Australian/New Zealand Standard™

Radio equipment and systems—Short range devices—Limits and methods of measurement

Standards Australia

STANDARDS NEW ZEALAND
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Civil Aviation Safety Authority
Department of Defence, Australia
Electromagnetic Compatibility Society of Australia
Electromagnetic Technical Evaluation Committee
Ministry of Economic Development, New Zealand
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Australian/New Zealand Standard™

Radio equipment and systems—Short range devices—Limits and methods of measurement

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee RC-006, *Radiocommunications Equipment—General* to supersede AS 4268.1—1996 and AS 4268.2—1995.

The objective of this Standard is to provide limits and methods of measurement for short range devices placed on the Australian market, and authorized for use by the *Radiocommunications (Low Interference Potential Devices) Class Licence 2000* (LIPD) and *Radiocommunications (Radio-controlled Models) Class Licence 2002* Class Licences issued by the Australian Communications Authority, or short range devices placed on the New Zealand market, and authorized for use by the General User Radio Licence (GURL) issued by the New Zealand Ministry of Economic Development.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard

Radio equipment and systems—Short range devices—Limits and methods of measurement

1 SCOPE

This Standard applies to Short Range Devices (SRDs) commonly used for radiocommunication in Australia and New Zealand. Examples of SRDs are: alarms, baby monitors, garage door openers, data collection systems, retail and logistic systems, telecommand applications, wireless home data telemetry and/or security systems, and keyless automobile entry systems. SRDs use all types of modulation, may be fixed, mobile or portable and have dedicated, and/or integral antennas.

In Australia and New Zealand, SRDs may be referred to as Low Interference Potential Devices (LIPDs). In New Zealand, before 2002, SRDs were known as Restricted Radiation Devices (RRDs).

This Standard specifies the minimum performance and methods of measurement for Short Range Devices whose use is supported by the following Radiocommunications Licences:

(a) **Australia** The *Radiocommunications (Low Interference Potential Devices) Class Licence 2000* and the *Radiocommunications (Radio-controlled Models) Class Licence 2002*. Other requirements also exist under the Radiocommunications Compliance and Labelling scheme.

(b) **New Zealand** The *Radiocommunications Regulations (General User Radio Licence for Short Range Devices) Notice* hereafter referred to as the General User Radio Licence or GURL.

SRDs can be expected to be sharing radiofrequency spectrum with other radiocommunications devices. It is a condition of operation of an SRD that the device not cause interference to other radiocommunications devices. If an SRD causes harmful interference to authorized radiocommunications devices, even if the SRD complies with all of the technical Standards and equipment authorization requirements in the National rules, the user of that device is in breach of the conditions of operation of that device. As well, SRDs are not afforded protection from interference caused by other radiocommunications services.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

CISPR 11	Industrial, scientific and medical (ISM) radio-frequency equipment—Electromagnetic disturbance characteristics—Limits and methods of measurement
CISPR 16	CISPR specification for radio disturbance and immunity measuring apparatus and methods
CISPR 16.1	Part 1: Radio disturbance and immunity measuring apparatus
CISPR 22	Information technology equipment—Radio disturbance characteristics—Limits and methods of measurement

ANSI	
C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ETSI	
EN 300 220	ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW
EN 300 220-1	Part 1: Technical characteristics and test methods
EN 300 330	ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz
EN 300 330-1 V1.3.2	Part 1: Technical characteristics and test methods
EN 300 440	Electromagnetic Compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range
EN 300 440-1 V1.3.1	Part 1: Technical characteristics and test methods
ETR 273	Electromagnetic Compatibility and Radio spectrum Matters (ERM); Improvement of radiated methods of measurement (using test sites) and evaluation of the corresponding measurement uncertainties
ETR 273-1-1	Part 1: Uncertainties in the measurement of mobile radio equipment characteristics; Sub-part 1: Introduction
Australian Communications Authority	*Radiocommunications (Low Interference Potential Devices) Class Licence 2000* *Radiocommunications (Radio-controlled Models) Class Licence 2002*
New Zealand Ministry for Economic development	*Radiocommunications Regulations (General User Radio Licence for Short Range Devices) Notice*

3 DEFINITIONS

For the purpose of this Standard, the following definitions apply.

3.1 Alarm

Use of radiocommunication for indicating an alarm condition at a distant location.

