

Australian/New Zealand Standard™

**Electromagnetic compatibility of
multimedia equipment—Emission
requirements**



AS/NZS CISPR 32:2015

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.

This Standard was published on 16 December 2015.

The following are represented on Committee TE-003:

Australian Communications and Media Authority
Australian Industry Group
Australian Information Industry Association
Consumer Electronics Supplier Association
Curtin University of Technology
Department of Defence (Australian Government)
Electrical Compliance Testing Association
EMC Society of Australia
Energy Networks Association
Engineers Australia
Free TV Australia
Lighting Council Australia
Lighting Council New Zealand
Ministry of Business, Innovation and Employment, New Zealand
National Measurement Institute
Wireless Institute Australia

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com.au or Standards New Zealand web site at www.standards.co.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

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 32:2015.

Australian/New Zealand Standard™

**Electromagnetic compatibility of
multimedia equipment—Emission
requirements**

Originated as AS/NZS CISPR 32:2013.
Second edition 2015.

COPYRIGHT

© Standards Australia Limited/Standards New Zealand

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Australia) or the Copyright Act 1994 (New Zealand).

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, Private Bag 2439, Wellington 6140.

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE-003, Electromagnetic Compatibility, to supersede AS/NZS CISPR 32:2013.

The objective of this Standard is to establish requirements which provide an adequate level of protection of the radio spectrum, allowing radio services to operate as intended, and to specify procedures to ensure the reproducibility of measurement and the repeatability of results.

This Standard is identical with, and has been reproduced from CISPR 32, Ed. 2.0 (2015), *Electromagnetic compatibility of multimedia equipment—Emission requirements*.

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

- (a) Additional requirements using a FAR.
- (b) Additional requirements for outdoor unit of home satellite receiving systems.
- (c) Addition of new informative annexes covering GTEM and RVC.
- (d) Numerous maintenance items to improve the testing of MME.

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

- (i) In the source text ‘this International Standard’ 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:

| <i>Reference to International Standard</i> | | <i>Australian/New Zealand Standard</i> | |
|--|--|--|--|
| 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 |
| 16-1-1:2010 AMD1:2010 AMD2:2014 | Part 1-1: Radio disturbance and immunity measuring apparatus—Measuring apparatus | 16.1.1:2012 AMD1:2015 | Part 1.1: Radio disturbance and immunity measuring apparatus—Measuring apparatus |
| 16-1-2:2003 AMD1:2004 AMD2:2006 | Part 1-2: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Conducted disturbances | 16.1.2:2012 | Part 1.2: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Conducted disturbances |
| 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 |

| | | | |
|----------------|--|----------------|--|
| CISPR | | AS/NZS CISPR | |
| 16-2-3:2010 | Part 2-3: Methods of measurement of disturbances and immunity—Radiated disturbance measurements | 16.2.3:2012 | Part 2.3: Methods of measurement of disturbances and immunity—Radiated disturbance measurements |
| AMD1:2010 | | AMD1:2015 | |
| AMD2:2014 | | | |
| 16-4-2: 2011 | Part 4-2: Uncertainties, statistics and limit modelling—Measurement instrumentation uncertainty | 16.4.2:2013 | Part 4.2: Uncertainties, statistics and limit modelling—Measurement instrumentation uncertainty |
| IEC | | AS/NZS IEC | |
| 61000 | Electromagnetic compatibility (EMC) | 61000 | Electromagnetic compatibility (EMC) |
| 61000-4-6:2008 | Part 4-6: Testing and measurement techniques—Immunity to conducted disturbances, induced by radio-frequency fields | 61000.4.6:2013 | Part 4.6: Testing and measurement techniques—Immunity to conducted disturbances, induced by radio-frequency fields |
| ISO/IEC | | AS ISO/IEC | |
| 17025:2005 | General requirements for the competence of testing and calibration laboratories | 17025—2005 | General requirements for the competence of testing and calibration laboratories |

