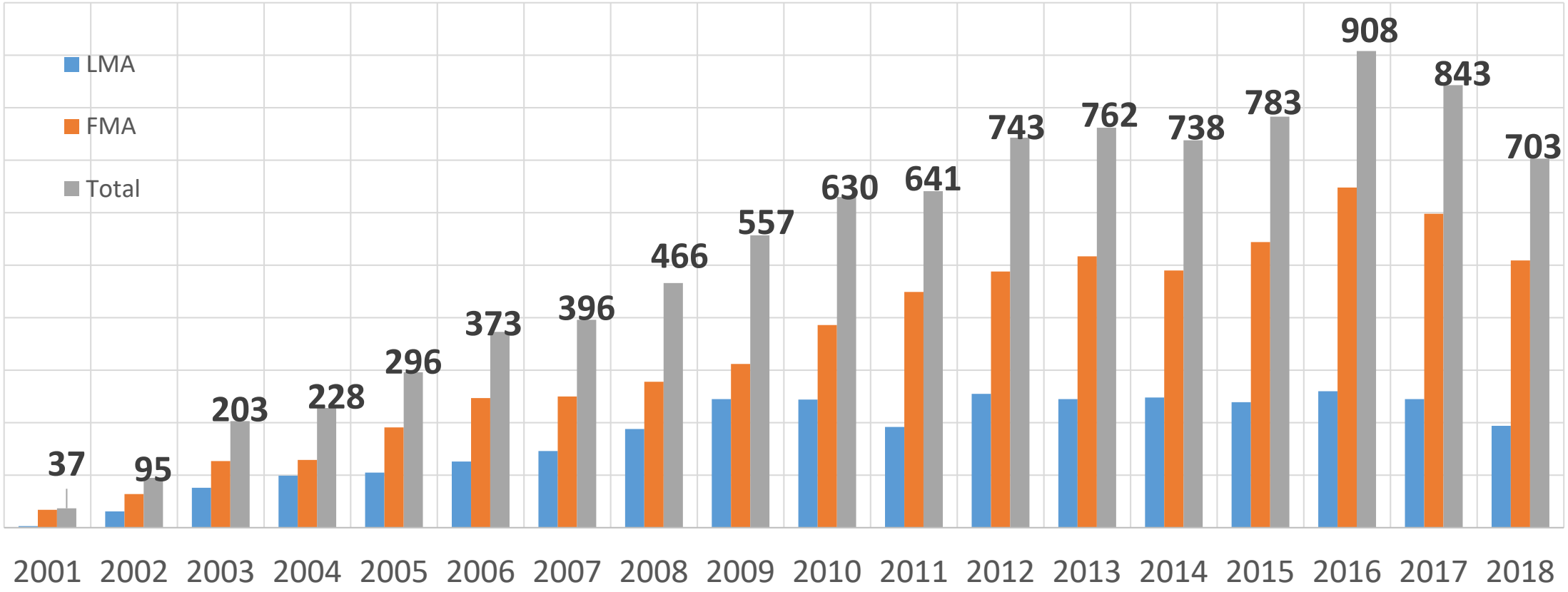
FCC Updates – Modular Approval

- FCC introduced the approval for transmitter modules around 2001
- Host devices do not require separate certification – module certification is leveraged
- Was not intended to remove the need to verify compliance of combination host + module
- FCC had concerns that modular approval was being misused
  - Non compliant systems

Host manufacturers should not assume that since the module is certified that they do not have any responsibility for final product compliance.

FCC Updates – Modular Approval

Modular Approvals By Year



FCC Updates – Modular Approval

- TCB Council-FCC open panel discussion in Spring 2017
  - TCB Council's Modular Approval Committee
  - Created a list of recommendations for improving the modular KDB guidance
  - Finalized Summer 2018
- In response FCC released two draft KDBs to the FCC KDB site.
  - Note the two draft KDBs are combined into a single document
- FCC are accepting comments on these documents to the FCC until November 2, 2018.

FCC Updates – Modular Approval

- **KDB 996369 D03 OEM Manual**
  - Guidance for instructions provided to host manufacturer.
  - Integration instructions to be provided by a grantee (applicant) to the host manufacturer.
  - Key elements to be reviewed by the TCB during the certification process.
  - Guidance on grant comments to be included on the grant of certification.

- **KDB 996369 D04 Host**
  - Guidance to host manufacturers for integrating modules into their products.
  - 10 steps a host manufacturers should address when using certified modules.
  - Composite Testing Guidance
  - Test laboratory notes

ANSI C63.10, ANSI C63.26 and KDBs

Regulatory testing methods and procedures for wireless devices

ANSI C63.10:2013

- ANSI C63.10 was sponsored by the TCB Council
- Consolidate guidance from FCC and ISED Canada related to testing of unlicensed radio transmitter devices
  - RSS 2xx
  - FCC Part 15
- ANSI C63.4 remains the standard for testing unintentional radiators, including receivers
- First edition published in 2009, second edition in 2013!
  - Third edition in 2019??

