

Australian/New Zealand Standard™

**Electromagnetic compatibility for
radiocommunications equipment
(EN 300 339:1998, MOD)**



AS/NZS 4778:2001

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 21 March 2001 and on behalf of the Council of Standards New Zealand on 12 March 2001. It was published on 5 May 2001.

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE-003 on Electromagnetic Interference as one of a series of Standards intended to facilitate control of electromagnetic interference and the compatibility of electrical and electronic equipment.

The objective of this Standard is to provide designers, manufacturers and installers of radiocommunications equipment with limits and methods of test to afford protection to the radiofrequency spectrum from radio disturbances emitted from the equipment at other than the antenna.

It has been reproduced from European Telecommunication Standard EN 300 339 V1.1.1(1998-06), *Electromagnetic compatibility and Radio spectrum Matters (ERM)—General Electro-Magnetic Compatibility (EMC) for radio communications equipment*, which was drawn up by the Electromagnetic Compatibility and Radio Spectrum Matters (ERM) Technical Committee of the European Telecommunications Standards Institute (ETSI).

The ETSI Standard was reviewed to establish the relevance of its contents and some requirements have been varied to reflect local conditions and usage.

The text of EN 300 339 has been varied technically to accommodate different or additional requirements for Australia and New Zealand. Vertical lines in the left hand margin indicate the clause or table affected and the variations are listed in Annex ZZ.

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

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annex to which they apply. A ‘normative’ annex is an integral part of a Standard, whereas an ‘informative’ annex is only for information and guidance.

As this Standard is reproduced from a European Standard the following applies:

- (a) Its number appears on the cover and title page while the European Standard number appears only on the cover.
- (b) In the source text ‘this European Telecommunications Standard’ should read ‘this Australian/New Zealand Standard’
- (c) A full point substitutes for a comma when referring to a decimal marker.
- (d) In the source text ‘radio’ should read ‘radiocommunication’.

References to international or other Standards should be replaced by equivalent Australian or Joint Australian/New Zealand Standards as follows:

<i>Reference to International Standard</i>		<i>Australian or Australian/New Zealand Standard</i>	
IEC		AS/NZS	
1000	Electromagnetic compatibility (EMC)	61000	Electromagnetic compatibility
1000-4	Testing and measurement techniques	6100.4	Testing and measurement techniques
1000-4-2	Electrostatic discharge test	—	
1000-4-3	Radiated, radio-frequency, electromagnetic field immunity test	61000.4.3	Radiated, radio-frequency, electromagnetic field immunity test
1000-4-4	Electrical fast transient/burst immunity test	—	
1000-4-5	Surge immunity test	61000.4.5	Surge immunity test
1000-4-6	Immunity to conducted disturbances, induced by radio-frequency fields	61000.4.6	Immunity to conducted disturbances, induced by radio-frequency fields
1000-4-11	Voltage dips, short interruptions and voltage variations immunity tests	—	

ISO		AS/NZS	
7637	Road vehicles, Electrical disturbance by conducting and coupling	—	
7637.1	Part 1: Passenger cars and light commercial vehicles with nominal 12 V supply voltage—Electrical conduction along supply lines only	—	
7637.2	Part 2: Commercial vehicles with nominal 24 V supply voltage - Electrical transient conduction along supply lines only	—	
CISPR			
16	Specification for radio disturbance and immunity measuring apparatus and methods	1052	Specification for radio disturbance and immunity measuring apparatus and methods
16.1	Radio disturbance and immunity measuring apparatus	1052.1	Radio disturbance and immunity measuring apparatus
16.2	Methods of measurement of disturbances and immunity	1052.2	Methods of measurement of disturbances and immunity
EN			
50081	Electromagnetic compatibility - Generic emission standard	4251	Electromagnetic compatibility—Generic emission standard
50081-1	Part 1: Residential, commercial and light industry	4251.1	Part 1: Residential, commercial and light industry
50082	Electromagnetic compatibility - Generic immunity standard	4252	Electromagnetic compatibility; Generic immunity standard
50082-1	Part 1: Residential, commercial and light industry	4252.1	Part 1: Residential, commercial and light industry
55022	Limits and methods of measurement of radio disturbance characteristics of information technology equipment	3548	Limits and methods of measurement of radio disturbance characteristics of information technology equipment

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NOTES

AUSTRALIAN/NEW ZEALAND STANDARD

**Electromagnetic compatibility for radiocommunications equipment
(EN 300 339:1998, MOD)**

1 Scope

The present document covers the assessment of radiocommunication and ancillary equipment in respect of Electromagnetic Compatibility (EMC).

