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IEEE Guide for EMF Exposure Assessment of Internet of Things (IoT) Technologies and Devices

Developed by the

IEEE Standards Coordinating Committee 39
on
Electromagnetic Safety

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IEEE

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Abstract: In the wireless communication field, 5G and Internet of Things (IoT) solutions are the main emerging technologies and future wireless communication will rely on them. A methodology for classifying IoT devices based on radio frequency (RF) exposure characteristics is provided. Classification is based on frequency, bandwidth, radiated power, and typical installation configuration. Links between device class and available measurement/computational standards are provided. A framework criterion for exclusion classes for exposure assessment and criteria for addressing situations where exposure assessment is unavailable are included.

Keywords: exposure to electromagnetic fields, IEEE 1528™, Internet of Things devices, multiple IoT devices

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Introduction

This introduction is not part of IEEE Std 1528.7-2020, IEEE Guide for EMF Exposure Assessment of Internet of Things (IoT) Technologies and Devices.

This project was sponsored by IEEE-SASB Coordinating Committees/SCC39—International Committee on Electromagnetic Safety (SASB/SCC39)[1] and SASB/SCC39/TC34 SC1 (TC 34 Chair: Dr. Teruo Onishi; TC 34 Vice-chair: Dr. Mark Douglas; TC 34 SC1 Chair: Dr. Mark Douglas).

This guide provides a methodology for classifying IoT devices based on RF exposure characteristics. Classification is based on frequency, bandwidth, radiated power, and typical installation configuration. Links between device class and available measurement/computational standards are provided. A framework criterion for exclusion classes for exposure assessment and criteria for addressing situations where exposure assessment is unavailable are included.

In the wireless communication field, 5G and IoT solutions are the main emerging technologies that will drive the future wireless communication.

[1] Online: https://www.ices-emfsafety.org/committees/tc34-subcommittees/.

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IEEE Guide for EMF Exposure Assessment of Internet of Things (IoT) Technologies and Devices

1. Overview

1.1 Scope

This guide provides references to the appropriate methodology for classifying Internet of Things (IoT) devices based on radio frequency (RF) exposure characteristics. The use and operating modes for a wide variety of devices are considered by grouping them into several deployments and following an appropriate assessment route. Classification of devices is based on frequency, bandwidth, radiated power, and typical installation configuration. The methodology applies to both the short-range (from less than 1 m to 1 km) and long-range (greater than 1 km) technologies that operate from 0 Hz up to 300 GHz frequency range. The available standards and documents applicable for the compliance assessment of IoT technologies/solutions are identified in this guide. Links between device class and available measurement/computational standards are provided. Included within this document is guidance for exclusion classes, exposure assessments, and solutions to address situations where guidance is unavailable.

This guide does not specify measurement and computational methods to assess the exposure of IoT devices, even in the cases there are no appropriate assessment methods. Instead, this guide indicates gaps in available assessment methods, but is not intended to establish the assessment methodology.

1.2 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*).[2, 3]

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*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals is *permitted to*).

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