Adoption of ANSI C63.10

- Canada
  - Adopted through RSS GEN Section 5

    The methods in ANSI C63.26, *American National Standard of Procedures for Compliance Testing of Licensed Transmitters*, and **ANSI C63.10**, *American National Standard for Testing Unlicensed Wireless Devices*, shall be used for measurement methods applicable to licensed and licence-exempt radio apparatus, respectively.
- FCC
  - Adopted in Part 15 of FCC rules

    §15.31 Measurement standards.

    (a) The following measurement procedures are used by the Commission to determine compliance …

    (3) Other intentional radiators are to be measured for compliance using the following procedure: ANSI C63.10-2013 (incorporated by reference, see §15.38).

ANSI C63.26 Edition 3 in Progress

- Routine maintenance
  - Update references as ISED/FCC rules have changed
- Address new(er) technologies
  - TV White Space Devices
  - Devices equipped with wireless power transfer (WPT) functionality
- Add measurement uncertainty (C63.23)
- Add dimensional tolerances

ANSI C63.26 Edition 3 in Progress

- Dimensional tolerances

Table Clause	Element	Spacing/ Distances	Tolerance	Measurement
6.3.2.3 Figure 7,8,10	Spacing between any two elements on the EUT support table.	10 cm	± 1.0 cm	Conducted and Radiated
6.3.3.3, 6.3.4.3 Figure 14	Spacing between any two elements where one or more of the elements are not on a table-top	Typical	n/a	Conducted and Radiated
Figure 12	Minimum distance between the rack (or cabinet) which contains the EUT and the vertically rising cabling which would normally leave the EUT rack (or cabinet)	≥ 20 cm	*	Conducted and Radiated
5.2.2	Reference ground plane	≥ 2 m × 2 m and extend ≥ 0.5 m beyond footprint of EUT arrangement	–*	Conducted
5.2.3 Figure 7	Vertical Conducting Plane to rear of EUT/AE/support table In case of protruding connectors on the rear face of the EUT/AE, the separation distance requirement applies for the rear face of the EUT/AE, not considering the protruding connector/cable end.	40 cm	± 1.0 cm	Conducted
5.2.3	Vertical Conducting Plane size	≥ (2 m × 2 m)	*	Conducted
7.3.1, Figure 8	Spacing between LISN and EUT	≥ 80 cm	*	Conducted

ANSI C63.26:2015

- Following the lead of ANSI C63.10
  - Consolidate guidance from FCC and ISED Canada related to testing of licensed devices
    - RSS 1xx
    - FCC Parts 22, 24, 27, 30, 90 etc.
  - Address test methods for wideband, digital modulation
    - TIA 603 did not cover this

- First edition published in 2015!

Adoption of ANSI C63.26:2015

- Canada
  - Adopted through RSS GEN Section 5
    - The methods in ANSI C63.26, *American National Standard of Procedures for Compliance Testing of Licensed Transmitters*, and ANSI C63.10, *American National Standard for Testing Unlicensed Wireless Devices*, shall be used for measurement methods applicable to licensed and licence-exempt radio apparatus, respectively.
- FCC
  - Adopted in Part 2 of FCC rules after R&O published November 2017
    - *2.910(c)(3) ANSI C63.26-2015, "American National Standard of Procedures for Compliance Testing of Transmitters Used in Licensed Radio Services," ANSI approved December 11, 2015, IBR approved for §2.1041(b).*
    - *§2.1041 (b) For equipment operating in the authorized radio services, measurements are required as specified in §§2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057. The measurement procedures in ANSI C63.26-2015 (incorporated by reference, see §2.910) are acceptable for performing compliance measurements for equipment types covered by the measurement standard. See also §2.947 for acceptable measurement procedures.*

ANSI C63.26 Edition 2 (what, already!?)

- The ink had barely dried and revision 2 was already being worked on
- mmWave Task Group
  - Concentrating on 28-30 GHz frequency ranges for new 5G bands
  - EIRP and Total Radiated Power (TRP) measurement methods
    - Unwanted (OOBE and Spurious) emissions limits

- Vehicular Radar Task Group
  - Guidance for compliance measurements on FMCW vehicular radars
  - 76-81 GHz and FCC Part 95, Subpart M rules.
  - This frequency band is harmonized for use in North America and Europe

    Attempting to harmonize the measurement methodologies to the maximum extent possible

ANSI C63.26 Edition 2 (what, already!?)

