

ANSI C63.022-1996

[Except for the USA foreword,
identical to CISPR 22 (1993) and Amendment 1 (1995)]

American National Standard for Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment

**Accredited Standards Committee on Electromagnetic Compatibility, C63
accredited by the
American National Standards Institute**

Secretariat

Institute of Electrical and Electronics Engineers, Inc.

Approved 27 September 1996

American National Standards Institute

Abstract: Emission limits are provided that are an acceptable alternative for limits of the current issue of FCC Part 15, Subpart B, for Information Technology Equipment (ITE). This document republishes CISPR 22 (1993) and Amendment 1 (1995) as an American National Standard, ANSI C63.022-1996, which is recognized within the U.S.

Keywords: conducted emissions, emission limits, emission measurement, information technology equipment, radiated emissions, radio disturbance, radio interference

The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street, New York, NY 10017-2394, USA

Copyright © 1997 by the Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 1997. Printed in the United States of America.

ISBN 1-55937-924-3

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

American National Standard

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether he has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review and users are cautioned to obtain the latest editions.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

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 part of ANSI C63.022-1996, American National Standard for Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment.)

At the time that the Accredited Standards Committee on Electromagnetic Compatibility, C63, approved this standard, it had the following membership:

Ralph M. Showers, *Chair*
Edwin L. Bronaugh, *Vice Chair*
Rosemary Tennis, *Secretary*

ACIL.....	Ross A. Hansen Walter Poggi
Alliance for Telecommunications Industry Solutions	John F. Lichtig O. J. Gusella (<i>alt.</i>)
American Automobile Manufacturers Association (AAMA)	Terry Rybak Barbara Wendling
American Radio Relay League	Hugh Turnbull Edward F. Hare
Aeronautical Radio, Inc. (ARINC)	Dan Martinac Paul Prisaznuk
Association of American Railroads.....	Chris Allman
Association of Telecommunication Attorneys	Glen Dash Jon Curtis (<i>alt.</i>)
Canadian Standards Association	vacant
Cellular Telephone Industry Association	vacant
Center for the Study of Wireless EMC	Hank Grant Bob Schlegel
Electric Light and Power Group, EEI	vacant Gary N Miller (<i>alt.</i>)
Electronic Industries Association (G-46 Chair)	John C. Windell
Electronic Industries Association	Ralph Justus
ESD Association	Douglas C. Smith
Federal Communications Commission (Chair SC-3)	Richard B. Engelman
Federal Communications Commission	L. A. (Art) Wall Hugh L. Van Tuyl (<i>alt.</i>)
Food and Drug Administration.....	Paul Ruggera Jeffrey Silberberg (<i>alt.</i>)
Health Industry Manufacturers Association.....	Eric V. Anderson Randall L. Anderson (<i>alt.</i>)
Hewlett-Packard Company	Ray Magnuson
Institute of Electrical and Electronics Engineers, Inc.	Edwin L. Bronaugh Donald N. Heirman Nestor Kolcio
Members-at-Large.....	Ralph Calcavecchio Robert J. Egan Warren A. Kesselman Arthur H. Light Richard B. Schulz Ralph M. Showers J. L. Norman Violette
Information Technology Industry Council (ITI)	William T. Rhoades William F. Hanrahan (<i>alt.</i>)

Lucent Technologies-Bell Labs.....	H. R. Hofmann
National Electrical Manufacturers Association (NEMA)	William J. Murphy Kenneth E. Gettman (<i>alt.</i>)
National Aeronautics and Space Administration.....	vacant
National Association of Broadcasters	Kelly Williams Marvin Ziskin (<i>alt.</i>)
Personal Computer	Bill C. Wong
Radio Shack Engineering	Mac Slayton
SAE (Land Vehicle)	Paul Andersen
SAE (Chair AE-4)	David A. Graham
SAE (Aerospace).....	Herbert Mertel
Southwest Research Institute (SwRI)	James J. Polonis
Telecom. Industry Association	Eric J. Schimmel
TUV Product Service	Daniel D. Hoolihan
Underwriters Laboratories, Inc.	Willard Tuthill Corey Hyatt (<i>alt.</i>)
Unisys Corporation	Wallace Amos
U. S. Department of the Air Force	John Zentner Dennis Baseley (<i>alt.</i>)
U. S. Department of Commerce (National Institute of Standards and Technology).....	Motohisa Kanda
U. S. Department of Commerce (National Technical Information Agency).....	Karl Nebbia
U. S. Department of Energy (Oak Ridge National Laboratory)	Paul Ewing
U. S. Department of Energy (Bonneville Power Administration).....	Vernon L. Chartier
U. S. Department of Energy (Western Area Power Administration).....	Scott E. Johnson
U. S. Department of the Navy	Stephen Caine Marcus Shellman (<i>alt.</i>)
U. S. Department of Transportation (Federal Aviation Administration).....	Robert Frazier
WIN Forum, AT&T Systems.....	Anatoly Tsaliovich

