

AS/NZS 3548:1995
IEC/CISPR 22:1993

Australian/New Zealand Standard®

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

AS/NZS 3548:1995

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee TE/3, Electromagnetic Interference. It was approved on behalf of the Council of Standards Australia on 5 September 1995 and on behalf of the Council of Standards New Zealand on 18 September 1995. It was published on 5 December 1995.

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Australian Electrical and Electronic Manufacturers Association
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STANDARDS AUSTRALIA
1 The Crescent,
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE/3 on Electromagnetic Interference to supersede AS/NZS 3548:1992, *Limits and methods of measurement of radio interference characteristics of information technology equipment*.

This Standard is identical with and has been reproduced from IEC/CISPR 22:1993, *Limits and methods of measurement of radio disturbance characteristics of information technology equipment* prepared by CISPR Subcommittee G and is one of a series of Standards intended to facilitate control of electromagnetic interference and the compatibility of electrical and electronic equipment.

A correction to the original text of Figure 1 is made on the page of the figure and the text to be corrected is noted by a bar adjacent to the text.

The term 'normative' has been used in this Standard to define the application of the annex to which it applies. A 'normative' annex is an integral part of a Standard.

Statements expressed in mandatory terms in notes, tables and figures are deemed to be requirements of this Standard.

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CISPR

AS/NZS

11	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment	2064	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment
16	CISPR specification for radio interference measuring apparatus and measurement methods	1052	CISPR specification for radio interference measuring apparatus and measurement methods
16	Specification for radio disturbance and immunity measuring apparatus and methods	1052	Specification for radio disturbance and immunity measuring apparatus and methods
16-1	Part 1: Radio disturbance and immunity measuring apparatus	1052.1	Part 1: Radio disturbance and immunity measuring apparatus
16-2	Part 2: Methods of disturbance and immunity measurements (under consideration)	—	
IEC		AS	
83	Plugs and socket-outlets for domestic and similar general use. Standards	3112	Approval and test specification—Plugs and socket-outlets
625	An interface system for programmable measuring instruments (byte serial, bit parallel)	—	

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V.24 List of definitions for interchange circuits, between data terminal equipment (DTE) and data circuit terminating equipment (DCE)

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AUSTRALIAN/NEW ZEALAND STANDARD

INTRODUCTION

The scope is extended to the whole radio frequency range from 9 kHz to 400 GHz, but limits are formulated only in restricted frequency bands which is considered sufficient to reach adequate emission levels to protect radio broadcast and telecommunication services and to allow other apparatus to operate as intended at reasonable distance.

LIMITS AND METHODS OF MEASUREMENT OF RADIO DISTURBANCE CHARACTERISTICS OF INFORMATION TECHNOLOGY EQUIPMENT

1 Scope and object

This standard applies to ITE as defined in 3.1.

Procedures are given for the measurement of the levels of spurious signals generated by the ITE and limits are specified for the frequency range 9 kHz to 400 GHz for both Class A and Class B equipment. No measurements need be performed at frequencies where no limits are specified.

The intention of this standard is to establish uniform requirements for the radio disturbance level of the equipment contained in the scope, to fix limits of disturbance, to describe methods of measurement and to standardize operating conditions and interpretation of results.

2 Normative references

The following standards are referred to in this publication:

IEC 83: 1975, *Plugs and socket-outlets for domestic and similar general use – Standards*

IEC 625, *An interface system for programmable measuring instruments (byte serial, bit parallel)*

CISPR 11: 1990, *Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific, and medical (ISM) radio-frequency equipment*

CISPR 16: 1987, *CISPR specification for radio interference measuring apparatus and measurement methods*

CISPR 16-1: 1993, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1: Radio disturbance and immunity measuring apparatus*

CISPR 16-2: 19XX, *CISPR specification for radio disturbance and immunity measuring apparatus and methods – Part 2: Methods of disturbance and immunity measurements (under consideration)*

NOTE – CISPR 16 (1987) should be used until CISPR 16-2 is available.

CCITT V.24: 1993, *List of definitions for interchange circuits, between data terminal equipment (DTE) and data circuit terminating equipment (DCE).*

3 Definitions

For the purpose of this standard the following definitions apply:

3.1 *Information Technology Equipment (ITE)*

Any equipment:

- a) which has a primary function of either (or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control, of data and of telecommunication messages and which may be equipped with one or more terminal ports typically operated for information transfer;
- b) with a rated supply voltage not exceeding 600 V.

It includes, for example, data processing equipment, office machines, electronic business equipment, and telecommunication equipment.

Any equipment (or part of the ITE equipment) which has a primary function of radio transmission and/or reception according to the ITU Radio Regulations are excluded from the scope of this standard.

NOTE – Any equipment which has a function of radio transmission and/or reception according to definitions of the ITU Radio Regulations should fulfil the national radio regulations, whether or not CISPR 22 is also valid.

Equipment, for which all disturbance requirements in the frequency range are explicitly formulated in other IEC or CISPR publications, are excluded from the scope of this standard.

3.2 equipment under test (EUT): A representative ITE or functionally interactive group of ITE (i.e. system) which includes one or more host unit(s) and is used for evaluation purposes.

3.3 host unit: Part of an ITE system or unit that provides the mechanical housing for modules, which may contain radio-frequency sources, and may provide power distribution to other ITE. Power distribution may be a.c., d.c., or both between the host unit(s) and modules or other ITE.

3.4 module: Part of an ITE which provides a function and may contain radio-frequency sources.