3.2 Dedicated antenna

Removable antenna supplied and type tested with the radio equipment, designed as an indispensable part of the equipment.

3.3 Digital modulation transmitter

A digital modulation transmitter is an intentional radiator (device) that may use digital modulation techniques such as direct sequence spread spectrum modulation, or other forms of complex digital modulation such as coded orthogonal frequency division multiplexing.

3.4 Effective radiated power (ERP)

The product of the power supplied to the antenna and its gain relative to a half wave dipole in a given direction (normally the direction of maximum radiation).

3.5 Emission 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 0.5% of the total *mean power* of a given *emissio*n.

3.6 Equivalent isotropically radiated power (EIRP)

The product of the power supplied to the antenna and its gain in a given direction (normally the direction of maximum radiation) relative to an isotropic antenna (absolute or isotropic gain).

NOTE: ERP will always be 2.15 dB less than EIRP for the same radiator in a given direction.

3.7 Far field

Region where the electric and magnetic fields exist as closed loops independently of the source antenna. The far field begins approximately where the power density begins to decrease in proportion to the inverse square of the distance to the antenna.

NOTE: For a dipole antenna this corresponds to a distance greater than $\lambda/2\pi$ metres, (where λ is wavelength).

3.8 Fixed station

Equipment intended for use in a fixed location.

3.9 Integral antenna

Permanent fixed antenna, which may be built in, designed as an indispensable part of the equipment.

3.10 Mobile station

Equipment normally fixed in a vehicle.

3.11 Portable station

Equipment intended to be carried, attached or implanted.

3.12 Radiated measurements

Measurements that involve the measurement of a radiated field.

3.13 Telecommand

Use of radiocommunication for the transmission of signals to initiate, modify or terminate functions of equipment at a distance.

3.14 Telemetry

Use of radiocommunication for indicating or recording data at a distance.

4 TEST CONDITIONS

Where doubt exists with regard to test conditions or any test parameter, the National Regulator is to be consulted.

4.1 Number of test samples

Only one sample representative of production need be tested.

4.2 Normal test conditions

4.2.1 *Temperature and humidity*

The temperature and humidity conditions for tests shall be any convenient combination of ambient temperature and humidity within the following ranges:

Temperature: +15°C to +30°C

Relative humidity: 20% to 75%

4.2.2 *Test power source*

4.2.2.1 *a.c. mains voltage*

The standard test source voltages for equipment to be connected to the a.c. mains network shall be the nominal mains voltage and frequency.

4.2.2.2 *Regulated lead-acid battery power source*

When the equipment is intended for operation from the usual type of regulated lead-acid battery source, the standard test voltage shall be 1.15 times the nominal voltage of the battery (e.g. 13.8 V in the case of a vehicle lead-acid battery with a nominal voltage of 12 V).

4.2.2.3 *Nickel-cadmium battery*

When the equipment is intended for operation from the usual type of nickel-cadmium battery, the standard test voltage shall be the nominal voltage of the battery (i.e. 1.2 V per cell).

4.2.2.4 *Other power sources*

For operation from other power sources or types of battery, the standard test voltage shall be that declared by the equipment manufacturer.

4.3 Extreme test conditions

These tests only relate to tests conducted under Clause 4.4.

4.3.1 *Extreme temperatures*

For tests at extreme temperatures, measurements shall be in accordance with the procedures specified in Clause 4.4 at an upper value of +55°C and at a lower value of −10°C.

4.3.2 *Extreme test source voltages*

4.3.2.1 *a.c. mains voltage*

The extreme test source voltages for equipment to be connected to the a.c. mains network shall be 0.9 and 1.1 times the nominal mains voltage at the nominal mains frequency.

4.3.2.2 *Power source (other than battery)*

When the equipment is intended for operation from an external d.c. power source (other than battery) the extreme test voltages shall be 0.9 and 1.1 times the manufacturer's stated standard test voltage.

4.3.2.3 *Regulated lead-acid battery power sources*

When the equipment is intended for operation from the usual type of lead-acid power source, the extreme test voltages shall be 0.9 and 1.3 times the nominal voltage of the battery.

4.3.2.4 *Nickel-cadmium battery*

When the equipment is intended for operation from a nickel-cadmium battery source, the extreme test voltage shall be 0.9 times the nominal voltage of the battery source.

