

IEEE Standard Requirements for the Control of Electromagnetic Interference Characteristics of Replaceable Electronic Modules

IEEE Electromagnetic Compatibility Society

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IEEE Std 1688™-2015

IEEE Standard Requirements for the Control of Electromagnetic Interference Characteristics of Replaceable Electronic Modules

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IEEE Electromagnetic Compatibility Society

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Abstract: Electromagnetic performance requirements for replaceable electronic modules (REMs) are specified. This standard is suitable for items that have the following features: removable/replaceable electronic circuit modules that plug into an equipment rack or frame, with electrical interconnections primarily through edge connectors that interface directly with a backplane, and electrical power input derived from the backplane power sources. This standard is based on MIL-STD-461E system/equipment level electromagnetic interference (EMI) controls. The conducted and radiated requirements, limits, and test methods were adapted to provide risk reduction of REM EMI before integration in a system/equipment.

Keywords: electromagnetic compatibility, electromagnetic emission, electromagnetic interference, electromagnetic susceptibility, electrostatic discharge, EMC, EMI, ESD, IEEE 1688™, REM, replaceable electronic module, test limits

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Introduction

This introduction is not part of IEEE Std 1688-2015, IEEE Standard Requirements for the Control of Electromagnetic Interference Characteristics of Replaceable Electronic Modules.

This standard is for use in the specification of electromagnetic performance requirements for replaceable electronic modules (REMs). This standard has been developed in response to changes in the technology used to implement functions and/or subsystems into larger, more complicated integrated systems. The architecture for complex systems and system platforms has evolved in recent years from a collective of stand-alone federated subsystems that each performs a set of functions to a highly integrated rack system that incorporate a backplane and multiple subordinate modules that perform the required functions. Some of the modules are designed for a particular purpose, such as power supply or power distribution, whereas others will provide maximum flexibility by being programmable to perform one or more functions. These modules have become items that are often procured independently from the system rack or frame in which they are designed to reside. For this reason, the module specification requirements have also had to mature to include not only descriptions of the functionality and interfaces required but also operational environment conditions. This standard addresses the module electromagnetic environments, by way of adaptation of the test requirements of MIL-STD-461E.¹ Since MIL-STD-461E is intended for use with electronic systems or subsystems, it is not appropriate to apply that standard directly to REMs. However, many of the environments simulated by MIL-STD-461E tests are relevant for REMs and have been used as the basis for the tests described in this standard.

Beneficial comments (recommendations, additions, and deletions) and any pertinent data that may be of use in improving this document should be addressed to: IEEE, Electromagnetic Compatibility (EMC) Society, Standards Development Committee, PAR-1688 Working Group.

The stated requirements are considered necessary to provide reasonable confidence that a particular REM that complies with these requirements will function within its designated design tolerances when within the electromagnetic operating environment of a designated rack, frame, enclosure, or modular system. The procuring activity should consider tailoring the individual requirements to be more or less severe based on the design features of the intended rack host and its mission in concert with personnel knowledgeable about electromagnetic compatibility issues affecting platform integration.

An annex is included that provides the rationale and background for each requirement and verification section.

A committee consisting of representatives of government and industry prepared this document under the IEEE EMC Society Standards Development Committee.

¹ Information on references can be found in Clause 2.

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1. Overview

1.1 General

This standard is for use in the specification of electromagnetic performance requirements for replaceable electronic modules (REMs). A REM is used in highly integrated rack systems that perform functions that heretofore were performed by a standalone equipment “box.. This standard provides the ability to control the electromagnetic interference (EMI) performance of a REM at the module level, giving the advantage of reducing risk associated with integrating with the host rack system. The requirements have matured to include not only descriptions of the functionality and interfaces required but also operational environment conditions. This standard addresses the module electromagnetic environments, by way of adaptation of the test requirements of MIL-STD-461E.¹ The standard includes general requirements, detailed requirements, verification methods, reporting requirements, and, most important, an informative application guide in the annex. In addition, this document is derived from public domain material and may be duplicated as required to develop test plans and procedures.

¹ Information on references can be found in Clause 2.