3.5 identical modules and ITE: Modules and ITE produced in quantity and within normal manufacturing tolerances to a given manufacturing specification.

4 Classification of ITE

ITE is subdivided into two categories denoted Class A ITE and Class B ITE.

4.1 *Class B ITE*

Class B ITE is a category of apparatus which satisfies the Class B ITE disturbance limits.

Class B ITE is intended primarily for use in the domestic environment and may include:

- equipment with no fixed place of use; for example, portable equipment powered by built-in batteries;
- telecommunication terminal equipment powered by a telecommunication network;
- personal computers and auxiliary connected equipment.

NOTE – The domestic environment is an environment where the use of broadcast radio and television receivers may be expected within a distance of 10 m of the apparatus concerned.

4.2 Class A ITE

Class A ITE is a category of all other ITE which satisfies the Class A ITE limits but not the Class B ITE limits. Such equipment should not be restricted in its sale but the following warning shall be included in the instructions for use:

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

5 Limits for conducted disturbance

5.1 Limits for conducted disturbance at mains ports

The equipment under test (EUT) shall meet the limits of disturbance of tables 1 or 2 including the average limits and the quasi-peak limits when using, respectively, an average detector receiver and a quasi-peak detector receiver, and measured in accordance with the methods described in clause 10. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

If the reading of the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the highest reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

Table 1 – Limits for conducted disturbance at the mains ports of Class A ITE

Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	79	66
0,5 to 30	73	60
NOTE – The lower limit shall apply at the transition frequency.		

Table 2 – Limits for conducted disturbance at the mains ports
of Class B ITE

Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,5 to 5	56	46
5 to 30	60	50
NOTES 1 The lower limit shall apply at the transition frequencies. 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

5.2 Limits for conducted disturbance at telecommunication ports

Under consideration.

6 Limits for radiated disturbance

The EUT shall meet the limits of tables 3 or 4 when measured at the measuring distance R in accordance with the methods described in clause 11. If the reading on the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the highest reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

Table 3 – Limits for radiated disturbance of Class A ITE at
a measuring distance of 10 m

Frequency range MHz	Quasi-peak limits dB(μV/m)
30 to 230	40
230 to 1 000	47
NOTES 1 The lower limit shall apply at the transition frequency. 2 Additional provisions may be required for cases where interference occurs.	

TABLE 4 – Limits for radiated disturbance of Class B ITE at a measuring distance of 10 m

Frequency range MHz	Quasi-peak limits dB(μV/m)
30 to 230	30
230 to 1 000	37
NOTES 1 The lower limit shall apply at the transition frequency. 2 Additional provisions may be required for cases where interference occurs.	

7 Limits for disturbance power

The authorities in certain countries apply, in the case of Class B equipment, the measurement of and limits for disturbance power for regulatory and control purposes. In this standard, the limits for, and measurement of, disturbance power of ITE are under consideration.

NOTE – Those countries which already have provision for using the absorbing clamp in their national standards may continue to include those provisions while the subject remains under consideration.

8 Interpretation of CISPR radio disturbance limit

8.1 Significance of a CISPR limit

8.1.1 A CISPR limit is a limit which is recommended to national authorities for incorporation in national standards, relevant legal regulations and official specifications. It is also recommended that international organizations use these limits.

8.1.2 The significance of the limits for equipment shall be that on a statistical basis at least 80 % of the mass-produced equipment complies with the limits with at least 80 % confidence

8.2 Application of limits in tests for conformity of equipment in series production

8.2.1 Tests shall be made:

8.2.1.1 Either on a sample of equipment of the type using the statistical method of evaluation set out in 8.2.3.

8.2.1.2 Or, for simplicity's sake, on one equipment only.

8.2.2 Subsequent tests are necessary from time to time on equipment taken at random from production, especially in the case referred to in 8.2.1.2.

8.2.3 Statistically assessed compliance with limits shall be made as follows:

This test shall be performed on a sample of not less than five and not more than 12 items of the type but if, in exceptional circumstances, five items are not available, a sample of four or three shall be used. Compliance is judged from the following relationship:

$$\bar{x} + kS_n \leq L$$

where

$\bar{x}$ is the arithmetic mean of the measured value of n items in the sample

$$S_n^2 = \frac{1}{n-1} \sum (x_n - \bar{x})^2$$

x_n is the value of the individual item

L is the appropriate limit

k is the factor derived from tables of the non-central t -distribution which assures with 80 % confidence that 80 % of the type is below the limit; the value of k depends on the sample size n and is stated below.

The quantities x_n , $\bar{x}$, S_n and L are expressed logarithmically: dB(μV), dB(μV/m) or dB(pW).

n	3	4	5	6	7	8	9	10	11	12
k	2,04	1,69	1,52	1,42	1,35	1,30	1,27	1,24	1,21	1,20

NOTE – For general information, see CISPR 16, Section Nine.

8.2.4 The banning of sales, or the withdrawal of a type approval, as a result of a dispute shall be considered only after tests have been carried out using the statistical method of evaluation in accordance with 8.2.1.1.

9 General measurement conditions

A test site shall permit disturbances from the EUT to be distinguished from ambient noise. The suitability of the site in this respect can be determined by measuring the ambient noise levels with the EUT inoperative and ensuring that the noise level is at least 6 dB below the limits specified in clauses 5 and 6.

If at certain frequency bands the ambient noise is not 6 dB below the specified limit, the methods shown in 11.4 may be used to show compliance of the EUT to the specified limits.