4.3.2.5 *Other power sources*

The lower extreme test voltage for equipment with power sources using primary batteries shall be as follows:

(a) For Leclanché type of battery—0.85 times the nominal voltage.

(b) For mercury type of battery—0.9 times the nominal voltage.

(c) For other types of primary battery—end point voltage declared by the equipment manufacturer.

For equipment using other power sources, or capable of being operated from a variety of power sources, the extreme test voltages shall be those agreed between the equipment manufacturer and the testing authority, and shall be recorded with the test results.

4.4 Procedure for tests at extreme temperatures

4.4.1 *General*

Before measurements are made the equipment shall have reached thermal balance in the test chamber. The equipment shall be switched off during the temperature stabilizing period. The sequence of measurements shall be chosen so that excessive condensation does not occur.

In the case of equipment containing temperature stabilization circuits designed to operate continuously, the temperature stabilization circuits may be switched on for 15 min after thermal balance has been attained.

4.4.2 *Procedure for equipment designed for continuous operation*

If the manufacturer states that the equipment is designed for continuous operation, the test procedure shall be as follows.

Before conducting tests at the upper temperature, the equipment shall be placed in the test chamber and left until thermal balance is attained. The equipment shall then be switched on in the transmit condition for a period of 30 min after which the equipment shall meet the specified requirements. For tests conducted at the lower temperature the equipment shall be left in the test chamber until thermal balance is attained, then switched to the stand-by or receive condition for 1 min after which the equipment shall meet the specified requirements.

4.4.3 *Procedure for equipment designed for intermittent operation*

If the manufacturer states that the equipment is designed for intermittent operation, the test procedure shall be as follows.

Before conducting tests at the upper temperature, the equipment shall be placed in the test chamber and left until thermal balance is attained. The equipment shall then be switched on for 1 min in the transmit condition, followed by 4 min in the receive condition, after which the equipment shall meet the specified requirements. For tests conducted at the lower temperature, the equipment shall be left in the test chamber until thermal balance is attained, then switched to the stand-by or receive condition for 1 min after which the equipment shall meet the specified requirements.

NOTE: In the transmit condition, the transmitter is permitted to automatically cease operation within the one minute period if it is not intended to have that duration of transmission.

4.5 Normal test signals for analogue speech

A third analogue test signal is introduced for non-speech analogue equipment. This test signal has the designation of A-M3 and is to be used in the case where analogue signals other than speech are generated and decoded in the equipment. The A-M3 test signal to be used shall be agreed between the equipment manufacturer and the National Regulator. The test signal used and the rationale behind its selection shall be reported with the result.

NOTE: A typical non-speech analogue signal is video.

5 RADIATED MEASUREMENTS

5.1 ERP and EIRP

Where a referenced method of measurement produces a measurand of Effective Radiated Power (ERP) in dBm and, the limit is provided as Equivalent Isotropically Radiated Power (EIRP) in Watts, then ERP shall be converted to EIRP in dBm by the addition of 2.15 dB then the result should be converted to, and reported in, Watts.

An alternative method is to convert the ERP in dBm to an ERP in Watts and then multiply that figure by 1.64 to give the EIRP in Watts.

5.2 High power levels in the 25 MHz to 40 GHz frequency range

The ERP method of measurement for equipment with integral or dedicated antennas in the 25 MHz to 1 000 MHz frequency range (Refer ESTI EN 300 220-1 Clause 8.3) is specified for power levels ranging up to 500 mW. Also, the EIRP substitution method of measurement in the frequency range 1 GHz to 40 GHz (Refer ETSI EN 300 400-1 Clause 7.1) is intended to measure power levels up to 4 W. However, the Class Licence and the General User Radio Licence have some applications above these power levels. The power levels of these measurement methods may be extended through the use of a calibrated attenuator fitted between the test antenna and receiver. The value of the attenuation used must be added when correcting for the gain of the substitution antenna. All values generated by this process shall be reported with the result.

NOTES:

1 Care must be taken to ensure that the measurement system is capable of accepting the magnitude of signal under test, i.e. the measurement system should be analysed to ensure adequate minimum discernible signal, third order intercept, dynamic range and noise figure.

2 Measurement uncertainty will need to be expanded to include the calibrated attenuator calibration data (Refer ETSI ETR 273-1-1 Clause 10.4).