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

The terms ‘normative’ and ‘informative’ are used to define the application of the annexes to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

CONTENTS

| | | |
|-------|---|----|
| 1 | Scope | 10 |
| 2 | Normative references | 10 |
| 3 | Terms, definitions and abbreviations | 11 |
| 3.1 | Terms and definitions..... | 11 |
| 3.2 | Abbreviations..... | 16 |
| 4 | Classification of equipment..... | 17 |
| 5 | Requirements | 18 |
| 6 | Measurements | 18 |
| 6.1 | General..... | 18 |
| 6.2 | Host systems and modular EUT | 18 |
| 6.3 | Measurement procedure | 19 |
| 7 | Equipment documentation | 20 |
| 8 | Applicability | 20 |
| 9 | Test report..... | 21 |
| 10 | Compliance with this publication | 22 |
| 11 | Measurement uncertainty | 22 |
| | Annex A (normative) Requirements..... | 23 |
| A.1 | General..... | 23 |
| A.2 | Requirements for radiated emissions | 24 |
| A.3 | Requirements for conducted emissions..... | 28 |
| | Annex B (normative) Exercising the EUT during measurement and test signal specifications..... | 33 |
| B.1 | General..... | 33 |
| B.2 | Exercising of EUT ports | 33 |
| B.2.1 | Audio signals..... | 33 |
| B.2.2 | Video signals | 33 |
| B.2.3 | Digital broadcast signals..... | 34 |
| B.2.4 | Other signals | 34 |
| | Annex C (normative) Measurement procedures, instrumentation and supporting information | 38 |
| C.1 | General..... | 38 |
| C.2 | Instrumentation and supporting information..... | 38 |
| C.2.1 | General | 38 |
| C.2.2 | Using CISPR 16 series as the basic standard | 38 |
| C.2.3 | EUT cycle time and measurement dwell time | 41 |
| C.3 | General measurement procedures | 41 |
| C.3.1 | Overview | 41 |
| C.3.2 | Prescan measurements | 43 |
| C.3.3 | Formal measurements | 43 |
| C.3.4 | Specifics for radiated emission measurements | 43 |
| C.3.5 | Specifics for conducted emission measurements on the AC mains power ports | 43 |
| C.3.6 | Specifics for conducted emission measurements on analogue/digital data ports | 43 |

| | | |
|-----------------------|---|----|
| C.3.7 | Specifics for conducted emission measurements on broadcast receiver tuner ports | 44 |
| C.3.8 | Specifics for conducted emission measurements on RF modulator output ports | 44 |
| C.4 | MME-related measurement procedures | 44 |
| C.4.1 | Measurement of conducted emissions at analogue/digital data ports | 44 |
| C.4.2 | Measurement of emission voltages at a TV/FM broadcast receiver tuner ports in the frequency range 30 MHz to 2,15 GHz | 50 |
| C.4.3 | Measurement of the wanted signal and emission voltage at RF modulator output ports, in the frequency range 30 MHz to 2,15 GHz | 51 |
| C.4.4 | Additional Normalized Site Attenuation (NSA) values | 52 |
| Annex D (normative) | Arrangement of EUT, local AE and associated cabling | 54 |
| D.1 | Overview | 54 |
| D.1.1 | General | 54 |
| D.1.2 | Table-top arrangement | 58 |
| D.1.3 | Floor standing arrangement | 58 |
| D.1.4 | Combinations of table-top and floor standing EUT arrangement | 59 |
| D.1.5 | Arrangements for radiated measurement in a FAR | 59 |
| D.2 | MME-related conditions for conducted emission measurement | 59 |
| D.2.1 | General | 59 |
| D.2.2 | Specific conditions for table-top equipment | 60 |
| D.2.3 | Specific requirements for floor standing equipment | 61 |
| D.2.4 | Specific requirements for combined table-top and floor standing equipment | 61 |
| D.3 | MME-related requirements for radiated measurement | 61 |
| D.3.1 | General | 61 |
| D.3.2 | Requirements for table-top equipment | 61 |
| Annex E (informative) | Prescan measurements | 72 |
| Annex F (informative) | Test report contents summary | 73 |
| Annex G (informative) | Support information for the measurement procedures defined in C.4.1.1 | 74 |
| G.1 | Schematic diagrams of examples of asymmetric artificial networks | 74 |
| G.2 | Rationale for emission measurements and procedures for wired network ports | 83 |
| G.2.1 | Limits | 83 |
| G.2.2 | Combination of current probe and CVP | 84 |
| G.2.3 | Basic ideas of the CVP | 85 |
| G.2.4 | Combination of current and voltage limit | 85 |
| G.2.5 | Ferrite requirements for use in C.4.1.1 | 87 |
| Annex H (normative) | Supporting information for the measurement of outdoor unit of home satellite receiving systems | 90 |
| H.1 | Rationale | 90 |
| H.2 | General | 90 |
| H.3 | Operation conditions | 91 |
| H.4 | Specific requirements for LO measurement | 91 |
| H.5 | EUT arrangements | 92 |
| Annex I (informative) | Other test methods and associated limits for radiated emissions | 94 |
| I.1 | General | 94 |
| I.2 | Procedures for radiated emission measurements using a GTEM or RVC | 94 |
| I.3 | Additional measurement procedure information | 96 |

