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NIST HANDBOOK 150-11A CHECKLIST

ECT: FCC Parts 2, 15, and 18

(Based on the FCC Technical Assessment Evaluation Checklist - July 22, 2010)

Instructions to the Assessor: This checklist addresses specific criteria relating to accreditation of a laboratory to determine the capability and competence of that laboratory to perform tests to show compliance of equipment subject to the FCC EMC Regulations contained in 47 CFR Parts 2, 15, and 18. It is intended for use during the assessment phase of the accreditation process as a guide to evaluate the capability of the applicant laboratory facility and to determine the competency of the laboratory personnel for performing the required measurements. It is not intended to replace the good engineering judgment of the technical assessor or a thorough evaluation of the facility. Other points may and should be added to this checklist as the on-site assessment progresses.

Circle all items you observed and verified at the laboratory. Circle the letter "Y", representing "yes" to show conformance with the criteria. Circle the letter "N", representing "No", to show a nonconformity. If the item is "Not Applicable", circle "N/A". Record an explanation of any nonconformity or comment on the comment sheet provided at the end of the checklist.

I. DOCUMENTATION (The laboratory should have copies of appropriate FCC rules, standards and measurement methods based on its scope of accreditation.)			
Y	N	N/A	1. C63.4-2003: <i>American National Standard for Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.</i>
Y	N	N/A	2. ANSI C63.4-2009, <i>American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.</i>
Y	N	N/A	3. FCC MP-5-1986: <i>Methods of measurement of radio noise emissions from Industrial, Scientific and Medical (ISM) equipment.</i> <i>Note: This procedure is only required when the prospective testing laboratory is being accredited for measuring ISM equipment. The special conditions and requirements in MP-5 must be taken into consideration along with the specific requirements in 47 CFR Part 18, which do not always follow ANSI C63.4.</i>
Y	N	N/A	4. FCC Rules and Regulations, 47 CFR Parts 2, 15 and 18.

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II. MEASUREMENT INSTRUMENTATION			
Y	N	N/A	<p>5. Are 50 ohm /50 μH LISNs used per C63.4-2003, Clause 4.1.2 (C63.4-2009, Clause 4.3)?</p> <p><i>Note: See 47CFR 18.307 which bases measurements on the use of a 50 ohm /50 μH LISN.</i></p>
Y	N	N/A	<p>6. Is the insertion loss of the LISN taken into account when determining the test result? (C63.4-2003, Annex E/C63.4-2009, Annex B)</p>
Y	N	N/A	<p>7. Are the LISN impedance measurements made at the point where the Equipment Under Test (EUT) is connected to the LISN with 50 ohm termination on the instrumentation monitoring port?</p> <p><i>Note: Connection of the EUT to the LISN socket or at the end of an extension cord may make a difference in line conducted measurements. (C63.4-2003, Annex E/C63.4-2009, Annex B)</i></p>
Y	N	N/A	<p>8. Are all unused EUT ports on the LISN appropriately terminated? (C63.4-2003, Annex E/C63.4-2009, Annex B)</p>
Y	N	N/A	<p>9. Are the LISNs installed and used in accordance with C63.4-2003, Clauses 5, 6 and 7 (C63.4-2009, Clauses 5, 6 and 7) and MP-5?</p> <p><i>Note: The test personnel should be prepared to demonstrate how the LISNs are installed and used.</i></p>
Y	N	N/A	<p>10. Does each of the antennas used for compliance measurements comply with the criteria in C63.4-2003, Clause 4.1.5 (C63.4-2009, Clause 4.5) and MP-5?</p> <p><i>Note: Rod and log-spiral antennas are not permitted for FCC type measurements (47 CFR §15.31(a)(3)).</i></p>
Y	N	N/A	<p>11. Are the measurement antennas calibrated in accordance with ANSI C63.5? (C63.4-2003, Clause 4.1.5/C63.4-2009, Clause 4.7.2)</p> <p><i>Note: The calibration procedure outlined in ANSI C63.5-2006 is based solely on horizontally polarized measurements performed at a standard antenna calibration site, with a measurement distance of 10 meters. The FCC has stated that ANSI C63.5-2006 should be used to calibrate measurement antennas (KDB Publication 822428).</i></p>