5.3 Alternative radiated measurements of electric field strength in dB(μV/m)

Where a radiated measurement is made in the far field then the following alternative methods of measurement may be used (Refer AS/NZS CISPR 22, AS/NZS CISPR 11 or ANSI C64.4). However, all test conditions, measurement bandwidths and detector functions detailed in this Standard and the applicable method of measurement document are to be used. These alternative methods of measurement produce a measurand in dB(μV/m). The preferred measurement distance is 10 m and the measurement distance must be reported with the result. When using any of these alternative methods the limit is converted from EIRP in Watts to electric field strength in dB(μV/m) using the following formula:

$$E_{\text{lim}} = 20 \times \log_{10}\left(\frac{\sqrt{30 P_{\text{lim}}}}{d}\right) + 120 \qquad \ldots 5.1$$

where

E_{lim} = electric field strength limit, in dB(μV/m)

P_{lim} = EIRP limit, in Watts

d = measurement distance, in metres

NOTES:

1 When using Open Area Test Site (OATS) alternatives to the substitution test method, results will be approximately 5 dB higher due to coincidental addition of direct and reflected signals over a ground plane (Refer ETSI ETR 273-1-1 Clause 7.7.1.2). Consequently, measurement results obtained over a reflecting ground plane should be reduced by 5 dB before being compared to the limit, E_{lim}.

2 Where a limit changes amplitude over a band of frequencies, logarithmic interpolation of frequency (i.e. a straight line on a graph with a logarithmic frequency axis) is to be used.

3 Generally the above alternatives can only be applied above 25 MHz (Refer ETSI ETR 273-1-1 Clause 7.2).

5.4 Radiated measurements of magnetic field strength in dB(μA/m)

In the frequency range 9 kHz to 30 MHz measurement of magnetic field strength is required. The result will not be considered to demonstrate compliance unless the measurement distance is reported with the result. The limit is converted from EIRP in Watts to magnetic field strength in dB(μA/m) using the following formula:

$$H_{lim} = 20 \times \log_{10}\left(\frac{\sqrt{P_{lim}/30}}{4\pi d}\right) + 120 \qquad \ldots 5.2$$

where

H_{lim} = magnetic field strength limit, in dB(μA/m)

P_{lim} = EIRP limit, in Watts

d = measurement distance, in metres

NOTES:

1 Where a limit changes amplitude over a band of frequencies, logarithmic interpolation of frequency (i.e. a straight line on a graph with a logarithmic frequency axis) is to be used.

2 In the frequency range 9 kHz to 30 MHz it is highly unlikely that the measurement can be made in the far field.

6 INTERPRETATION OF TEST RESULTS AGAINST LIMITS TO DETERMINE COMPLIANCE

In Australia and New Zealand the application of measurement uncertainties to results in determining compliance with specification limits shall be as follows:

(a) For radiated emission level measurements, the measured value is used to determine compliance with the limit. The value of measurement uncertainty shall be equal to or lower than those required by the referenced method of measurement. For guidance on the evaluation of measurement uncertainty refer to ETSI ETR 273-1-1.

(b) For test results to Clauses 8.3 (emission bandwidth) and 8.4 (operating frequency limits) of this Standard, it should also be noted that measuring instruments not only vary in their accuracy but also their resolution of measurement. For example, a spectrum analyser locked to a very accurate frequency source but using digital display technology having 1 thousand values across the display will step from segment to segment in steps of a thousandth of the frequency span setting. The markers of these instruments can give wildly incorrect reading hence the need to employ marker generator measurement techniques. Where the result, including the measurement uncertainty, does not show a device clearly complies with the limits given in the standard, the test should be repeated using a signal generator as a marker for the band edge. For the purposes of this Standard the generator shall be referenced to a frequency reference of accuracy 1 in 10^9.

7 FREQUENCY BANDS

The radiofrequency spectrum regulators of Australia and New Zealand do not necessarily support the use of devices in the frequency bands identified in ETSI documents. ETSI documents are referred to in this paragraph for their methods of measurement; the limits provided in this Standard are to be used in conjunction with the referenced methods of measurement. Unless specifically referenced, the frequency limits provided in the ETSI document do not apply to Australia or New Zealand.