CLAUSE	PAGE
1. Purpose of this standard	1
2. Policy of U.S. National Committee to the IEC to republish International Standards.....	1
3. Policy of ANSI on standards	2
4. Technical comparison of CISPR 22 and FCC Part 15B limits.....	2
4.1 Note on limit classes	2
4.2 Conducted emission limit voltage on power lines	3
4.3 Radiated emission limits	3
5. Measurement method comparison	4
6. Implementation	4
Annex: Text of CISPR 22 (1993) and Ammendment 1 (1995).....	6

United States National Foreword for CISPR 22

1. Purpose of this standard

The CISPR 22 standard provides emission limits that are an acceptable alternative for limits of the current issue of FCC Part 15, Subpart B, for Information Technology Equipment (ITE). This document republishes CISPR 22 as an American National Standard, ANSI C63.022-1996, which is recognized within the U.S. This is a first step towards achieving commonality between ANSI C63 standards and international standards.

NOTE — Even though the limits of CISPR 22 are accepted by the FCC, the measurements must be performed in accordance with ANSI C63.4-1992 .

2. Policy of U.S. National Committee to the IEC to republish International Standards

It is the policy of USNC/IEC to work towards commonality between IEC International Standards and U.S. National Standards, consistent with U.S. technology and practice. Certain conditions may lead to differences in both procedures and in degree of agreement between such corresponding documents. This policy delineates the guiding principles and procedures to be followed to promote maximum practicable agreement between such corresponding documents.

When an American National Standard or other broadly accepted USA Standard exists, and an IEC document has been adopted, one of the following procedures shall be followed.

- a) If the IEC document was adopted with the concurrence of the U.S. and based on the U.S. document, the U.S. Technical Advisor shall see that the organization responsible for the U.S. Standard determines the practicability of modifying the U.S. document to make it identical with the IEC Standard. At such times as the standard is so modified, the sponsoring organization shall be considered as the agent of the National Standards Body to which the cost-free IEC copyright would apply.

NOTE — The USNC recognizes that standards developing organizations generate proprietary documents on which they own copyrights, and unless such organizations enjoy a cost-free IEC copyright with respect to international documents that are based on their proprietary standards, this could act as a deterrent to adoption of IEC Standards by the sponsoring organizations.

- b) If the IEC document was adopted over a negative vote by the U.S., no action need be taken in the U.S. toward preparing and adopting a consistent U.S. National Standard.

3. Policy of ANSI on standards

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

4. Technical comparison of CISPR 22 and FCC Part 15B limits

The FCC endorses the use of CISPR 22 emission limits as an alternative to FCC Part 15B limits for digital devices provided that the data is obtained per the measurement procedures of ANSI C 63.4-1992. Since these measurement procedures are similar to measurement procedures specified in CISPR 16, a commonality of measurement procedures exist. One of the major differences is that the FCC allows measurements of personal computers for radiated emissions at a 3 m test distance whereas CISPR measures at 10 m but allows extrapolation of data from the 3 m to the 10 m distance. The FCC also allows extrapolation of data from the 10 m distance to the 3 m distance. However, extrapolation should be viewed with extreme caution.

The other major difference is that CISPR 22 requires maximization of all emissions, whereas ANSI C63.4-1992 maximizes the highest emissions with respect to the limit. Hence the reason for the FCC selecting the ANSI C63.4-1992 procedures for its flexibility and more detailed measurement methods. Note that the proposed next edition of CISPR 22 will incorporate most of the procedures in ANSI C63.4-1992, leading to further harmonization.

4.1 Note on limit classes

The FCC Part 15 emission protection limits are divided into the more restrictive residential/domestic (Class B) and, the less restrictive commercial/industrial (Class A) limit classes (environments). In the USA and in Canada the limit classifications are set by manufacturers and depend on how the product is marketed. CISPR 22 also allows the manufacturer to set the classification of equipment, but requires a warning statement that assigns responsibility to the user for correction of any interference problems that may occur if the Class A equipment is installed in a domestic environment.

