

IEEE Standard Method for Measurement of the Magnetic Field in the Vicinity of a Telephone Receiver

Sponsor
**Transmission and Access Systems Committee
of the
IEEE Communications Society**

Approved 23 September 1996

Reaffirmed 25 March 2004

IEEE Standards Board

Approved 6 February 1997

Reaffirmed 8 July 2004

American National Standards Institute

Abstract: The methodology for measuring the magnetic field strength in the vicinity of a telephone receiver is described.

Keywords: magnetic field, telephone receiver

The Institute of Electrical and Electronics Engineers, Inc.

345 East 47th Street, New York, NY 10017-2394, USA

Copyright ©1996 by the Institute of Electrical and Electronics Engineers, Inc.

All rights reserved. Published 1996. Printed in the United States of America.

ISBN 1-55937-851-4

IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Board. Members of the committees serve voluntarily and without compensation. They are not necessarily members of the Institute. The standards developed within IEEE represent a consensus of the broad expertise on the subject within the Institute as well as those activities outside of IEEE that have expressed an interest in participating in the development of the standard.

Use of an IEEE Standard is wholly voluntary. The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE Standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE Standard is subjected to review at least every five years for revision or reaffirmation. When a document is more than five years old and has not been reaffirmed, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE Standard.

Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of IEEE, the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of all concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason, IEEE and the members of its societies and Standards Coordinating Committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration.

Comments on standards and requests for interpretations should be addressed to:

Secretary, IEEE Standards Board
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331
USA

Note: Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. The IEEE shall not be responsible for identifying all patents for which a license may be required by an IEEE standard or for conducting inquiries into the legal validity or scope of those patents that are brought to its attention.

Authorization to photocopy portions of any individual standard for internal or personal use is granted by the Institute of Electrical and Electronics Engineers, Inc., provided that the appropriate fee is paid to Copyright Clearance Center. To arrange for payment of licensing fee, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; (508) 750-8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Introduction

(This introduction is not a part of IEEE Std 1027-1996, IEEE Standard Method for Measurement of the Magnetic Field in the Vicinity of a Telephone Receiver.)

This standard replaces IEEE Std 1027-1984, IEEE Trial-Use Standard Method for Measuring the Magnetic Field Intensity Around a Telephone Receiver. Comments on this standard and suggestions for the additional material should be addressed to: Secretary, IEEE Standards Board, The Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, Piscataway, NJ 08855.

This new standard was prepared by the Subcommittee on Telephone Instrument Testing of the Transmission and Access Systems Committee of the IEEE Communications Society (formerly the IEEE Communications Technology Group).

At the time this standard was approved, the members of the Working Group of the Subcommittee on Telephone Instrument Testing, were as follows:

Joel Adams	Paul Coverdale	Frederick M. Kruger
John Bareham	Fred Dekalb	Ron Magnuson
Roger Britt	Steve Graham	Henry Mar
Chandru Butani	Roger Gutzwiller	Peter May
Cliff Chamney	Glenn Hess	Christopher Struck
Thomas Childers		Robert Young

At the time this standard was approved the members of the Subcommittee on Telephone Instrument Testing were as follows:

John Bareham, *Chair* **Glenn Hess, *Vice Chair***

Joel Adams	Steve Graham	Henry Mar
Roger Britt	Roger Gutzwiller	Peter May
Chandru Butani	Claus Hetting	Anthony Scott
Cliff Chamney	Ron Johnson	Christopher Struck
Thomas Childers	Frederick M. Kruger	Stephen Whitesell
Paul Coverdale	Dwight Lynn	Robert Young
Fred Dekalb	Ron Magnuson	John Zhao

The following persons were on the balloting committee:

Joel Adams	Paul Coverdale	Ron Magnuson
John Bareham	Fred Dekalb	Henry Mar
Roger Britt	Steve Graham	Peter May
Chandru Butani	Roger Gutzwiller	Christopher Struck
Cliff Chamney	Glenn Hess	Stephen Whitesell
Thomas Childers	Frederick M. Kruger	Robert Young
	Dwight Lynn	

When the IEEE Standards Board approved this standard on 23 September 1996, it had the following membership:

Donald C. Loughry, *Chair*

Richard J. Holleman, *Vice Chair*

Andrew G. Salem, *Secretary*

Gilles A. Baril
Clyde R. Camp
Joseph A. Cannatelli
Stephen L. Diamond
Harold E. Epstein
Donald C. Fleckenstein
Jay Forster*
Donald N. Heirman

Ben C. Johnson
E. G. “Al” Kiener
Joseph L. Koepfinger*
Stephen R. Lambert
Lawrence V. McCall
L. Bruce McClung
Marco W. Migliaro
Mary Lou Padgett
John W. Pope
Jose R. Ramos

Arthur K. Reilly
Ronald H. Reimer
Gary S. Robinson
Ingo Rüsç
John S. Ryan
Chee Kiow Tan
Leonard L. Tripp
Howard L. Wolfman

*Member Emeritus

Also included are the following nonvoting IEEE Standards Board liaisons:

Satish K. Aggarwal
Alan H. Cookson
Chester C. Taylor

Rochelle L. Stern
IEEE Standards Project Editor

Contents

CLAUSE	PAGE
1. Overview.....	1
1.1 Scope.....	1
1.2 Purpose.....	1
2. References.....	2
3. Definitions.....	2
4. Test equipment.....	3
4.1 General.....	3
4.2 Probe coils.....	3
4.3 Integrator.....	4
4.4 AC measuring device.....	4
4.5 Tracking filter	5
4.6 Artificial ear.....	5
4.7 Standard test circuits.....	5
5. Probe coil calibration	6
5.1 Sensitivity	6
5.2 Linearity.....	6
5.3 Signal-to-noise ratio of the calibration system	6
6. Test procedure.....	7
6.1 General.....	7
6.2 Conditioning of carbon transmitters.	7
6.3 Receiver acoustic termination.....	8
6.4 Magnetic field measurement.....	8
ANNEX	
Annex A (normative) Integrator	11
Annex B (normative) Coil output voltage derivation	12
Annex C (normative) Generation of a known magnetic field using Helmholtz coils	13
Annex D (informative) Bibliography.....	15

IEEE Standard Method for Measurement of the Magnetic Field in the Vicinity of a Telephone Receiver

1. Overview

This standard describes the methodology for measuring the magnetic field strength in the vicinity of a telephone receiver.

Recommended test equipment, including probe coils and test circuits, are described in clause 4. Magnetic field probe calibration is outlined in clause 5. Test procedures are described in clause 6. Annex A describes a suitable integrator circuit for linearizing the probe coil output voltage. Annex B gives the derivation of the relationship between the electrical output of the probe coil and the magnetic field strength. Annex C illustrates a method of generating a known magnetic field using Helmholtz coils.

1.1 Scope

Magnetic fields of analog and digital telephone receivers, as well as non-traditional telephone receivers, such as wireless devices, may be objectively measured using this standard. Receivers not connected to a telephone may be evaluated as well. Measurement of static fields, such as those created by permanent magnets, is not covered.

The methodology described in this standard is suitable for measurements in the range of 100 Hz to 10 000 Hz.

1.2 Purpose

The impetus for this work was derived from a need to specify the alternating magnetic field at selected locations around a telephone receiver required for satisfactory inductive coupling to hearing aids. It is also useful for other applications where knowledge of the magnetic field strength is required.

The results, thus obtained, may be used to evaluate or specify the magnetic field strength produced by a receiver on a standardized basis.