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Y	N	N/A	<p>12. Are the measuring receiver(s) or spectrum analyzer(s) used for compliance measurements compliant with the requirements in C63.4-2003, Clause 4.1.1 (C63.4-2009, Clause 4.2)?</p> <p><i>Note: Part 15 requires the use of measuring equipment in compliance with CISPR Publication 16 (47 CFR §15.35). C63.4-2009 references the specification in C63.2 or CISPR 16-1-1:2007. C63.4-2009, Clause 4.2.2 contains significant information on using spectrum analyzers. Annex H: "Precautions in using spectrum analyzers" is also relevant.</i></p>
Y	N	N/A	<p>13. Is any measurement software used by the testing laboratory documented in the test report? (C63.4-2009, Clause 10.2.7)</p> <p><i>Note: The test personnel should be prepared to demonstrate any measurement software used including demonstration it is adequate for the measurement. When parameters are entered by the user of the test instrumentation, it is considered a data transfer and subject to appropriate checks, i.e., check that the correct calibration corrections factors are used and revision of entered parameters, calculations and logic are adequate and under revision control consistent with ISO/IEC 17025, Clause 4.3 and 5.4.7.2.</i></p>
Y	N	N/A	<p>14. Have the RF cables, RF switches, terminators, attenuators and pre-amplifiers been characterized in accordance with C63.4-2003, Clause 4.4.5 (C63.4-2009, Clause 4.7.5)?</p> <p><i>Note: The reference in C63.4-2009 provides guidance on the insertion loss of cables and the impact of their exposure to the environment, with specific guidance on addressing temperature variations.</i></p>
III. TEST FACILITIES			
A. Facilities for measuring power-line conducted emissions			
Y	N	N/A	<p>15. Are the power-line conducted ambient signal levels at least 6 dB below the limit per C63.4-2003, Clause 5.1.2 (C63.4-2009, Clause 5.1.2) or can it be demonstrated that the testing personnel are capable of using alternative methods provided in C63.4?</p>
Y	N	N/A	<p>16. Does each line conducted facility used by the testing laboratory comply with the conditions and requirements of C63.4-2003, Clause 5.2 (C63.4-2009, Clause 5.2) and MP-5 as appropriate? Is the LISN electrically bonded to the reference ground plane?</p>

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Y	N	N/A	<p>17. Is the vertical conducting plane, if used, installed and used in accordance with C63.4-2003, Clause 5.2.2 (C63.4-2009, Clause 5.2.2)? Is the vertical plane bonded (3 cm minimum strap width) properly to the horizontal reference ground plane (3 bonds minimum)?</p> <p><i>Note: The vertical conducting plane is optional in both editions of C63.4. Therefore the laboratory does not have to use it for table top products. However, in case of dispute, the test performed using a vertical conducting plane shall take precedence. This option was entered when conducted tests are performed at an open area test site with only a ground plane present and no conducting wall.</i></p>
<p>B. Facilities for measuring radiated emissions in the frequency range of 30 MHz to 1 GHz</p>			
Y	N	N/A	<p>18. For each type and size of EUT to be measured, does each radiated emission test facility comply with the conditions and requirements of C63.4-2003, Clause 5.4 (C63.4-2009, Clause 5.4.4 and Annex D)?</p>
Y	N	N/A	<p>19. Are LISN(s), filters, and isolation transformers, if used, installed in accordance with C63.4-2003, Clause 5.2.3 (C63.4-2009, Clause 5.2.3)? Is the LISN bonded to the ground reference plane?</p>
Y	N	N/A	<p>20. Is the reflecting ground plane in accordance with C63.4-2003, Clause 5.4.3 (C63.4-2009, Clause 5.4.3)?</p>
Y	N	N/A	<p>21. Is the EUT turntable installed and used in accordance with C63.4-2003, Clause 5.4.4 (C63.4-2009, Clause 5.1.3)?</p>
Y	N	N/A	<p>22. Is the antenna positioner installed in accordance with C63.4-2003, Clause 5.4.5 (C63.4-2009, Clause 5.1.5)?</p>
Y	N	N/A	<p>23. Does the radiated emission test site(s) meet the site validation requirements of C63.4-2003, Clause 5.4.6 (C63.4-2009, Clause 5.4.4) for the frequency range of 30 MHz to 1 GHz?</p> <p><i>Note: In C63.4-2009 detailed requirements for the site validation are contained in a new Annex D. In Clause 5.4.4 reference to ground plane mounted LISNs are presented and should be verified that such LISNs are in place when performing site validations. In addition, "Is the special cabling connected to the antenna used: if so, is that cabling also used while making emissions measurements?"</i></p>
Y	N	N/A	<p>24. Was the test site validation for performing radiated emissions measurements below 1 GHz completed in the last three years? (C63.4-2003 Clause 5.4.6.2 and C63.4-2009, Clause 5.4.4.2)</p>