| | | |
|-------|--|-----|
| 1.3.1 | General | 96 |
| 1.3.2 | Specific considerations for radiated emission measurements using a GTEM | 96 |
| 1.3.3 | Specific considerations for radiated emission measurements using an RVC | 96 |
| 1.4 | Use of a GTEM for radiated emission measurements | 97 |
| 1.4.1 | General | 97 |
| 1.4.2 | EUT layout | 97 |
| 1.4.3 | GTEM, measurements above 1 GHz | 98 |
| 1.4.4 | Uncertainties | 99 |
| 1.5 | Specific EUT arrangement requirements for radiated emission measurements above 1 GHz using an RVC | 99 |
| 1.6 | Reference documents | 99 |
| | Bibliography | 101 |
| | Figure 1 – Examples of ports | 15 |
| | Figure 2 – Example of a host system with different types of modules | 19 |
| | Figure A.1 – Graphical representation of the limits for the AC mains power port defined in Table A.10 | 23 |
| | Figure C.1 – Measurement distance | 39 |
| | Figure C.2 – Boundary of EUT, Local AE and associated cabling | 40 |
| | Figure C.3 – Decision tree for using different detectors with quasi peak and average limits | 41 |
| | Figure C.4 – Decision tree for using different detectors with peak and average limits | 42 |
| | Figure C.5 – Decision tree for using different detectors with a quasi-peak limit | 42 |
| | Figure C.6 – Calibration fixture | 50 |
| | Figure C.7 – Arrangement for measuring impedance in accordance with C.4.1.7 | 50 |
| | Figure C.8 – Circuit arrangement for measurement of emission voltages at TV/FM broadcast receiver tuner ports | 51 |
| | Figure C.9 – Circuit arrangement for the measurement of the wanted signal and emission voltage at the RF modulator output port of an EUT | 52 |
| | Figure D.1 – Example measurement arrangement for table-top EUT (conducted and radiated emission) (top view) | 62 |
| | Figure D.2 – Example measurement arrangement for table-top EUT (conducted emission measurement – alternative 1) | 63 |
| | Figure D.3 – Example measurement arrangement for table-top EUT (conducted emission measurement – alternative 2) | 64 |
| | Figure D.4 – Example measurement arrangement for table-top EUT measuring in accordance with C.4.1.6.4 | 64 |
| | Figure D.5 – Example measurement arrangement for table-top EUT (conducted emission measurement – alternative 2, showing AAN position) | 65 |
| | Figure D.6 – Example measurement arrangement for floor standing EUT (conducted emission measurement) | 66 |
| | Figure D.7 – Example measurement arrangement for combinations of EUT (conducted emission measurement) | 67 |
| | Figure D.8 – Example measurement arrangement for table-top EUT (radiated emission measurement) | 67 |
| | Figure D.9 – Example measurement arrangement for floor standing EUT (radiated emission measurement) | 68 |

