



American National Standard for Laboratory Immunity Testing of Multimedia Equipment Exposed to RF Sources

C63[®]

USEMCSC C63[®] Committee on Electromagnetic Compatibility –
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American National Standards Institute

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STANDARDS

American National Standard for Laboratory Immunity Testing of Multimedia Equipment Exposed to RF Sources

USEMCSC C63® Committee on Electromagnetic Compatibility

Accredited by the

American National Standards Institute

Secretariat

Institute of Electrical and Electronics Engineers, Inc.

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Abstract: This standard provides recommended test methods and limits for assuring the radio-frequency immunity of multimedia equipment to general use transmitters and other RF sources.

Keywords: C63.9, electromagnetic interference, EMI, immunity, interference, multimedia equipment, RF, RFI susceptibility

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Introduction

This introduction is not part of ANSI/USEMCSC C63.9-2024, American National Standard for Laboratory Immunity Testing of Multimedia Equipment Exposed to RF Sources.

In recent years, the offering of different types of electronic products has rapidly increased. The use of electronic products in close proximity to other electronic devices requires that they have a sufficient level of radio-frequency (RF) immunity to verify that they can function as intended in the target environment. While fluorescent lights, microwave ovens, portable wireless devices, nearby commercial radio, TV stations, and other RF sources have been part of the electromagnetic interference environment for a number of years. Interference problems with many types of equipment have been exacerbated by the recent dramatic growth in personal RF devices such as cellular telephones, wireless network connections, and cordless telephones. It is common today to have two or more wireless connections actively within inches of one another. Similarly, a conference room can have multiple wireless devices operating simultaneously during a meeting with an active conference call and the use of audio-visual equipment. Further, traditional mobile phones, laptop computers, personal digital assistants (PDAs), and other types of products are merging to become multifunctional, often including multiple wireless transmitters with other functionality. The term “Transmitting Portable Electronic Devices” has been used in several standards to encompass this larger class of RF transmitting devices. Standards for assuring a degree of immunity exist in some global regions, but these have proven insufficient for this new, aggressive RF environment. This standard addresses the need to evaluate the RF immunity of devices for use in the kinds of environments they are likely to experience.

A second distinction of this standard is that it addresses the exceedingly high-quality expectations in today’s multi-use environment. RF interference is unacceptable unless the effect is so small as to be virtually imperceptible. Accordingly, this standard has been written to provide protection sufficient to satisfy these stringent expectations.

It should also be noted that equipment like internet protocol (IP) phones, IEEE 802.11 network connections, PDAs, etc., are used in a variety of environments, like manufacturing plants, warehouses, ships, and even mines. In these environments, the problem is compounded because not only can the field strength from an RF emitter become more concentrated, but resultant malfunctions can pose more serious operational problems.

For equipment manufacturers, this poses new problems regarding the adequate evaluation of product immunity. The current standard used to evaluate the immunity of multimedia equipment, CISPR 35⁶ (which is the basis for EN 55035), is often inadequate to realistically simulate an interference scenario as described above. For example, radiated immunity tests are performed with a spacing of 3 m (or 1 m) between the device and the radiating antenna. In multi-use environments, the separation between devices is very often just centimeters. Furthermore, the current radiated immunity testing, based on the method described in IEC 61000-4-3:2020, uses amplitude modulated CW signals, and only in specific cases is pulse modulation applied. Modern wireless communication devices use digital modulation, which are impulsive signals. These broadband signals pose a different interference potential since the exposure mechanism is very different from the one in a test where a simple CW or amplitude-modulated signal is used. This matter is further compounded by the dependency of the equipment under test (EUT) behavior on the data rate and protocols employed by interfering devices operating in the near area, such as GSM, CDMA, TDMA, Wireless LAN, and amplitude modulation (AM) devices, as well as by the power of the interferer.

ANSI/TIA-631-A [B3] focuses specifically on the RF immunity requirements for telephone equipment.⁷ While this and other existing standards have continuing value, they do not address the specific issues or provide the level of protection being addressed in this standard. By some methods of comparison, AM is more severe than pulse modulation, and it can be argued, therefore, that testing with AM overstresses a

⁶ Information on references can be found in Clause 2.

⁷ The numbers in brackets correspond to those of the bibliography in Annex D.

product. However, multiple companies have reported to this committee that developed this standard that they have found not all failure conditions are revealed when testing with AM modulation. These reports motivated the committee to evaluate more complex modulations for this standard.

This standard was developed in response to the recognized need for a more suitable immunity test methodology standard for electronic equipment for some environments and users. This standard serves manufacturers, purchasers, and users of multimedia equipment by providing tests and performance targets that give a reasonable assurance that the RF immunity of the components, digital devices, and subsystems within multimedia equipment are suitable to withstand the typical RF environments created by portable transmitters. It must be emphasized that no standard can guarantee the interference-free operation of a device. A compromise must be made between design cost (and thus the cost of a product), testing effort, and acceptable performance. This standard represents the consensus compromise opinion of the committee on the proper balance of these competing factors.

This standard provides evaluation methods of product immunity to electromagnetic radiation in the operating bands of transmitters in the range below 7.125 GHz. Problems with interference among IR (infrared) remote controls and plasma displays, for example, or blinding of one RF device by another incompatible but nearby RF device, are outside the scope of this standard.

It is also noted that for a test to be acceptable, it need not duplicate an operational environment. Testing that exposes the same flaws, but in different ways, can be acceptable. For practical reasons, it can be desirable, as an example, to use a gigahertz transverse electromagnetic (GTEM) cell (rarely found in a normal multi-use environment). The test methodology provided in this standard is believed to have been sufficiently validated and can be expected to stress the EUT in a manner that uncovers product vulnerability and reveals the RF immunity of the product.

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