Australian/New Zealand Standard™

Specification for radio disturbance and immunity measuring apparatus and methods

Part 4.2: Uncertainties, statistics and limit modelling—Measurement instrumentation uncertainty

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee TE-003, Electromagnetic Interference. It was approved on behalf of the Council of Standards Australia on 16 January 2013 and on behalf of the Council of Standards New Zealand on 18 December 2012.
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We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

This Standard was issued in draft form for comment as DR AS/NZS CISPR 16.4.2.

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE-003, Electromagnetic Interference, to supersede AS/NZS CISPR 16.4.2:2004.

The objective of this Standard is to specify the method of applying Measurement Instrumentation Uncertainty (MIU) to determine compliance with CISPR disturbance limits. The material is also relevant to any EMC test when interpretation of the results and conclusions reached will be impacted by the uncertainty of the measurement instrumentation used during testing.

This Standard is identical with, and has been reproduced from, CISPR 16-4-2, Ed. 2.0 (2011), *Specification for radio disturbance and immunity measuring apparatus and methods*—Part 4-2: *Uncertainties, statistics and limit modelling—Measurement instrumentation uncertainty.*

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number appears on the cover and title page while the International Standard number appears only on the cover.

(b) In the source text ‘This part of CISPR 16-4' should read ‘this Australian/New Zealand Standard'.

(c) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

CISPR		AS/NZS CISPR	
11	Industrial, scientific and medical equipment—Radio-frequency disturbance characteristics—Limits and methods of measurement	11	Industrial, scientific and medical equipment—Radio-frequency disturbance characteristics—Limits and methods of measurement
12	Vehicles, boats and internal combustion engines—Radio disturbance characteristics—Limits and methods of measurement for the protection of off-board receivers	12	Vehicles, boats and internal combustion engines—Radio disturbance characteristics—Limits and methods of measurement for the protection of off-board receivers
13	Sound and television broadcast receivers and associated equipment—Radio disturbance characteristics—Limits and methods of measurement	13	Sound and television broadcast receivers and associated equipment—Radio disturbance characteristics—Limits and methods of measurement
16	Specification for radio disturbance and immunity measuring apparatus and methods	16	Specification for radio disturbance and immunity measuring apparatus and methods
16-1-1	Part 1-1: Radio disturbance and immunity measuring apparatus—Measuring apparatus	16.1.1	Part 1.1: Radio disturbance and immunity measuring apparatus—Measuring apparatus
16-1-2	Part 1-2: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Conducted disturbances	16.1.2	Part 1.2: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Conducted disturbances
16-1-3	Part 1-3: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Disturbance power	16.1.3	Part 1.3: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Disturbance power

16-1-4	Part 1-4: Radio disturbance and immunity measuring apparatus—Antennas and test sites for radiated disturbance measurements	16.1.4	Part 1.4: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Radiated disturbances
16-2-1	Part 2-1: Methods of measurement of disturbances and immunity—Conducted disturbance measurements	16.2.1	Part 2.1: Methods of measurement of disturbances and immunity—Conducted disturbance measurements
16-2-2 (2008)	Part 2-2: Methods of measurement of disturbances and immunity—Measurement of disturbance power	16.2.2 (2009)	Part 2.2: Methods of measurement of disturbances and immunity—Measurement of disturbance power
CISPR/TR		AS/NZS CISPR/TR	
16-3	Part 3: CISPR technical reports	16.3	Part 3: CISPR technical reports
16-4-1	Part 4-1: Uncertainties, statistics and limit modelling—Uncertainties in standardized EMC tests	16.4.1	Part 4.1: Uncertainties, statistics and limit modelling—Uncertainties in standardized EMC tests
16-4-3	Part 4-3: Uncertainties, statistics and limit modelling—Statistical considerations in the determination of EMC compliance of mass-produced products	16.4.3	Part 4.3: Uncertainties, statistics and limit modelling—Statistical considerations in the determination of EMC compliance of mass-produced products
22	Information technology equipment—Radio disturbance characteristics—Limits and methods of measurement	22	Information technology equipment—Radio disturbance characteristics—Limits and methods of measurement

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

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INTRODUCTION

The CISPR 16-4 series, *Specification for radio disturbance and immunity measuring apparatus and methods – Uncertainties, statistics and limit modelling, contains information related to uncertainties, statistics and limit modelling*, and consists of the following five parts:

- Part 4-1: Uncertainties in standardized EMC tests,
- Part 4-2: Measurement instrumentation uncertainty,
- Part 4-3: Statistical considerations in the determination of EMC compliance of mass-produced products,
- Part 4-4: Statistics of complaints and a model for the calculation of limits for the protection of radio services, and
- Part 4-5: Conditions for the use of alternative test methods.