The present document may be applied to all categories of radiocommunications equipment with the exception of broadcast receivers. It does not apply to inductive communications equipment.

Where a relevant Harmonized dedicated product EMC EN or product family Harmonized EMC EN exists, such an EN takes precedence over the present document.

The present document specifies the applicable EMC tests, the methods of measurements, the limits and the minimum performance criteria for radio equipment operating in the frequency range 9 kHz to 3 000 GHz, and any associated ancillary equipment.

The present document contains all of the EMC requirements for radio equipment. However, it does not specify general methods of measurement related to the antenna port.

The present document does not specify requirements for emission above 40 GHz from the antenna port or enclosure port.

For equipment operating at frequencies above 20 GHz, specialized methods of measurement may be found in other standards related to the effective use of the radio spectrum.

The electromagnetic environments encompassed in the present document refer to generic standards EN 50081-1 [2], EN 50082-1 [3], except for the vehicular environment class which refers to ISO 7637-1 [4] and ISO 7637-2 [5].

The EMC requirements have been selected to ensure an adequate level of compatibility for apparatus at residential, commercial, light industrial and vehicular environments. The levels, however, do not cover extreme cases which may occur in any location but with a low probability of occurrence.

The present document may not cover those cases where a potential source of interference producing individually repeated transient phenomena or a continuous phenomena is permanently present, for example a radar or broadcast site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference, or the interfered part, or both.

Certain products such as high power radio transmitters, which cannot be tested in a normal test laboratory environment, can be tested on-site or at the manufacturer's premises. The general basis for the test methods and limits used to assess these products should be in accordance with the present document, where appropriate.

Compliance of radio equipment with the requirements of the present document does not signify compliance with any requirements related to the use of the equipment, for example licensing requirements.

Compliance with the requirements of the present document does not signify compliance with any safety requirements. However, it is the responsibility of the assessor of the equipment to record in the report any observations regarding the test sample becoming dangerous or unsafe as a result of the application of the tests called for in the present document.

The present document is based on the considerations and guidance given in ETR 238 [14].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, subsequent revisions do apply.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] 89/336/EEC: "Council Directive on the Approximation of the Laws of the Member States Relating to Electromagnetic Compatibility".
- [2] EN 50081-1: "Electromagnetic Compatibility; Generic Emission Standard; Part 1: Residential, Commercial and Light Industry".
- [3] EN 50082-1: "Electromagnetic Compatibility; Generic Immunity Standard; Part 1: Residential, Commercial and Light Industry".
- [4] ISO 7637-1: "Road vehicles, Electrical disturbance by conduction and coupling; Part 1: Passenger cars and light commercial vehicles with nominal 12 V supply voltage - Electrical transient conduction along supply lines only".
- [5] ISO 7637-2: "Road vehicles, Electrical disturbance by conduction and coupling; Part 2: Commercial vehicles with nominal 24 V supply voltage - Electrical transient conduction along supply lines only".
- [6] EN 55022: "Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment".
- [7] CISPR 16-1: "Specification for radio disturbance and immunity measuring apparatus and methods".
- [8] EN 61000-4-2: "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 2: Electrostatic Discharge Immunity Test".
- [9] EN 61000-4-3: "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test".
- [10] EN 61000-4-4: "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 4: Electrical Fast Transient/Burst Immunity Test".
- [11] EN 61000-4-5: "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 5: Surge Immunity Test".
- [12] EN 61000-4-6: "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 6: Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields".
- [13] EN 61000-4-11: "Electromagnetic Compatibility (EMC); Part 4: Testing and Measurement Techniques; Section 11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests".
- [14] ETR 238: "CENELEC/ETSI Standardization Programme for the Development of Harmonized Standards Related to Electro-Magnetic Compatibility (EMC) in the Field of Telecommunications".
- [15] ITU-R Radio Regulations (1994).