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C. Facilities for measuring radiated emissions in the frequency range of 1 GHz to 40 GHz			
Y	N	N/A	<p>25. Has the sensitivity of the complete measurement system been determined and have any preamplifiers used to attain this sensitivity been checked to ensure that they do not cause distortion, spurious signals or overload (C63.4-2003, Clause 4.1.5.4/C63.4-2009, Clause 8.2.4)?</p> <p><i>Note: In Clause 4.1.5.4 of C63.4-2003, there is a requirement that the overall measurement sensitivity is at least 6 dB below the applicable limits at the measurement distance used.</i></p>
Y	N	N/A	<p>26. Are the beamwidths of the measurement antennas known so that the beamwidth versus size of the EUT can be taken into account (C63.4-2003, Clauses 4.1.5.4, 8.2.4 and 8.3.1.2/C63.4-2009, Clauses 4.5.4 and 8.2.4)? Has the antenna beamwidth been verified and then considered in making measurements over the full frequency range of the test?</p>
Y	N	N/A	<p>27. Does the EMI receiver or spectrum analyzer cover the required frequency range per the scope of accreditation for the measurements to be performed by the testing laboratory? (47 CFR §15.33/C63.4-2003, Clause 4.1.1/C63.4-2009, Clause 4.2)</p>
Y	N	N/A	<p>28. Does the radiated emission test site(s) meet the site validation requirements for measurements above 1 GHz? (C63.4-2003, Clause 5.5/C63.4-2009, Clause 5.5)</p> <p><i>Note: Site validation above 1 GHz includes that the site meets NSA below 1 GHz as required in both editions of C63.4. C63.4-2009 provides two options for test facilities used to make radiated emission measurements above 1 GHz, and clarifies that the use of RF absorbers on the top of the ground plane is permitted. (KDB Publication 704992)</i></p>
IV. EMISSION TESTS			
A. Power-line conducted emission tests			
Y	N	N/A	<p>29. Are the AC power-line conducted emission tests performed in accordance with the applicable parts of C63.4-2003, Clauses 6 and 7 (C63.4-2009, Clauses 6 and 7), and 47 CFR §§15.31-15.35 and 15.107?</p> <p><i>Note: The test personnel should be prepared to demonstrate how the power-line conducted emission measurements are performed.</i></p>

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Y	N	N/A	<p>30. Are the guidelines in ANSI C63.4 and MP-5 followed for large EUTs, including <i>in-situ</i> measurements, if appropriate? C63.4-2003, Clause 4.1.3 (C63.4-2009, Clause 4.4)?</p> <p><i>Note: Ask for a demonstration or description of how large EUTs are handled Ask the test personnel to explain what special measurements, test equipment and conditions are required when the power requirement is greater than the rated capacity of the LISN.</i></p>
Y	N	N/A	<p>31. Is the conducted emission test setup in accordance with C63.4 with the required separation between the EUT and any conducting surfaces maintained? (C63.4-2003, Clauses 6 and 7/C63.4-2009, Clauses 6 and 7)</p> <p><i>Note: (1) For a tabletop EUT, C63.4-2003 Figure 10a/C63.4-2009, Figure 7.</i></p> <p><i>(2) For a floor-standing EUT, C63.4-2003, Figure 10b/C63.4-2009, Figure 8.</i></p> <p><i>(3) For combination equipment, C63.4-2003, Figure 14/C63.4-2009, Figure 13.</i></p> <p><i>(4) For floor standing equipment interconnected via an overhead cable trays, C63.4-2003, Figures 12a and 12b/C63.4-2009, Figures 11 and 12.</i></p>
Y	N	N/A	<p>32. Is the conducted emission test performed on the AC cord supplying power to a common power strip, when the device has the power strip as part of the EUT which contains multiple power cords that use the power strip? (C63.4-2003, Clause 7.2.1/C63.4-2009, Clause 7.3.1)</p>
Y	N	N/A	<p>33. Is the excess power cord length between the EUT and the LISN folded back and forth in a bundle, located in the center of the power cord, not to exceed 40 cm? (C63.4-2003, Clause 7.2.1/C63.4-2009, Clause 7.3.1)</p>
Y	N	N/A	<p>34. Is the EUT connected to one LISN and all the peripherals connected to one or more LISNs or a power strip to one LISN? (C63.4-2003, Clause 7.2.1/C63.4-2009, Clause 7.3.1)</p>
Y	N	N/A	<p>35. Does the final conducted emission test represent the maximized cable configuration and worst case mode of EUT operation as based on the configuration from the exploratory tests? (C63.4-2003, Clause 7.2.4/C63.4-2009, Clause 7.3.4)</p>
Y	N	N/A	<p>36. For each type of EUT, are measurements made over the correct frequency ranges and the correct detectors and bandwidth as required by 47 CFR §§15.33, 15.35 and 18.309?</p>