8 TRANSMITTER PARAMETERS

8.1 Maximum EIRP for Australia and New Zealand

8.1.1 *Limits for EIRP*

8.1.1.1 *Australian limits*

Refer to Tables 1 and 2 (Table 3 is provided for reference purposes).

8.1.1.2 *New Zealand limits*

Refer to the General User Radio Licence.

8.1.2 *Methods of measurement for ERP*

Equipment and frequency range	Method of measurement
Radio equipment 9 kHz to 25 MHz; and, inductive loop systems 9 kHz to 30 MHz	ETSI EN 300 330-1 V1.3.2 Clause 7.2
Radio equipment 25 MHz to 1000 MHz	ETSI EN 300 220-1 V1.3.1 Clause 8.2 for equipment with a permanent external antenna connector presenting an impedance of 50Ω; use Clause 8.3 for all other equipment.
Radio equipment 1 GHz to 40 GHz	ETSI EN 300 440-1 V1.3.1 Clause 7.1

NOTES:

1 Frequency bands for specific applications do apply, see the Class Licence and GURL.

2 Where the measurement method states ‘The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna, if necessary.’ Then subtract the calibrated gain of the substitution antenna from the result..

3 See Clause 5.3 for radiated measurement alternatives.

8.2 Transmitter spurious emissions for Australia and New Zealand

8.2.1 *Limits*

Limits are specified in clauses 8.2.1.1 and 8.2.1.2 below. For transmitter spurious emissions above 1GHz, the emissions shall not exceed the limits as specified, but without the need to be below 1.64µW EIRP (1.0µW ERP).

NOTE: This is in recognition of the rise in measuring receiver noise floor when the test receiver bandwidth according to CISPR measurement practices is increased from 120kHz to 1MHz above test frequencies of 1GHz.

8.2.1.1 *Australian limits*

Refer to Tables 1 and 2 (Table 3 is provided for reference purposes).

8.2.1.2 *New Zealand limits*

Refer to the General User Radio Licence.

8.2.2 *Methods of measurement for transmitter spurious emissions Australia and New Zealand*

Equipment and frequency range	Method of measurement
Radio equipment 9 kHz to 25 MHz; and, inductive loop systems 9 kHz to 30 MHz	ETSI EN 300 330-1 V1.3.2 Clause 7.4
Radio equipment 25 MHz to 1000 MHz	ETSI EN 300 220-1 V1.3.1 Clause 8.7
Radio equipment 1 GHz to 40 GHz	ETSI EN 300 440-1 V1.3.1 Clause 7.3

NOTES:

1 See the notes associated with Clause 8.1.2 for measurement guidance.

2 Transmitter spurious emissions are of an unmodulated transmitter.

8.3 Emission bandwidth

8.3.1 *Emission bandwidth limits*

NOTE: The upper and lower frequency limits of the *emission bandwidth* shall at all times remain within the operating frequency limits given in Clause 8.4.

8.3.1.1 *Australian limits*

Refer to Tables 1 and 2 (Table 3 is provided for reference purposes).

8.3.1.2 *New Zealand limits*

Refer to the General User Radio Licence

Some transmitter categories require a specific limit for *emission bandwidth*. In such cases the *emission bandwidth* established by testing in accordance with Clause 8.3.2 must not exceed the specified value.

8.3.2 *Method of measurement for emission bandwidth*

A spectrum analyser or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output. The frequencies of the upper and lower markers indicating the edges of the transmitters '99% power' emission bandwidth shall be recorded. The emission bandwidth shall then be calculated.

When making a measurement of the emission bandwidth:

(a) An rms detector function must be used. The measurement bandwidth used must be stated with the result. The rms detector used must comply with AS/NZS CISPR 16.

(b) A measurement instrument with an integrated 99% power bandwidth function may be used to automate the test process.

(c) The measurement instrument bandwidth and span must be set sufficiently wide, and, the scan time set sufficiently slow, to ensure all major modulation products are captured. Note that the measurement bandwidth should also be set sufficiently narrow to avoid adding significant error to the test result.

(d) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided the emission is repetitive in nature.

NOTES:

1 For non-speech analogue equipment refer Clause 4.5 regarding the test signal.

2 For telecommand or telemetry transmissions it is desirable to have the transmission enabled for at least 3 s so that all sidebands and modulation products may be observed.

3 Alternative test methods to the one above may be required for pulse modulated transmitters (e.g. radar), spread spectrum and more complex digital modulation types.

