EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60556:2006+A1

June 2016

ICS 29.100.10

English version

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

(IEC 60556:2006)

Materiaux gyromagnétiques destinés aux applications hyperfréquences - Méthodes de mesure des caractéristiques (CEI 60556:2006)

Gyromagnetische Materialien für Mikrowellenanwendungen - Messverfahren zur Ermittlung der Eigenschaften (IEC 60556:2006)

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 60556:2006 E

Foreword

The text of document 51/850/FDIS, future edition 2 of IEC 60556, prepared by IEC TC 51, Magnetic components and ferrite materials, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60556 on 2006-05-01.

This Standard is to be used in conjunction with IEC 60392.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2007-02-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-05-01

Annex ZA has been added by CENELEC.

_____

Endorsement notice

The text of the International Standard IEC 60556:2006 was approved by CENELEC as a European Standard without any modification.

_____

Foreword to amendment A1

The text of document 51/1064/CDV, future IEC 60556:2006/A1, prepared by IEC/TC 51 "Magnetic components and ferrite materials" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60556:2006/A1:2016.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2017-02-05
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2019-05-05

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60556:2006/A1:2016 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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 amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60050-221	-[1)]	International electrotechnical vocabulary - Chapter 221: Magnetic materials and components	-	-
IEC 60205	2006	Calculation of the effective parameters of magnetic piece parts	EN 60205	2006
IEC 60392	1972	Guide for the drafting of specifications for microwave ferrites	-	-

[1)] Undated reference.

CONTENTS

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.