In the European Union (EU) product standards exist for a number of product families, e.g., ITE; household appliances; receivers; industrial, scientific and medical (ISM) equipment; etc. If a product standard does not exist for a given product, the generic standard is applied instead. This generic standard requires that equipment for use in residential, commercial, and light industry environments conform to the Class B limits of CISPR 22.

4.2 Conducted emission limit voltage on power lines

4.2.1 Class B equipment

Figure 1 shows a comparison of the Class B conducted power line limits. It must be noted that the CISPR measurement range starts at 0.15 MHz and the FCC starts at 0.45 MHz, and both end at 30 MHz. The average detector limit is 10 dB lower for CISPR than the associated quasi-peak detector limit.

The FCC defines a lower limit differently. The following wording comes from ANSI C63.4-1992, 11.5.2: "If the amplitude measured in the quasi-peak mode is at least 6 dB higher than the amplitude measured in the average mode, the level measured in the quasi-peak mode may be reduced by 13 dB before comparing it to the limit. If the 13 dB reduced quasi-peak mode level is below the limit, the EUT is considered to have met the limit requirements."

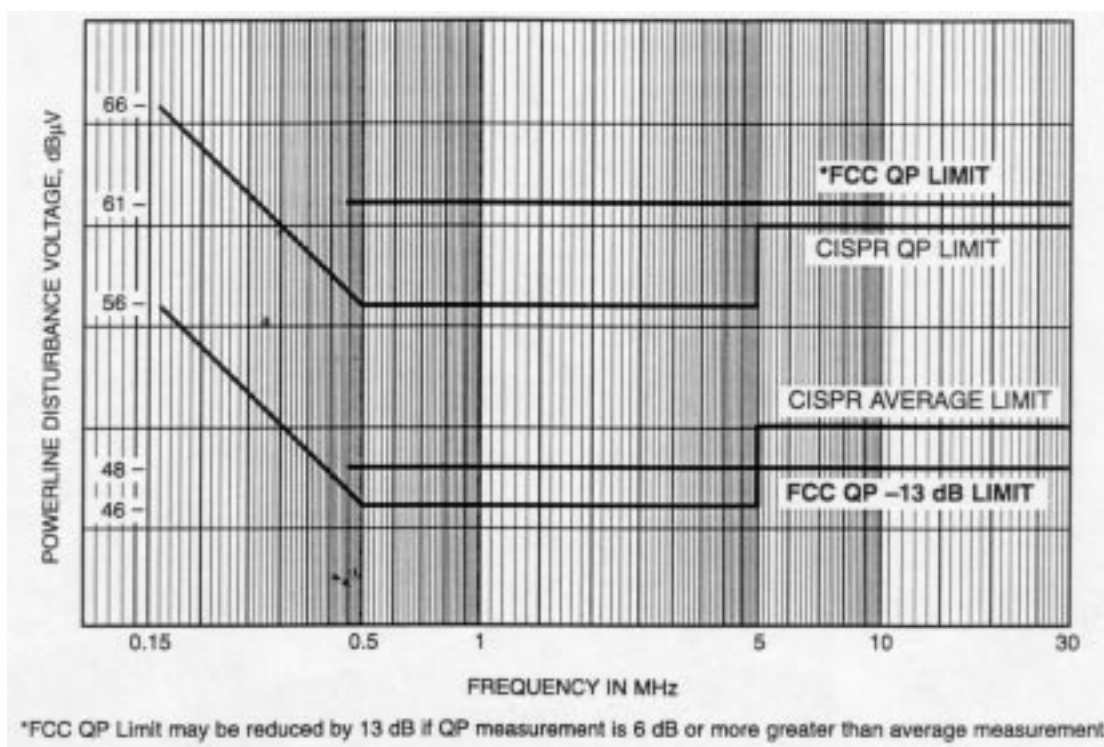


Figure 1 —Power line conducted emission limit specified in FCC Part 15B and CISPR 22 for Class B ITE

4.2.2 Class A equipment

Figure 2 shows the comparison of the Class A conducted power line limits. The CISPR measurement range starts at 0.15 MHz and the FCC starts at 0.45 MHz and both The average detector limit is 13 dB lower for CISPR than the quasi-peak detector limit. The -13 dB rule applies to the FCC limit as described in 4.2.1.

4.3 Radiated emission limits

The radiated emission limits for Class A and B are shown in Figure 3. The data is normalized for a 10 m measurement distance using linear distance extrapolation.