8.4 Operating Frequencies for Australia and New Zealand

8.4.1 ***Operating frequency limits.*** *(Operation within permitted operating frequency band)*

Emission bandwidth shall be within the designated frequency band. This requirement applies to all transmitters, whether single frequency or multi-channel.

8.4.1.1 *Australian limits*

Testing is to be conducted under normal and extreme test conditions. Refer to Tables 1 and 2 (Table 3 is provided for reference purposes).

8.4.1.2 *New Zealand limits*

Refer to the General User Radio Licence. Testing is to be conducted under normal and extreme test conditions.

8.4.2 *Method of measurement for operating frequency in Australia and New Zealand*

For testing purposes, multi-channel transmitters may be tested on the highest and lowest available channels only (for upper and lower band edges respectively), to demonstrate compliance.

Compliance is determined by using the emission bandwidth test method given in Clause 8.3.2. The upper and lower frequency limits of the emission bandwidth shall lay within the permitted frequency band at all times to meet requirements. The test report shall include details of the modulation scheme used as per Article 2, Appendix 1 of the *International Telecommunication Union Radio Regulation* (Edition of 2001).

An alternative method of assessment is to use a combination of results for the measured emission bandwidth test and frequency stability test performed according to the standards listed below. If the modulated emission is symmetrical about the carrier frequency, then the upper and lower frequency limits of the emission can be determined by adding and subtracting half the emission bandwidth from the unmodulated carrier frequency measured under all test conditions. This assumes that the application of modulation does not affect frequency stability.

Equipment and frequency range	**Method of measurement**
Radio equipment 9 kHz to 25 MHz; and, inductive loop systems 9 kHz to 30 MHz	ETSI EN 300 330-1 V1.3.2 Clause 7.3.2
Radio equipment 25 MHz to 1000 MHz	ETSI EN 300 220-1 V1.3.1 Clause 8.6.2
Radio equipment 1 GHz to 40 GHz	ETSI EN 300 440-1 V1.3.1 Clause 7.2.2; or, for FHSS use Clause 7.2.3

The designated frequency band is the permitted operating frequency band in Table 1 or 2 or the operating frequency limits of the GURL.

NOTES:

1 For telecommand or telemetry transmissions it is desirable to have the transmission enabled for at least 3 s so that all sidebands and modulation products may be observed.

2 Alternative test methods to the one above may be required for pulse modulated transmitters (e.g. radar), spread spectrum and more complex digital modulation types.

9 RECEIVER PARAMETERS

9.1 Receiver emissions

9.1.1 *Limits for receiver emissions in Australia and New Zealand*

Equipment and frequency range	Limit
Radio equipment 9 kHz to 25 MHz; and, inductive loop systems 9 kHz to 30 MHz	9 kHz to 30 MHz Figure 1; and, from 30 MHz to 1 GHz 3.3 nW EIRP, or 2.0 nW ERP.

