

C63.4 interpretation questions:

For an external peripheral attached to the EUT via a wire or cable (PS2 or USB), such as a keyboard or mouse, what is the expectation for exercising the device during EMC testing? Does the answer depend on if the keyboard or mouse is the EUT or an externally connected peripheral device on a system?

My observation of common international EMI lab practice for testing of a personal computer would have an external keyboard and mouse connected to either the PS2 or USB ports as available on the system. However, when qualifying a PC, these devices are static or passive during the test and not exercised. While there is some minimal low-frequency port scanning for activity, not exercising fails to reveal any potential issue. Other ports, such as display, printer, serial, have better defined expectations for exercising. C63.4 does state that "Accessories connected to the EUT shall be exercised independently.", however, I don't see this practice observed for keyboards or mice. The reason for my question is that because of the passive nature of these devices, the lack of exercising during system qualification, and resultant low EMI, they have become the peripheral of choice for attachment to a PC during EMI testing. It is not uncommon to see an EMC report for a system with 4, 6 or 8 USB ports to utilize 4, 6, or 8 USB mice to populate the ports because it almost guarantees a pass where a read-write or active device, such as an external memory or camera, would reveal system design deficiencies with the port. Despite the guidance in the standards for a typical representative configuration, that appears to be secondary in favor of the ease of passing results.

It may be desirable to have C63.4 recommend for PCs, to use typical devices on ports that represent the typical load and exercise the read-write capabilities of ports to the extent possible except where this guidance conflicts with other requirements in the standard. For example serial, USB and IEEE 1394 ports shall utilize read-write devices. Exception, where PC has only USB ports, some of those ports may need to be utilized for keyboard, mouse, or printer to create a typical and representative user configuration.

I also have questions on IR remote controls and the C63.4 expectations for testing and exercising of such devices. The issue is that the system and the IR remotes are frequently from different manufacturers. Thus, even remotes bundled with a base device, such as a television, projector, or personal computer are often not evaluated for any potential EMI. What is the expectation for exercising the IR remote during EMC testing? Does the answer depend on if the IR remote is the EUT or a bundled component of a base product?

I have reviewed numerous EMC test reports for base products that utilize remotes and remotes as stand-alone digital devices. I have yet to find an test report that provides any indication that the remote was exercised during the EMI test. This may on the surface seem simplistic but consider today's IR remotes. These devices contain microprocessors, digital logic, memory, displays, and may include interface cables (USB or serial) to program via a personal computer. Some may include a docking station that keeps the batteries charged. Thus, the practice of just having the remote sit on table with no exercising basically is evaluating the device in its off state, determining that it has no EMI when it isn't used. It just doesn't seem reasonable to not have some exercise requirements for these digital devices. The proliferation of these devices (I would guess every home has at least 5 different remotes) without guidance on how to test / exercise is unfortunate and should be addressed by C63.4. I don't feel the intermittent use of digital devices should excuse the lack of functional exercising during EMI testing.

Subcommittee Response:

1. For an external peripheral attached to the EUT via a wire or cable (PS2 or USB), such as a keyboard or mouse, what is the expectation for exercising the device during EMC testing? Does the answer depend on if the keyboard or mouse is the EUT or an externally connected peripheral device on a system?

Explanation: Clause 11.1 and the associated sub-clauses address this question. The example cited in the standard is a printer (see clause 11.1.2). In that example where the EUT is NOT the printer (or in your example a mouse) it is not necessary that the printer be continuously scrolling H's. Similarly it would not be anticipated that the mouse be continuously moving. Where the accessory IS the EUT, it is expected to be "driven by the appropriate host equipment" and this clearly means operate the device (mouse in your example). You quoted "Accessories connected to the EUT shall be exercised independently." Please note that this phrase is used in Annexes G and H which apply to unintentional radiators that are NOT ITE and intentional radiators. The example you provide - a PC with a mouse - would be considered an ITE product.

2. What is the expectation for exercising the IR remote during EMC testing? Does the answer depend on if the IR remote is the EUT or a bundled component of a base product?

Explanation: Clause 6.1 provides general direction on the operating conditions. Yes, it does depend on whether the device is under test or an accessory. If it is the EUT, clause 6.1 would require the device be "...operated to ensure that all of the functions are exercised (software, etc.)". If the device were not the EUT, then exercising the EUT and the accessories should be made as a judgement and documented as stated in clause 6.1:

"For some EUTs, it may be necessary to develop a set of explicit requirements specifying the test conditions, EUT operation, and so on, to be used in testing a specific EUT or class of EUTs for radio-noise emissions. Such requirements shall be documented in the report of measurements for the EUT and may be used in determining compliance with the limits.."