IEC 60556

Edition 2.1 2016-03

CONSOLIDATED VERSION

VERSION CONSOLIDÉE

colour inside

Gyromagnetic materials intended for application at microwave frequencies – Measuring methods for properties

Matériaux gyromagnétiques destinés à des applications hyperfréquences – Méthodes de mesure des propriétés

IEC 60556:2006-04+A1:2016-03 CSV(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.100.10

ISBN 978-2-8322-3292-7

IEC 60556

Edition 2.1 2016-03

REDLINE VERSION

VERSION REDLINE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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GYROMAGNETIC MATERIALS INTENDED FOR APPLICATION AT MICROWAVE FREQUENCIES – MEASURING METHODS FOR PROPERTIES

FOREWORD

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This Consolidated version of IEC 60556 bears the edition number 2.1. It consists of the second edition (2006-04) [documents 51/850/FDIS and 51/859/RVD] and its amendment 1 (2016-03) [documents 51/1064/CDV and 51/1089A/RVC]. The technical content is identical to the base edition and its amendment.

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 60556 has been prepared by IEC technical committee 51: Magnetic components and ferrite materials.

This second edition is a consolidation of the first edition and its amendments 1 and 2. It includes editorial improvements as well as improvements to the figures.

This standard is to be read in conjunction with IEC 60392.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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GYROMAGNETIC MATERIALS INTENDED FOR APPLICATION AT MICROWAVE FREQUENCIES – MEASURING METHODS FOR PROPERTIES

1 Scope

This International Standard describes methods of measuring the properties used to specify polycrystalline microwave ferrites in accordance with IEC 60392 and for general use in ferrite technology. These measuring methods are intended for the investigation of materials, generally referred to as ferrites, for application at microwave frequencies.

Single crystals and thin films generally fall outside the scope of this standard.

NOTE 1 For the purposes of this standard, the words “ferrite” and “microwave” are used in a broad sense:

– by “ferrites” is meant not only magneto-dielectric chemical components having a spinel crystal structure, but also materials with garnet and hexagonal structures;

– the “microwave” region is taken to include wavelengths approximately between 1 m and 1 mm, the main interest being concentrated on the region 0,3 m to 10 mm.

NOTE 2 Examples of components employing microwave ferrites are non-reciprocal devices such as circulators, isolators and non-reciprocal phase-shifters. These constitute the major field of application, but the materials may be used in reciprocal devices as well, for example, modulators and (reciprocal) phase-shifters. Other applications include gyromagnetic filters, limiters and more sophisticated devices, such as parametric amplifiers.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendment) applies.

IEC 60050-221, *International Electrotechnical Vocabulary (IEV) – Part 221: Magnetic materials components*

IEC 60205:2006, *Calculation of the effective parameters of magnetic piece parts*

IEC 60392:1972, *Guide for the drafting of specifications for microwave ferrites*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-221 apply.

4 Saturation magnetization M_s

4.1 General

Saturation magnetization is a characteristic parameter of ferrite materials. It is widely used in theoretical calculations, for instance in computation of tensor permeability components (see IEC 60050-221). In a variety of microwave applications, saturation magnetization determines the lower frequency limit of the device, mainly due to the occurrence of so-called low-field loss when the material is unsaturated.