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# IEEE Guide for the Electromagnetic Characterization of Conductive Gaskets in the Frequency Range of DC to 40 GHz

IEEE Electromagnetic Compatibility Society

Developed by the
Standards Development Committee

**IEEE Std 1302™-2019**
(Revision of IEEE Std 1302-2008)

IEEE

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# IEEE Guide for the Electromagnetic Characterization of Conductive Gaskets in the Frequency Range of DC to 40 GHz

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**Standards Development Committee**
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Approved 7 November 2019

**IEEE SA Standards Board**

**Abstract:** Information to assist users of gaskets in evaluating gasket measurement techniques to determine which exhibit the properties critical to the intended application, to highlight limitations and sources of error of the competing measurement techniques, and to provide a basis for comparing the techniques is provided in this guide. Emphasis is placed on those measurement techniques that have been adopted through incorporation into standards, both commercial and military, or that have been used extensively.

**Keywords:** aperture transmission, electromagnetic shielding, EMI gaskets, IEEE 1302™, measurement techniques, reverberation chamber, shielding effectiveness, stirred mode, transfer impedance

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## Introduction

This introduction is not part of IEEE Std 1302-2019, IEEE Guide for the Electromagnetic Characterization of Conductive Gaskets in the Frequency Range of DC to 40 GHz.

An EMI gasket is a conductive material used to improve the electrical bonding between metallic parts of an electronic chassis, equipment enclosure, or electromagnetic shield. A wide variety of materials and techniques is used to produce EMI gaskets. The effectiveness of gaskets in the closing of seams and joints is dependent upon the properties of the gasket and the method of installation. Several techniques are available to measure the electromagnetic properties of EMI gaskets. Unfortunately, measurement results are often inconsistent between techniques.

This guide provides guidance on the use of recognized techniques for the electromagnetic performance characterization of EMI gaskets. It does not recommend one technique over another. It is recognized that some or all of the "alternative" techniques may, at some time in the future, become widely accepted and practiced. At such time, the guide will be revised to reflect their adoption. It is also recognized that efforts are currently underway to revise the measurement techniques currently covered in this guide. These revisions will be included in future updates of this document.

The theory of gasket behavior given in this guide is highly simplified and is intended to illustrate primary principles only. For a greater understanding of the electromagnetic interactions occurring in a gasketed joint, the reader is advised to consult the many excellent mathematical treatments in books and papers available through the IEEE and other technical publishers.

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# IEEE Guide for the Electromagnetic Characterization of Conductive Gaskets in the Frequency Range of DC to 40 GHz

## 1. Overview

### 1.1 Scope

The scope of this guide is to provide manufacturers of gaskets and designers of electronic systems appropriate methods for the characterization of gaskets. This document guides the user in the selection of the appropriate test method in order to determine the level of electromagnetic shielding provided in the intended application.

### 1.2 Purpose

The purpose of this guide is to provide guidance on the strengths and weaknesses of each of the recommended methods, and provide in-depth documentation for each method. Therefore, it identifies limitations and sources of errors of the commonly accepted techniques for measuring gaskets, and provides a basis for comparing the various accepted techniques. It encompasses measurements of the as-installed behavior of gaskets as well as manufacturing-related quality control measurements.

Special attention is also given to test methods for small samples of gaskets (also above 1 GHz), correlation between different methods, and identification of possible measuring methods for near-field characterization of gaskets [as used on printed circuit board (PCB) board applications].

### 1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).[1, 2]

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).

[1]The use of the word *must* is deprecated and cannot be used when stating mandatory requirements; *must* is used only to describe unavoidable situations.
[2]The use of *will* is deprecated and cannot be used when stating mandatory requirements; *will* is only used in statements of fact.