AS/NZS CISPR 16.1.5:2015
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AS/NZS CISPR 16.1.5:2015

Australian/New Zealand Standard™

Specification for radio disturbance and immunity measuring apparatus and methods

Part 1.5: Radio disturbance and immunity measuring apparatus—Antenna calibration sites and reference test sites for 5 MHz to 18 GHz

STANDARDS Australia

STANDARDS NEW ZEALAND
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This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee TE-003, Electromagnetic Compatibility. It was approved on behalf of the Council of Standards Australia on 26 October 2015 and on behalf of the Council of Standards New Zealand on 22 October 2015.
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE-003, Electromagnetic Compatibility, to supersede AS/NZS CISPR 16.1.5:2013, *Specification for radio disturbance and immunity measuring apparatus and methods*, Part 1.5: *Radio disturbance and immunity measuring apparatus—Specifications and validation procedures for CALTS and REFTS form 30 MHz to 1 000 MHz*.

The objective of this Standard is to specify the requirements for calibration sites used to perform antenna calibrations according to AS/NZS CISPR 16.1.6 and for reference test sites (REFTS) that are used for the validation of compliance test sites (COMTS) according to AS/NZS CISPR 16.1.4.

This Standard is identical with, and has been reproduced from CISPR 16-1-5, Ed. 2.0 (2014), *Specification for radio disturbance and immunity measuring apparatus and methods,* Part 1-5: *Radio disturbance and immunity measuring apparatus—Antenna calibration sites and reference test sites for 5 MHz to 18 GHz*.

The principal differences between this and the previous edition are as follows:

(a) Site validation methods for other sites covered in AS/NZS CISPR 16.1.6 are added.

(b) Smaller step sizes are specified for swept-frequency measurements.

(c) The minimum ground plane size is increased.

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

(i) In the source text ‘this part of CISPR 16’ should read ‘this Australian/New Zealand Standard’.

(ii) 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:

Reference to International Standard		*Australian/New Zealand Standard*	
CISPR		AS/NZS CISPR	
16	Specification for radio disturbance and immunity measuring apparatus and methods	16	Specification for radio disturbance and immunity measuring apparatus and methods
16-1-4:2010 AMD1:2012	Part 1-4: Radio disturbance and immunity measuring apparatus—Antennas and test sites for radiated disturbance measurements	16.1.4:2013	Part 1.4: Radio disturbance and immunity measuring apparatus—Antennas and test sites for radiated disturbance measurements
16-1-6: 2014	Part 1-6: Radio disturbance and immunity measuring apparatus—EMC antenna calibration	16.1.6:2015	Part 1.6: Radio disturbance and immunity measuring apparatus—EMC antenna calibration

Only normative references that have been adopted as Australian or Australian/New Zealand Standards have been listed.

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

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INTRODUCTION

This standard describes validation procedures for Calibration Test Sites (CALTS) that are used to calibrate antennas in the frequency range 5 MHz to 18 GHz. The associated antenna calibration procedures are described in CISPR 16-1-6.

Due to problems with suppressing ground reflections in the frequency range 30 MHz to 200 MHz, the main function of a reflecting ground plane is for the calibration of dipole, biconical, and hybrid antennas over the frequency range for which their H-plane patterns are uniform. The free-space antenna factor, F_a, for dipole antennas may be measured in a free-space environment above 200 MHz. Because of the difficulty of reducing reflections from objects that surround an antenna, and in particular the ground surface, a flat metal ground plane is used to ensure reproducibility of results and to enable the ground reflected signal to be precisely removed mathematically.

Requirements for the construction of a CALTS are given in Annex A. The specifications and validation procedures for a CALTS are given in Clause 4. The most precise way of validating a CALTS is to use calculable dipole antennas, which are the basis of the validation procedure in this standard. The design principles of calculable antennas are given in Annex B, and the theory and methods for calculating site insertion loss (SIL) are given in Annex C and Annex D.