NOTE — The measurement distance in CISPR 22 for both Class A and Class B equipment is set at 10 m. The FCC Part 15 measurement distance for Class B equipment is 3 m. Extrapolation between 3 m and 10 m should be viewed with extreme caution.

5. Measurement method comparison

Since ANSI C63.4-1992 is the FCC-required document for measuring emissions, the USA acceptance of CISPR 22 is limited to the limits as discussed in Clause 4.

6. Implementation

Use of CISPR 22 limits shall be noted when applying this standard in demonstrating compliance with USA FCC Regulations. A positive statement to the use of ANSI C63.4-1992 measurement procedures shall also be made.

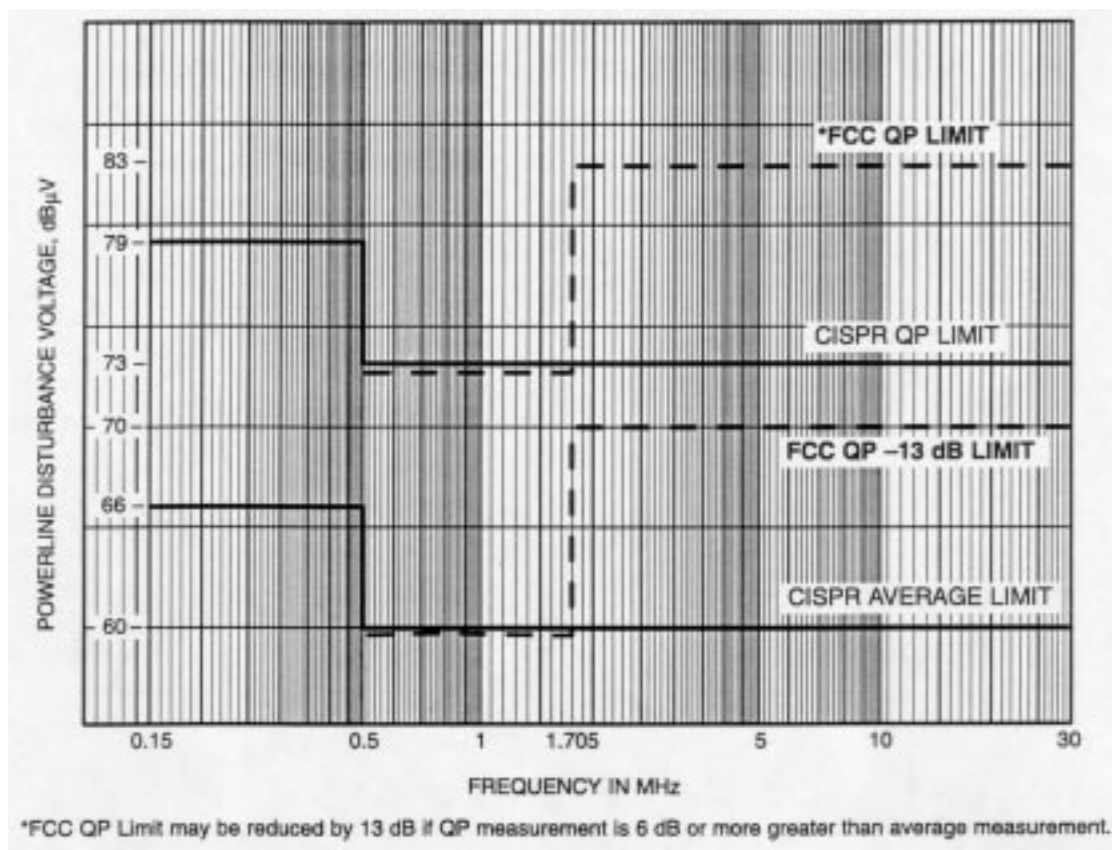


Figure 2 —Power line conducted emission limit specified in FCC Part 15B and CISPR 22 for Class A ITE