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B. Radiated emission tests			
Y	N	N/A	37. Are the radiated emission tests performed in accordance with C63.4-2003 Clauses 6, 8, and 11 (C63.4-2009, Clauses 6, 8, and 11)? <i>Note: The test personnel should be prepared to demonstrate how the radiated emission measurements are performed.</i>
Y	N	N/A	38. Is the radiated emission test setup for an EUT with a video display in accordance with C63.4-2003, Clause 11.1.3/C63.4-2009, Clause 11.4 and Figure 15?
Y	N	N/A	39. Do the procedures for handling ambient emissions follow C63.4-2003, Clause 5.1.2 (C63.4-2009, Clause 5.1.2)?
Y	N	N/A	40. Are exploratory and final radiated measurements made in accordance with C63.4-2003, Clauses 8.3, and 11 (C63.4-2009, Clauses 8.3, and 11)? <i>Note: An informative annex is provided in C63.-2003, Annex C/C63.4-2009, Annex E – Method of exploratory radiated emission maximization.</i>
Y	N	N/A	41. Is the radiated emission test setup in accordance with C63.4-2003, Figures 11a (tabletop), 11b (floor standing), 14 (combination floor standing and tabletop), and 12a and 12b (floor standing interconnected via overhead cable trays/C63.4-2009, Figures 9 (tabletop), 10 (floor standing), 13 (combination table top and floor standing) and Figures 11 and 12 (floor standing interconnected via overhead cable trays).
Y	N	N/A	42. For Information Technology Equipment (ITE), is the EUT operated and tested in accordance with the procedures in C63.4-2003, Clause 11 (C63.4-2009, Clause 11)?
Y	N	N/A	43. Are unintentional radiators, other than ITE, tested in accordance with the requirements in 47 CFR §15.31 and the procedures in C63.4-2003, Clause 12 and Annex G (C63.4-2009, Clause 12) and MP-5?
Y	N	N/A	44. Are intentional radiators tested in accordance with the requirements in 47 CFR §15.31 and the procedures in C63.4-2003, Clause 13 and Annex H (C63.4-2009, Clause 13)?
Y	N	N/A	45. Does the radiated emission measurement represent the maximized cable configuration and worst case mode of EUT operation as based on exploratory testing configuration? (C63.4-2003, Clause 8.3.1.2/C63.4-2009, Clauses 8.3.2.1 and 8.3.2.2)
Y	N	N/A	46. For each type of EUT, are the correct frequency ranges investigated and the correct measurement detectors and bandwidth used per 47 CFR §§15.33 and 15.35?

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Y	N	N/A	47. For products in which the limits from CISPR 22 are used to demonstrate compliance with 47 CFR Part 15, are the measurements made in accordance with 47 CFR §15.109(g)? <i>Note: The test procedures in C63.4-2003 or C63.4-2009 shall be used to determine compliance to the radiated emission limits The EUT is required to comply with the FCC radiated emission limits above 1 GHz.</i>
Y	N	N/A	48. If the laboratory has a TEM waveguide, are the requirements followed in making radiated emission measurements using TEM waveguides? (C63.4-2003, Annex L/C63.4-2009, Annex F)
V. TEST REPORTS (<i>Assessor should request to review several sample test reports for various types of products.</i>)			
Y	N	N/A	49. Does each of the test reports contain all the required information and does the laboratory follow the report disposition procedure (C63.4-2003, Clauses 10.1 and 10.2/C63.4-2009, Clauses 10.2 and 10.3, and 47 CFR Part 2)?
Y	N	N/A	50. Does the test report reference the standard used (C63.4-2003, Clause 10.1.1/C63.4-2009, Clause 10.2.1 and FCC Public Notice DA 09-2478) and define any deviations (C63.4-2003, Clause 10.1.9/C63.4-2009, Clause 10.2.9 and FCC Public Notice DA 09-2478)?
Y	N	N/A	51. Is the rationale for selecting and arranging the EUT clearly stated and are the components of the EUT system clearly identified per C63.4-2003, Clause 10.1.2 (C63.4-2009, Clause 10.2.2)?
Y	N	N/A	52. Does the test report include photographs or detailed sketches of the EUT configuration per C63.4-2003, Clause 10.1.12 (C63.4-2009, Clause 10.2.12)?
Y	N	N/A	53. Does the measurement report include a sample calculation with all conversion and correction factors used? (C63.4-2003, Clauses 10.1.4, 10.1.5 and 10.1.8/C63.4-2009 Clauses 10.2.4, 10.2.5 and 10.2.8)
VI. PERSONNEL COMPETENCY (<i>The following is a list of general or lead-in questions, which are intended to be used as a guide to assess competency of laboratory personnel. Additional specific questions should be used to determine the technical competency of the personnel performing the measurement.</i>)			
Y	N	N/A	54. Are laboratory personnel able to obtain recent and appropriate interpretations of the FCC Rules?
Y	N	N/A	55. Do the test personnel know how to determine if an emission is from the EUT or is an ambient signal? Do the test personnel know how to handle an emission that is close to, or coincident with, an ambient signal? (C63.4-2003, Clause 5.1.2/C63.4-2009, Clause 5.1.2)?

