

INTERNATIONAL STANDARD

NORME INTERNATIONALE

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE
COMITÉ INTERNATIONAL SPÉCIAL DES PERTURBATIONS RADIOÉLECTRIQUES

Vehicles, boats and internal combustion engines – Radio disturbance characteristics – Limits and methods of measurement for the protection of off-board receivers

Véhicules, bateaux et moteurs à combustion interne – Caractéristiques de perturbation radioélectrique – Limites et méthodes de mesure pour la protection des récepteurs extérieurs





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2009 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC online collection - oc.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC online collection - oc.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.



CISPR 12

Edition 6.1 2009-03
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

NORME INTERNATIONALE

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE
COMITÉ INTERNATIONAL SPÉCIAL DES PERTURBATIONS RADIOÉLECTRIQUES

Vehicles, boats and internal combustion engines – Radio disturbance characteristics – Limits and methods of measurement for the protection of off-board receivers

Véhicules, bateaux et moteurs à combustion interne – Caractéristiques de perturbation radioélectrique – Limites et méthodes de mesure pour la protection des récepteurs extérieurs

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 27.020; 33.100.10

ISBN 978-2-8891-0004-0

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	9
3 Terms and definitions	9
4 Limits of disturbance	11
4.1 Determination of conformance of vehicle/boat/device with limits.....	11
4.2 Peak and quasi-peak detector limits	13
4.3 Average detector limit.....	13
5 Methods of measurement	14
5.1 Measuring instrument.....	14
5.1.1 Spectrum analyser parameters	15
5.1.2 Scanning receiver parameters	15
5.1.3 Antenna types	16
5.1.4 Accuracy	16
5.2 Measuring location requirements.....	17
5.2.1 Outdoor test site (OTS) requirements	17
5.2.2 Absorber lined shielded enclosure (ALSE) requirements.....	19
5.2.3 Antenna requirements	20
5.3 Test object conditions.....	22
5.3.1 General	22
5.3.2 Vehicles and boats	22
5.3.3 Devices	23
5.4 Data collection	24
6 Methods of checking for compliance with CISPR requirements	24
6.1 General.....	24
6.2 Application of limit curves.....	24
6.2.1 Measurements under dry conditions	24
6.2.2 Measurements under wet conditions.....	24
6.3 Evaluation (general)	25
6.4 Type approval test.....	25
6.4.1 Single sample.....	25
6.4.2 Multiple samples (optional).....	25
6.5 Surveillance (quality audit) of series production.....	25
6.5.1 Single sample.....	25
6.5.2 Multiple samples (optional).....	25
6.6 Quick prototype check for development testing (optional, quasi-peak detector emissions only)	25
Annex A (normative) Statistical analysis of the results of measurements	26
Annex B (normative) Procedure to determine an alternative emission limit for measurements at 3 m antenna distance	28

Annex C (informative) Antenna and transmission line maintenance and characterization	30
Annex D (informative) Construction features of motor vehicles affecting the emission of ignition noise	35
Annex E (informative) Measurement of the insertion loss of ignition noise suppressors	36
Annex F (informative) Methods of measurement to determine the attenuation characteristics of ignition noise suppressors for high voltage ignition systems	42
Annex G (informative) Flow chart for checking the applicability of CISPR 12	52
Annex H (informative) Items under consideration	54
Bibliography	55
Figure 1 – Method of determination of conformance	12
Figure 2 – Limit of disturbance (peak and quasi-peak detector) at 10 m antenna distance	13
Figure 3 – Limits of disturbance (average detector) at 10 m antenna distance	14
Figure 4 – Measuring site (OTS) for vehicles and devices	18
Figure 5 – Measuring site (OTS) for boats	19
Figure 6 – Antenna position to measure emissions – Vertical polarization	20
Figure 7 – Antenna position to measure emissions – Horizontal polarization	21
Figure B.1 – Determination of the maximum antenna angle	28
Figure B.2 – Calculation of the resulting gain reduction a	29
Figure C.1 – Alternate antenna factor determination (10 m antenna distance)	34
Figure E.1 – Test circuit	38
Figure E.2 – General arrangement of the test box	38
Figure E.3 – Details of the test box lid	39
Figure E.4 – Details of the test box	39
Figure E.5 – Straight spark-plug ignition noise suppressor (screened or unscreened)	40
Figure E.6 – Right-angle spark-plug ignition noise suppressor (screened or unscreened)	40
Figure E.7 – Noise suppression spark-plug	40
Figure E.8 – Resistive distributor brush	40
Figure E.9 – Noise suppressor in distributor cap	41
Figure E.10 – Noise suppression distributor rotor	41
Figure E.11 – Noise suppression ignition cable (resistive or reactive)	41
Figure F.1 – Test set-up, side view	44
Figure F.2 – Test set-up, top view	45
Figure F.3 – Pressure chamber with ventilation	46
Figure F.4 – Top view of the set-up of a right-angle ignition noise suppressor for distributors	47
Figure F.5 – Location of high voltage ignition components	48
Figure F.6 – Top view of the test set-up for distributor rotors	49

Figure F.7 – Side view of the test set-up for ready-to-use resistive ignition cables 50

Table 1 – Spectrum analyser parameters 15

Table 2 – Scanning receiver parameters 15

Table 3 – Internal combustion engine operating speeds 23

Table A.1 – Statistical factors 26

Table A.2 – Example of frequency sub-bands 27

Table F.1 – Limits 42

INTERNATIONAL ELECTROTECHNICAL COMMISSION
INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

**VEHICLES, BOATS AND INTERNAL COMBUSTION ENGINES –
RADIO DISTURBANCE CHARACTERISTICS –
LIMITS AND METHODS OF MEASUREMENT FOR THE PROTECTION
OF OFF-BOARD RECEIVERS**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

CISPR 12 edition 6.1 contains the sixth edition (2007-05) [documents CISPR/D/322/CDV and CISPR/D/341/RVC] and its amendment 1 (2009-03) [documents CISPR/D/354/CDV and CISPR/D/361/RVC].

A vertical line in the margin shows where the base publication has been modified by amendment 1.

International Standard CISPR 12 has been prepared by CISPR subcommittee D: Electromagnetic disturbances related to electric/electronic equipment on vehicles and internal combustion powered devices.

The following changes were made with respect to the previous edition:

- deletion of narrowband / broadband determination
- general improvement of wording

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 amendments will remain unchanged until the maintenance result 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.

INTRODUCTION

There is a specific need for standards to define acceptable radio frequency performance of all electrical/electronic products. CISPR 12 has been developed to serve the road vehicle and related industries with test methods and limits that provide satisfactory protection for radio reception.

CISPR 12 has been used for many years as a regulatory requirement in numerous countries, to provide protection for radio receivers in the residential environment. It has been extremely effective in protecting the radio environment outside the vehicle.