| | |
|--|----|
| Figure D.10 – Example measurement arrangement for combinations of EUT (radiated emission measurement) | 69 |
| Figure D.11 – Example measurement arrangement for tabletop EUT (radiated emission measurement within a FAR) | 70 |
| Figure D.12 – Example cable configuration and EUT height (radiated emission measurement within a FAR) | 71 |
| Figure G.1 – Example AAN for use with unscreened single balanced pairs | 74 |
| Figure G.2 – Example AAN with high LCL for use with either one or two unscreened balanced pairs | 75 |
| Figure G.3 – Example AAN with high LCL for use with one, two, three, or four unscreened balanced pairs | 76 |
| Figure G.4 – Example AAN, including a 50 Ω source matching network at the voltage measuring port, for use with two unscreened balanced pairs | 77 |
| Figure G.5 – Example AAN for use with two unscreened balanced pairs | 78 |
| Figure G.6 – Example AAN, including a 50 Ω source matching network at the voltage measuring port, for use with four unscreened balanced pairs | 79 |
| Figure G.7 – Example AAN for use with four unscreened balanced pairs | 80 |
| Figure G.8 – Example AAN for use with coaxial cables, employing an internal common mode choke created by bifilar winding an insulated centre-conductor wire and an insulated screen-conductor wire on a common magnetic core (for example, a ferrite toroid) | 81 |
| Figure G.9 – Example AAN for use with coaxial cables, employing an internal common mode choke created by miniature coaxial cable (miniature semi-rigid solid copper screen or miniature double-braided screen coaxial cable) wound on ferrite toroids | 81 |
| Figure G.10 – Example AAN for use with multi-conductor screened cables, employing an internal common mode choke created by multifilar winding multiple insulated signal wires and an insulated screen-conductor wire on a common magnetic core (for example, a ferrite toroid) | 82 |
| Figure G.11 – Example AAN for use with multi-conductor screened cables, employing an internal common mode choke created by winding a multi-conductor screened cable on ferrite toroids | 83 |
| Figure G.12 – Basic circuit for considering the limits with defined common mode impedance of 150 Ω | 86 |
| Figure G.13 – Basic circuit for the measurement with unknown common mode impedance | 86 |
| Figure G.14 – Impedance layout of the components in the method described in C.4.1.6.3 | 87 |
| Figure G.15 – Basic measurement setup to measure combined impedance of the 150 Ω and ferrites | 89 |
| Figure H.1 – Description of $\pm 7^\circ$ of the main beam axis of the EUT | 92 |
| Figure H.2 – Example measurement arrangements of transmit antenna for the wanted signal | 93 |
| Figure I.1 – Typical GTEM side sectional view showing some basic parts | 97 |
| Figure I.2 – Typical GTEM plan sectional view showing floor layout | 98 |
| Figure I.3 – Typical EUT mounting for combination of modules being measured | 98 |
| Figure I.4 – Overview of the reverberation chamber for radiated emission measurement | 99 |
| Table 1 – Required highest frequency for radiated measurement | 21 |