- Massive MIMO Task Group
  - Measurements on systems with large array antennae (> 128 individual elements)
- Carrier Aggregation / multi-channel
  - Guidance on test cases
- Signal Booster Task Group
  - Guidance for multi-enclosure boosters.
- Routine maintenance

ANSI C63.10/.26, FCC KDBs and Test Sites

9 kHz to 30 MHz C63.10 Sections 5.2 and 6.4

- Site: Open field site with no ground plane
  - Can be done on an equivalent site – FCC KDB for “equivalent”
- Measurement antenna: Calibrated loop described in section 4.3.2 and Table 1
- Test distance –rules specify measurement distances of 30m up to 300m (impractical)
- Measurements at shorter distances with extrapolation
  - FCC rules specify $1/d^2$ ($40\log(d_{meas}/d_{limit})$)
  - ANSI C63.10 based on frequency (wavelength) and distance (near/far field)
  - Both all factor to be based on measurements at multiple distances

ANSI C63.10/.26, FCC KDBs and Test Sites

30 MHz – 1GHz C63.10 Sections 5.2 and 6.5

- Site: Open Area Test Site or equivalent
  - C63.4 (C63.4a) and C63.7
- Measurement antenna options in 4.3.1 Table 1
  - Resonant tuned dipole (passive)
  - Biconical dipole (50 Ω or 200 Ω Balun)
  - Log-periodic dipole array (LPDA)
  - Hybrid (bicon/log)
    - *There are potential issues with the use of hybrid antennas; the use of other antennas in these frequency ranges may be advisable pending further guidance on the use of hybrid antennas.*
    - *Annex N of C63.4:2014 provides guidance*

ANSI C63.10/.26, FCC KDBs and Test Sites

30 MHz – 1GHz C63.10 Sections 5.2 and 6.5

- Test distance – rules typically specify measurement distance 3m. Measurements at shorter distances with extrapolation
  - Extrapolation factor is 1/d ($20\log(d_{meas}/d_{limit})$ – avoid near field

ANSI C63.10/.26, FCC KDBs and Test Sites

Above 1GHz C63.10 Sections 5.2 and 6.6

- Site: CISPR 16-1-4:2010
  - sVSWR up to 18GHz to cover testing to 40GHz
  - Above 40 GHz no site requirements - reflection contributions shall be reduced to the extent possible in consideration of practical limitations
- Measurement antenna options in 4.3.1 Table 1
  - Precision biconical dipole
  - Log-periodic dipole array (LPDA)
  - Hybrid (bicon/log)
  - Waveguide horn
  - Double-ridged guide horn (passive or active)

ANSI C63.10/.26, FCC KDBs and Test Sites

Above 1GHz C63.10 Sections 5.2 and 6.6

- Test distance – rules specify measurement distance 3m, measurements at shorter distances with extrapolation
  - Extrapolation factor is 1/d (20log(d_{meas}/d_{limi}mit) – avoid near field
- EUT height is 1.5m (0.8m for other frequency ranges)
- EUT support – non-conductive
- Annex E gives some guidance on instrumentation

ANSI C63.10/.26, FCC KDBs and Test Sites

ANSI C63.26

- Measurement antennas follow ANSI C63.10
- Can use test sites qualified for ANSI C63.10
  - Must use these sites if doing direct field strength measurements
  - For Canada all radiated measurements must be made on test sites meeting the requirements of C63.10
- For substitution measurements can use any site
  - The substitution measurement should account for the site path loss
  - Caveat for Canada!

FCC KDB Guidance related to Test Sites

- KDB 300643 Part 15 Intentional and Unintentional Radiator measurement procedures
  - Points to C63.10 / C63.4
  - Provided transition periods from the 2009 versions to the 2013 / 2014 versions
- KDB 442401 Radiated emission measurements for licensed radio service equipment
  - References C63.26, ANSI/TIA 603-E and others
- KDB 460108 Loop Antennas for radiated emission below 30 MHz
- KDB 822428 Antenna Calibration Procedure, ANSI C63.5:2006
- KDB 971168 D01 Power Meas License Digital Systems v03r01
  - Cross references ANSI C63.26

FCC KDB Guidance related to Test Sites

KDB 414788 D01 Radiated Test Site v01r01

- Guidance of determining if a site is equivalent to the open field site for measurements below 30MHz
  - Compare measurements at the alternative test site to those obtained for the same device at an open-field test site.
  - Statistical analysis of the measurement data from several similar devices may be required to show correlation
  - Site comparison is valid for similar equipment at similar frequencies
    - Different frequencies / devices will need additional site qualification
  - Document evidence of correlation between the alternative site and an open-field test site
    - Make it available to the Commission upon request and for review during a laboratory accreditation assessment

FCC KDB Guidance related to Test Sites

KDB 414788 D01 Radiated Test Site v01r01

- References C63.4 and C63.10 for site validation for measurements 30MHz – 18GHz
- Use of TEM for ANSI C63.4 (unintentional radiators)
- COMPLIANCE TESTING EXPERIMENTAL LICENSE
  - Needed for radiated emissions measurements on open area sites
  - https://apps.fcc.gov/oetcf/els/forms/442Dashboard.cfm
  - https://apps.fcc.gov/edocs_public/attachmatch/DA-14-398A1.pdf

Questions?

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