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Y	N	N/A	56. Do the test personnel know how to identify and avoid potential overload conditions of the test instrumentation? (C63.4-2003, Clause 4.1.1.2/C63.4-2009, Clause 4.2.2 and Annex H.3)
Y	N	N/A	57. For measurement of ISM equipment, are the test personnel knowledgeable of the intricacies and special procedures in MP-5 and the rules in 47 CFR Part 18?
Y	N	N/A	58. Can the test personnel explain the FCC requirements for testing a product in accordance with the requirements in 47 CFR §§15.31-15.37? Are the test personnel knowledgeable of the FCC testing conditions for different types of products?
Y	N	N/A	59. For a testing laboratory providing <i>in-situ</i> testing services, can the test personnel satisfactorily describe how measurements would be performed at the user's location (consistent with ANSI C63.4-2003, Clauses 5.6 and 8.3.2/C63.4-2009, Clauses 5.6 and 8.3.3, and IEEE 139)
Y	N	N/A	60. Have one of the laboratory personnel, at each type of site, replicate at least three frequency points on the horizontal site attenuation and at least three frequency points on the vertical site attenuation. Is the test performed correctly and is the site attenuation data at these frequencies consistent with the previously recorded data? <i>Note: Pick frequencies from previous data that have both low and high deviations from the NSA.</i>

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I hereby attest that at the time of assessment, the laboratory's technical capabilities met the aforementioned requirements based on a reasonable assessment sampling basis subject to effective corrective action for any nonconformities noted in the overall Accreditation Body (AB) reports of the assessment.

Assessor(s) Signature

Date

The FCC has developed the questions contained in this checklist to be used by the AB to assist in the assessment of EMC testing laboratories. The FCC also requires the AB to provide them with a copy of the completed checklist revealing the technical competence of the laboratory for the specific tests required by the FCC, and to meet APEC TEL MRA obligations. Please be advised that all information provided to the FCC will be made publicly available, as directed by the Freedom of Information Act (FOIA), unless a confidentiality request is submitted to the FCC with the recognition request pursuant to 47 CFR 0.457 and 0.459. Please note that failure to authorize NVLAP to submit this document to the FCC may result in the FCC's not recognizing your laboratory as an "Accredited" testing laboratory.

I hereby grant permission to NVLAP, providing this assessment, at the request of the FCC to release a copy of this completed checklist to the FCC.

Laboratory Authorized Representative Signature

Date

Continue to Annex A to complete site attenuation information.

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Annex A: SITE ATTENUATION INFORMATION	
Please complete the Site Attenuation information below during the on-site assessment.	
NSA measurement verification facility address:	<input style="width: 100%; height: 20px;" type="text"/> <input style="width: 100%; height: 20px;" type="text"/> <input style="width: 100%; height: 20px;" type="text"/> <input style="width: 100%; height: 20px;" type="text"/>
Site Description (i.e., 3 m, 10 m, OATS, Chamber):	<input style="width: 100%; height: 20px;" type="text"/>

Transmit antenna height:				
Test distance:				
<i>Frequency (MHz)</i>	<i>Old Value (dB)</i> <small>(Deviation from Theoretical NSA)</small>	<i>New Value (dB)</i> <small>(Deviation from Theoretical NSA)</small>	<i>Polarization</i>	<i>Position</i>
			Vertical	
			Vertical	
			Vertical	
Transmit antenna height:				
Test distance:				
<i>Frequency (MHz)</i>	<i>Old Value (dB)</i> <small>(Deviation from Theoretical NSA)</small>	<i>New Value (dB)</i> <small>(Deviation from Theoretical NSA)</small>	<i>Polarization</i>	<i>Position</i>
			Horizontal	
			Horizontal	
			Horizontal	

Note: Acceptance value is +/- 4 dB from the theoretical value (C63.4-2003, Clause 5.4.6/ C63.4-2009, Clause 5.4.4, *Site quality validation*).