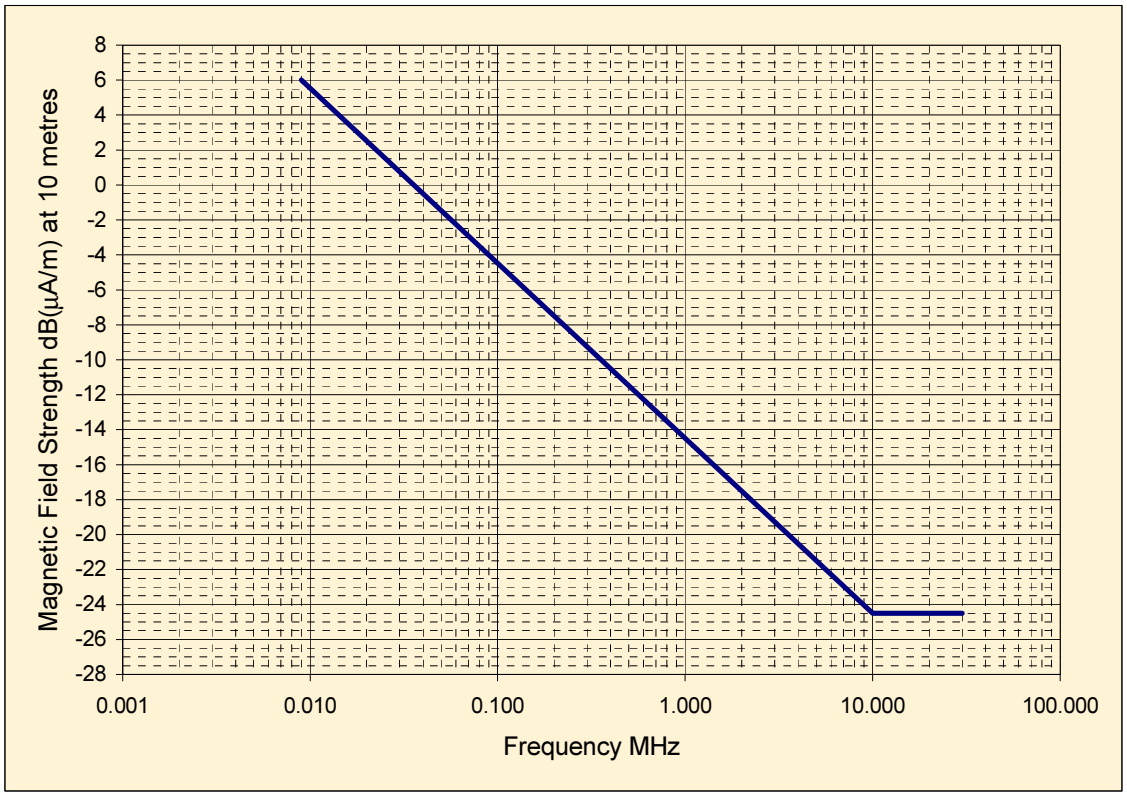

FIGURE 1 RECEIVER EMISSIONS 9 kHz TO 30 MHz

Equipment and frequency range	Limit
All other radio equipment	25 MHz to 1 GHz 3.3 nW EIRP, or 2.0 nW ERP 1 GHz to 40 GHz 32.8 nW EIRP, or 20 nW ERP

9.1.2 *Methods of measurement for receiver emissions in Australia and New Zealand*

Equipment and frequency range	Method of measurement
Radio equipment 9 kHz to 25 MHz; and, inductive loop systems 9 kHz to 30 MHz	ETSI EN 300 330-1 V1.3.2 Clause 8.3
Radio equipment 25 MHz to 1000 MHz	ETSI EN 300 220-1 V1.3.1 Clause 9.4
Radio equipment 1 GHz to 40 GHz	ETSI EN 300 440-1 V1.3.1 Clause 8.4

NOTE: For measurement guidance refer to the notes associated with Clause 8.1.2.

TABLE 1

AUSTRALIAN REQUIREMENTS

Row	Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Transmitter spurious emissions (EIRP)	Other requirements
1	All transmitters	0.000 to 0.014	200 µW	0.2µW	
2	All transmitters	0.014 to 0.01995	50 µW	0.1µW	
3	All transmitters	0.02005 to 0.07	7.5 µW	0.1µW	
4	All transmitters	0.07 to 0.16	3 µW	0.1µW	
5	All transmitters	0.16 to 0.285 0.325 to 0.415	500 nW	0.1µW	
6	All transmitters	3.025 to 3.155	7.5 nW	7.5nW	
7	All transmitters	3.5 to 3.7	30 pW	30pW	
8	All transmitters	3.7 to 3.95 4.438 to 4.65	7.5 nW	7.5nW	
9	All transmitters	13.553 to 13.567	100 mW	1µW	
10	All transmitters	24 to 24.89	10 mW	0.1µW	
11	All transmitters	26.957 to 27.283	1 W	2.5µW	1. Separation of the transmitter's emission from the centre frequency of any adjacent citizen band radio channel must be at least 5 kHz. 2. The emission bandwidth must not exceed 10 kHz.