Validation procedures for other antenna calibration sites are given in Clause 5 through Clause 7. Where an antenna calibration method utilizes the ground reflection, a CALTS is required. The validation methods are summarized in Table 1 with reference to the associated antenna calibration methods in CISPR 16-1-6.

All site validation methods involve the measurement of SIL between two antennas. It is critical that the validation of the site itself not be unduly compromised by reflections from antenna supports; see A.3 for associated guidance.

Table 1 – Summary of site validation methods by subclause number

Calibration site(s)		CISPR 16-1-5 validation method(s) Subclause	CISPR 16-1-6:2014 calibration method(s) Subclause	Frequency range MHz	Antenna type(s)	Polarization	Notes
1	CALTS for monopoles	4.10	G.1	5 to 30	Monopole	VP	With tolerance of ± 1 dB
2	CALTS or SAC[a]	4, 7.2	8.4	30 to 1 000	Biconical, LPDA, hybrid	HP	SSM
3	CALTS or SAC	4	9.2.2	30 to 300	Biconical, hybrid, dipole	HP or VP	At large height or with absorber on ground
4	FAR	5.3.2	9.2.2	30 to 300 60 to 1 000	Biconical, hybrid, dipole Biconical, dipole	HP	
5	REFTS CALTS	4.7 4.9	9.3	30 to 300	Biconical, hybrid	VP	
6	Free space	6.1	9.4.2 9.4.3	200 to 18 000	LPDA, hybrid, horn	VP	HP with greater height
7	Free space	6.2	9.4.4	200 to 18 000	LPDA, hybrid, horn	VP (or HP)	With absorber on ground
8	FAR	5.3.3	9.5	1 000 to 18 000	Horn, LPDA	HP or VP	
9	FAR	5.3.2	9.2 and 9.4	140 to 1 000	LPDA, hybrid	HP or VP	
10	CALTS	4.6	B.4, B.5	30 to 300	Biconical, dipole	HP	
11	Transfer of properties of a validated site to a site not validated by methods in other clauses	7.1 (excluding 5.3 FAR)	A.9.4	30 and above	Any, but not monopole or loop	HP or VP	Use primarily for SAM and FAR, for particular antenna types and frequencies, except 5.3

[a] A CALTS is well specified as being free of reflecting obstacles, and if the antenna supports have negligible reflections the ground plane itself is likely to provide results that agree with the theoretical performance to better than 0,5 dB. However for a Semi Anechoic Chamber (SAC), it is important that the entire allowed acceptance criterion of 1 dB is not taken up by wall reflections, leaving no latitude for other uncertainty components such as reducing reflections from masts and cables.

NOTES

AUSTRALIAN/NEW ZEALAND STANDARD

Specification for radio disturbance and immunity measuring apparatus and methods

Part 1.5: Radio disturbance and immunity measuring apparatus—Antenna calibration sites and reference test sites for 5 MHz to 18 GHz

1 Scope

This part of CISPR 16 specifies the requirements for calibration sites in the frequency range 5 MHz to 18 GHz used to perform antenna calibrations according to CISPR 16-1-6. It also specifies the requirements for reference test sites (REFTS) that are used for the validation of compliance test sites (COMTS) in the frequency range 30 MHz to 1 000 MHz according to CISPR 16-1-4.

It has the status of a basic EMC standard in accordance with IEC Guide 107, *Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications.*

Measurement instrumentation specifications are given in CISPR 16-1-1 [1][1] and CISPR 16-1-4. Further information and background on uncertainties in general is given in CISPR 16-4 [3], which can also be helpful in establishing uncertainty estimates for the calibration processes of antennas and site validation measurements.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CISPR 16-1-4:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance measurements*
CISPR 16-1-4:2010/AMD 1:2012

CISPR 16-1-6:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-6: Radio disturbance and immunity measuring apparatus – EMC antenna calibration*

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org>)

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050, as well as the following apply.

NOTE Full terms for abbreviations not already given in 3.1 are listed in 3.2.

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1 Numbers in square brackets refer to the bibliography.