

Interpretation/explanation Request 2004-C63-SC1-5

14 February 2005

From: Daniel, Kevin J [mailto:kevin.j.daniel@intel.com]
Sent: Tuesday, February 01, 2005 6:01 PM
To: Donald Heirman; d.heirman@ieee.org
Subject: Interpretation of Section 8.2.4 of ANSI C63.4

Hello Mr. Heirman,

There has been some debate among my colleagues regarding the use of absorber material for FCC testing above 1GHz. In section 8.2.4 of ANSI C63.4:2003, the last sentence of the third paragraph states,

"Because the receiving antenna is unlikely to sense simultaneously both a direct signal and a signal reflected from the reference groundplane, a reference groundplane is not required."

I would like to get your interpretation on this as to whether we can place absorber cones for above 1GHz measurements for preliminary and final radiated emissions measurements. It never seems to be clear if absorbers are allowed or not based on previous revisions of ANSI C63.4. With the EMCO 3115 or 3117 horn antenna, reflections are detectable in the lower GHz range.

I understand the activities in CISPR for site validation above 1GHz would ultimately require absorbers on the groundplane to meet the site VSWR criteria.

Thank you for your time in advance. I'm looking forward to your response.

Sincerely,
Kevin

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The following response from the C63 Subcommittee 1 is considered an explanation of the clause in ANSI C63.4

In response to the question on the application of ANSI C63.4, the following explanation and background are offered.

Explanation for Clause 5.5: In clause 5.5 below, until site validation procedures are generated to assess the suitability of test sites above 1 GHz, there is no reason to not allow the presence of the reference groundplane which is used for measurements below 1 GHz.

5.5 Radiated emission test site requirements above 1 GHz

There are currently no test site validation requirements above 1 GHz. However, facilities suitable for measurements in the frequency range 30 MHz to 1000 MHz are considered suitable for the frequency range 1 GHz to 40 GHz, including the presence of the reference groundplane (see ANSI C63.7-1992). NOTE—Additional site validation requirements above 1 GHz are currently under study.

Explanation for Clause 8.2.4: The second paragraph of Clause 8.2.4 below indicated that such measurements can be made in test facilities that if properly constructed have only one reflective surface, i.e. the ground plane typical of OATS and semi-anechoic chambers. In addition the last sentence in the second paragraph below further bolsters the argument that the effect of reflections by signals reflected from the ground plane are not considered to affect the results. This was due to the committee initial search of the beamwidths of typical horn antennas used above 1 GHz showed sufficiently narrow beamwidths so as not to “see” the ground plane reflection of the signal from the EUT. Hence the statement that a reference ground plane is not required but as stated in clause 5.5 above could still be present.

8.2.4 Electric field radiated emissions (1 GHz to 40 GHz)

Radiated emission measurements above 1 GHz are made using calibrated linearly polarized antennas as specified in 4.1.5.4, which may have a smaller beamwidth (main lobe) than do the antennas used for frequencies below 1 GHz. Because some EUTs may have a size larger than the beamwidth of the antenna at the specified measurement distance, and because the source of emissions is generally limited to relatively small-angle cones of radiation, the antenna beamwidth shall be known so that when emissions from large EUTs are measured, the area of coverage of the EUT can be determined. Moving the measurement antenna over the surfaces of the four sides of the EUT or another method of scanning of the EUT is required when the EUT is larger than the beamwidth of the measuring antenna. When radiated measurements are made at the measurement distance and the measurement antenna does not completely encompass a large EUT at that distance, additional measurements at a greater distance may be necessary to demonstrate that emissions were at maximum at the limit distance. For any EUT, the frequencies of emission should first be detected. Then the amplitudes of the emissions are measured at the specified measurement distance using the required antenna height, polarization, and detector characteristics.

It is preferred that measurements be performed on an OATS or in an absorber-lined room. However, measurements may also be performed where there is adequate clearance, considering the radiation pattern of the EUT, to ensure that any reflections from any other objects in the vicinity do not affect the measurements. Because the receiving antenna is unlikely to sense simultaneously both a direct signal and a signal reflected from the reference groundplane, a reference groundplane is not required.

Conclusion:

- 1. Absorbing material can be placed on the ground plane between the equipment under test and the receiving antenna for both exploratory and final radiated emission measurements.**
- 2. Work continues in CISPR Subcommittee A and ASC C63 on the actual antenna beamwidth for horn antennas and initial findings are that indeed some antennas are not well behaved and do see the reflected signal at frequencies just above 1 GHz. Since this is still work in progress, the statements in the present C63.4-2003 standard still holds and the allowance of absorber material on the floor as noted in the first conclusion above holds.**