For practical reasons, standardized electromagnetic compatibility (EMC) tests are simplified representations of possible electromagnetic interference (EMI) scenarios that a product may encounter in practice. Consequently, in an EMC standard, the measurand, the limit, measurement instruments, measurement set-up, measurement procedure and measurement conditions are simplified but are still meaningful (representative). Here meaningful means that there is a statistical correlation between compliance of the product with a limit, based on a standardized EMC test using standardized test equipment, and a high probability of actual EMC of the same product during its life cycle. Part 4-4 provides methods based on statistics to derive meaningful disturbance limits to protect radio services.

In general, a standardized EMC test should be developed such that reproducible results are obtained if different parties perform the same test with the same EUT. However, various uncertainty sources limit the reproducibility of a standardized EMC.

Part 4-1 is a technical report that consists of a collection of informative reports that address all relevant uncertainty sources that may be encountered during EMC compliance tests. Typical examples of uncertainty sources are the EUT itself, the measurement instrumentation, the set-up of the EUT, the test procedures and the environmental conditions.

Part 4-2 describes a specific category of uncertainties, i.e. measurement instrumentation uncertainties. In this part, examples of MIU budgets are given for most of the CISPR measurement methods. Also in this part, normative requirements are given on how to apply the MIU when determining compliance of an EUT with a disturbance limit (i.e. conformity assessment decision).

Part 4-3 is a technical report that describes the statistical treatment of test results when compliance tests are performed on samples of mass-produced products. This treatment is known as the 80 %/80 % rule.

Part 4-4 is a technical report that contains CISPR recommendations for the collation of statistical data on interference complaints and for the classification of interference sources. Also, models for the calculation of limits for various modes of interference coupling are given.

Part 4-5 is a technical report describing a method to enable product committees to develop limits for alternative test methods, using conversions from established limits.

AUSTRALIAN/NEW ZEALAND STANDARD

Specification for radio disturbance and immunity measuring apparatus and methods

Part 4.2: Uncertainties, statistics and limit modelling—Measurement instrumentation uncertainty

1 Scope

This part of CISPR 16-4 specifies the method of applying Measurement Instrumentation Uncertainty (MIU) when determining compliance with CISPR disturbance limits. The material is also relevant to any EMC test when interpretation of the results and conclusions reached will be impacted by the uncertainty of the measurement instrumentation used during testing.

NOTE In accordance with IEC Guide 107, CISPR 16-4-2 is a basic EMC standard for use by product committees of the IEC. As stated in Guide 107, product committees are responsible for determining the applicability of the EMC standard. CISPR and its sub-committees are prepared to co-operate with technical committees and product committees in the evaluation of the applicability of this standard for specific products.

The annexes contain the background material used in providing the amount of MIU found in generating the CISPR values shown in Clauses 4 through 8 and hence provide valuable background material for those needing both initial and further information on MIU and how to take individual uncertainties in the measurement chain into account. The annexes, however, are not intended to be a tutorial or user manual or to be copied when making uncertainty calculations. For that purpose, the references shown in the bibliography, or other widely recognized documents, may be used.

Measurement instrumentation specifications are given in the CISPR 16-1 series, while the methods of measurement are covered in the CISPR 16-2 series. Further information and background on CISPR and radio disturbances is given in CISPR 16-3. The other parts of the CISPR 16-4 series contain further information on uncertainties in general, statistics and limit modelling. See the introduction of this part for more information on the background and on the content of the CISPR 16-4 series.

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 amendments) applies.

CISPR 11, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 12, *Vehicles, boats and internal combustion engines – Radio disturbance characteristics – Limits and methods of measurement for the protection of off-board receivers*

CISPR 13, *Sound and television broadcast receivers and associated equipment – Radio disturbance characteristics – Limits and methods of measurement*

CISPR 16-1-1, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*