- [16] ETS 300 296: "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment using integral antennas intended primarily for analogue speech".
- [17] ETS 300 390: "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment intended for the transmission of data (and speech) and using an integral antenna".
- [18] ETR 027 (1991): "Radio Equipment and Systems (RES); Methods of measurement for private mobile radio equipment".
- [19] ETR 028 (1992): "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".
- [20] ETS 300 086: "Radio Equipment and Systems (RES); Land mobile group; Technical characteristics and test conditions for radio equipment with an internal or external RF connector intended primarily for analogue speech".
- [21] ETS 300 113: "Radio Equipment and Systems (RES); Land mobile service; Technical characteristics and test conditions for radio equipment intended for the transmission of data (and speech) and having an antenna connector".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions apply:

ancillary equipment: Equipment used in connection with a radiocommunications equipment is considered as an ancillary equipment if:

- the equipment is intended for use in conjunction with a radiocommunications equipment to provide additional operational and/or control features, for example to extend control to another position or location; and
- the equipment cannot be used on a stand alone basis to provide user functions independently of a radiocommunications equipment; and
- the radiocommunications equipment to which it is connected is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment. (i.e. it is not a sub unit of the main equipment essential to the main equipment's basic functions).

integral antenna equipment: Radiocommunications equipment fitted with an antenna designed to be connected to the equipment without the use of an external connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment. In equipment of this type, the enclosure port and the antenna port are identical.

non-integral antenna equipment: Radiocommunications equipment with a connector or waveguide flange intended for connection to an antenna either directly, or via a feeder or waveguide. In equipment of this type, the antenna port is separate from the enclosure port.

fixed equipment: Equipment intended for installation in a fixed position.

manufacturer (supplier): The legal entity responsible under the terms of the Council Directive 89/336/EEC [1] for placing the product on the market in a member state of the European Union.

port: A particular interface of the specified equipment (apparatus) with the electromagnetic environment. Any connection point on an equipment intended for connection of cables to or from that equipment is considered as a port (see figure 1).

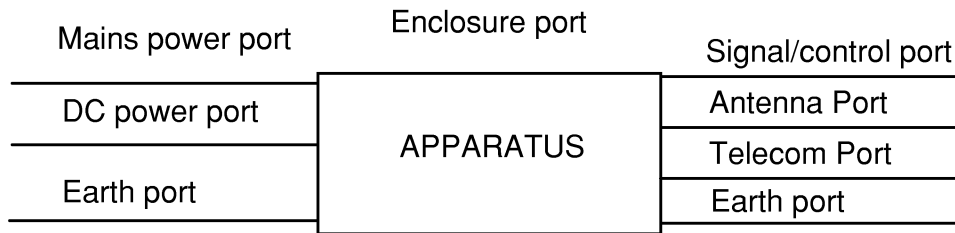


Figure 1: Examples of ports

necessary bandwidth: For a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions (ITU-R Radio Regulations [15], clause 146). For application to multi-channel or multi-carrier transmitters/transponders, where several carriers may be transmitted simultaneously from a final output amplifier or an active antenna, the necessary bandwidth is taken to be the transmitter or transponder bandwidth.

occupied bandwidth: The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage $\beta/2$ of the total mean power of a given emission. Unless otherwise specified by ITU-R for the appropriate class of emission, the value of $\beta/2$ should be taken as 0,5 % (ITU-R Radio Regulations [15]).

telecommunications port: A port intended for direct connection to a telecommunications network.

simplex: Instantaneous one-way communications link (includes semi-duplex mode).

product standard: Functional standard describing frequency management parameters of radio product.

radiocommunications equipment: Telecommunications equipment which includes one or more radio transmitters and/or receivers and/or parts thereof for use in a fixed, mobile or portable application. It can be operated with ancillary equipment but if so, is not dependent on it for basic functionality.

operating frequency range: The range(s) of continuous radio frequencies covered by the (Equipment Under Test) EUT.

enclosure port: The physical boundary of the equipment onto which an electromagnetic phenomenon may radiate or impinge. In the case of integral antenna equipment, this port is inseparable from the antenna port.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AC	Alternating Current
AM	Amplitude Modulation
AMN	Artificial Mains Network
B	measurement Bandwidth
BER	Bit Error Ratio
DC	Direct Current
DSB	Double SideBand full carrier
EMC	Electromagnetic Compatibility
emf	electromotive force
ESD	Electro Static Discharge
EUT	Equipment Under Test
FER	Frame Erasure Ratio
LISN	Line Impedance Stabilizing Network
PEP	Peak Envelope Power
RF	Radio Frequency
rms	root mean of squares
SSB	Single SideBand suppressed carrier modulation
TDM	Time Division Multiplexed