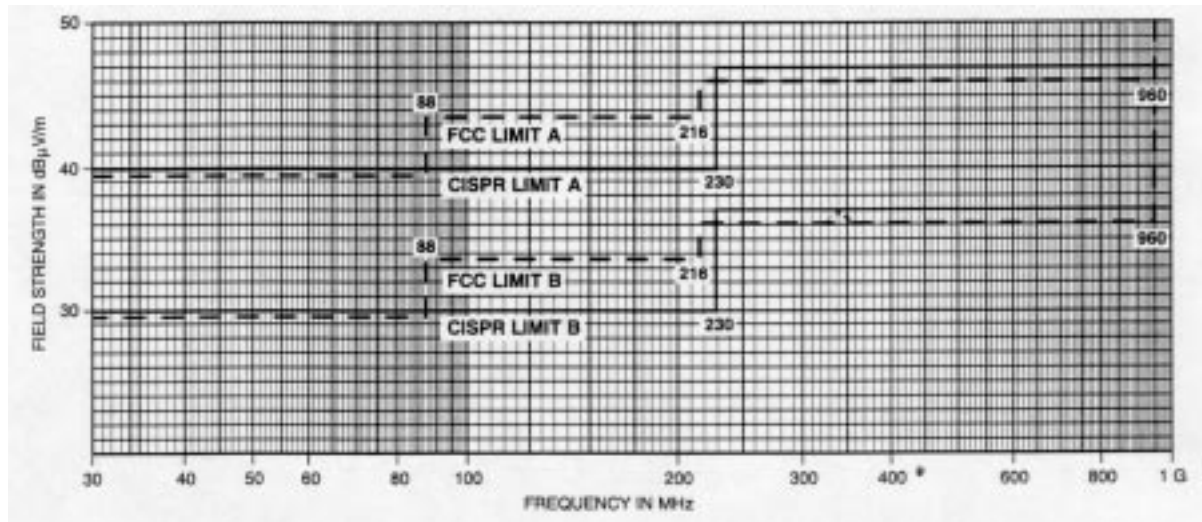


Figure 3 —Radiated emission limit at 10 m specified in FCC Part 15B and CISPR 22 for Class A and B ITE

CISPR 22

Second edition
1993-12

INTERNATIONAL ELECTROTECHNICAL COMMISSION

Limits and methods of measurement of radio disturbance characteristics of information
technology equipment

© CEI 1993 Copyright—all rights reserved

Reference number CISPR 22: 1993



Revision or this publication

The technical content of IEC and C.I.S.P.R. publications is kept under constant review by the IEC and C.I.S.P.R., thus ensuring that the content reflects current technology.

Information on the work of revision, the issue of revised editions and amendment sheets may be obtained from IEC National Committees and from the following IEC sources:

- IEC Bulletin
- IEC Yearbook
- Catalogue of IEC Publications Published yearly

Terminology used in this publication

Only special terms required for the purpose of this publication are defined herein.

For general terminology, readers are referred to IEC Publication 50: International Electrotechnical Vocabulary (IEV), which is issued in the form of separate chapters each dealing with a specific field, the General Index being published as a separate booklet. Full details of the IEV will be supplied on request.

For terms on radio interference, see Chapter 902.

Graphical and letter symbols

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to:

- IEC Publication 27: Letters symbols to be used in electrical technology;
- IEC Publication 617: Graphical symbols for diagrams.

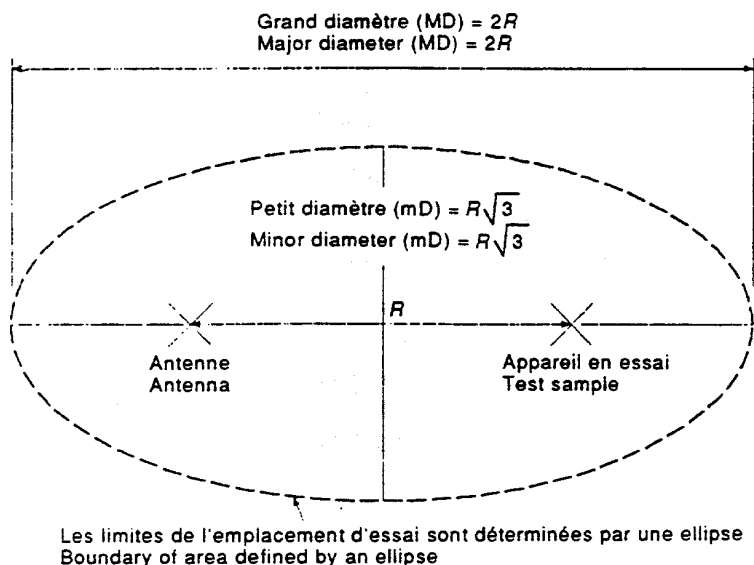
The symbols and signs contained in the present publication have either been taken from IEC Publications 27 or 617, or have been specifically approved for the purpose of this publication.

C.I.S.P.R. publications

The attention of readers is drawn to pages 3 and 4 of the cover, which list C.I.S.P.R. publications

CORRIGENDUM

Figure 1, replace the existing diagram by the new diagram below:



CEI-IEC 09/195