| | |
|--|----|
| Table A.1 – Radiated emissions, basic standards and the limitation of the use of particular methods | 25 |
| Table A.2 – Requirements for radiated emissions at frequencies up to 1 GHz for class A equipment | 26 |
| Table A.3 – Requirements for radiated emissions at frequencies above 1 GHz for class A equipment | 26 |
| Table A.4 – Requirements for radiated emissions at frequencies up to 1 GHz for class B equipment | 26 |
| Table A.5 – Requirements for radiated emissions at frequencies above 1 GHz for class B equipment | 27 |
| Table A.6 – Requirements for radiated emissions from FM receivers | 27 |
| Table A.7 – Requirements for outdoor units of home satellite receiving systems | 28 |
| Table A.8 – Conducted emissions, basic standards and the limitation of the use of particular methods | 29 |
| Table A.9 – Requirements for conducted emissions from the AC mains power ports of Class A equipment..... | 29 |
| Table A.10 – Requirements for conducted emissions from the AC mains power ports of Class B equipment..... | 30 |
| Table A.11 – Requirements for asymmetric mode conducted emissions from Class A equipment..... | 30 |
| Table A.12 – Requirements for asymmetric mode conducted emissions from Class B equipment..... | 31 |
| Table A.13 – Requirements for conducted differential voltage emissions from Class B equipment..... | 32 |
| Table B.1 – Methods of exercising displays and video ports..... | 34 |
| Table B.2 – Display and video parameters | 34 |
| Table B.3 – Methods used to exercise ports..... | 35 |
| Table B.4 – Examples of digital broadcast signal specifications | 36 |
| Table C.1 – Analogue/digital data port emission procedure selection | 45 |
| Table C.2 – LCL values..... | 46 |
| Table C.3 – 5 m OATS/SAC NSA values | 53 |
| Table D.1 – Measurement arrangements of EUT | 54 |
| Table D.2 – Arrangement spacing, distances and tolerances | 57 |
| Table F.1 – Summary of information to include in a test report..... | 73 |
| Table G.1 – Summary of advantages and disadvantages of the procedures described in C.4.1.6..... | 84 |
| Table H.1 – Derivation of the limit within $\pm 7^\circ$ of the main beam axis..... | 90 |
| Table I.1 – Radiated emissions, basic standards and the limitation of the use of GTEM and RVC methods..... | 94 |
| Table I.2 – Proposed limits for radiated emissions at frequencies up to 1 GHz for Class A equipment, for GTEM..... | 95 |
| Table I.3 – Proposed limits for radiated emission for frequencies above 1 GHz for Class A equipment, for GTEM..... | 95 |
| Table I.4 – Proposed limits for radiated emission for frequencies above 1 GHz for Class A equipment, for RVC | 95 |
| Table I.5 – Proposed limits for radiated emissions at frequencies up to 1 GHz for Class B equipment, for GTEM..... | 96 |
| Table I.6 – Proposed limits for radiated emission for frequencies above 1 GHz for Class B equipment, for GTEM..... | 96 |

Table I.7 – Proposed limits for radiated emission for frequencies above 1 GHz for Class B equipment, for RVC 96

AUSTRALIAN/NEW ZEALAND STANDARD

Electromagnetic compatibility of multimedia equipment—Emission requirements**1 Scope**

NOTE Blue coloured text within this document indicates text that will be aligned with the future MME immunity publication CISPR 35.

This International Standard applies to multimedia equipment (MME) as defined in 3.1.24 and having a rated r.m.s. AC or DC supply voltage not exceeding 600 V.

Equipment within the scope of CISPR 13 or CISPR 22 is within the scope of this publication.

MME intended primarily for professional use is within the scope of this publication.

The radiated emission requirements in this standard are not intended to be applicable to the intentional transmissions from a radio transmitter as defined by the ITU, nor to any spurious emissions related to these intentional transmissions.

Equipment, for which emission requirements in the frequency range covered by this publication are explicitly formulated in other CISPR publications (except CISPR 13 and CISPR 22), are excluded from the scope of this publication.

In-situ testing is outside the scope of this publication.

This publication covers two classes of MME (Class A and Class B). The MME classes are specified in Clause 4.

The objectives of this publication are:

- 1) to establish requirements which provide an adequate level of protection of the radio spectrum, allowing radio services to operate as intended in the frequency range 9 kHz to 400 GHz;
- 2) to specify procedures to ensure the reproducibility of measurement and the repeatability of results.

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 16-1-1:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*

CISPR 16-1-1:2010/AMD1:2010

CISPR 16-1-1:2010/AMD2:2014