(*continued*)

TABLE 1 (*continued*)

Row	Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Transmitter spurious emissions (EIRP)	Other requirements
12	All transmitters	29.7 to 29.72 30 to 30.0625 30.3125 to 31 36.6 to 37 39 to 39.7625 40.25 to 40.66	100 mW	5µW	
13	All transmitters	40.66 to 41	1W	5µW	
14	All transmitters	54 to 56	2.5 mW	0.1µW	
15	All transmitters	70 to 70.24375 77.29375 to 77.49375 150.7875 to 152.49375 173.29375 to 174	100 mW	0.1µW	
16	All transmitters	225 to 242 244 to 267 273 to 303.95 304.05 to 328.6 335.4 to 399.9	10 µW	0.1µW	
17	All transmitters	433.05 to 434.79	25 mW	0.1µW	
18	All transmitters	915 to 928	3 mW	0.1µW	
19	All transmitters	2400 to 2463	10 mW	0.1µW	
20	All transmitters	10 500 to 10 550 24 000 to 24 250	100 mW	1µW	
21	Wireless audio transmitters and auditory assistance transmitters (See Note 1)	88 to 108	10 µW	0.1µW	1. The emission must be frequency modulated and have a maximum bandwidth of 180 kHz. 2. Capable of frequency change by the user to meet the operational requirements of the Class Licence. Refer to Note 1

(*continued*)

TABLE 1 (*continued*)

Row	Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Transmitter spurious emissions (EIRP)	Other requirements
22	Wireless audio transmitters (See Note 1)	174 to 230 520 to 820	3 mW	0.1µW	1. The emission must be frequency modulated and have a maximum bandwidth of 330 kHz. 2. Capable of frequency change by the user to meet the operational requirements of the Class Licence. Refer to Note 1
23	Biomedical telemetry transmitters (See Note 1)	174 to 230	10 µW	0.1µW	1. Capable of frequency change by the user to meet the operational requirements of the Class Licence. Refer to Note 1
24	Biomedical telemetry transmitters (See Note 1)	520 to 668	3 mW	0.1µW	1. Capable of frequency change by the user to meet the operational requirements of the Class Licence. Refer to Note 1
25	Telecommand or telemetry transmitters	472.0125 to 472.1125	100 mW	0.1µW	
26	Telecommand or telemetry transmitters	2400 to 2450 5725 to 5795 5815 to 5875	1 W	10µW	
27	Telecommand or telemetry transmitters	5795 to 5815	2 W	10µW	
28	Auditory assistance transmitters	3.155 to 3.4, with a carrier frequency of: (a) 3.175 MHz; or (b) 3.225 MHz; or (c) 3.275 MHz; or (d) 3.325 MHz.	60 µW	0.1µW	

(*continued*)

TABLE 1 (*continued*)

Row	Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Transmitter spurious emissions (EIRP)	Other requirements
29	Auditory assistance transmitters	1. 41 to 42, with a carrier frequency of: (a) 41.55 MHz; or (b) 41.65 MHz; or (c) 41.75 MHz; or (d) 41.85 MHz; or (e) 41.95 MHz. 2. 43 to 44, with a carrier frequency of: (a) 43.05 MHz; or (b) 43.15 MHz; or (c) 43.25 MHz; or (d) 43.35 MHz; or (e) 43.45 MHz.	1.3 mW	0.1µW	
30	Radiofrequency identification transmitters	1.77 to 2.17 2.93 to 3.58 7.2 to 10.01	100 pW	100pW	
31	Radiofrequency identification transmitters	13.553 to 13.567 918 to 926 2400 to 2450 5725 to 5795 5815 to 5875 24 000 to 24 250	1 W	1µW	
32	Radiofrequency identification transmitters	5795 to 5815	2 W	1µW	
33	Alarm transmitters (including security and personal safety transmitters)	303.60 to 304.05	100 µW	0.1µW	

(*continued*)

TABLE 1 (*continued*)

Row	Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Transmitter spurious emissions (EIRP)	Other requirements
34	Home detention monitoring equipment	314.075 to 314.325	200 µW	0.1µW	In a 10 s period, a single transmission must not exceed 10^{-3} s.
35	Radio-determination transmitters	24 000 to 24 250	1 W		
36	Radio-determination transmitters	60 000 to 61 000	20 mW		
37	Aquatic-animal-tracking transmitters	48 to 49	10 mW	1µW	
38	Personal alarm transmitters	27.500 to 27.510	100 µW	0.1µW	
39	Transmitters used with personal alarm transmitters operating in the frequency band 27.500 – 27.510 MHz	27.500 to 27.510	500 mW	2.5µW	Each transmission must not exceed 4 s over a 60 s period.
40	Alarm transmitters	344.8 to 345.2	1 mW	0.1µW	The average EIRP must not exceed 100 µW: (a) if the length of a pulse train does not exceed 0.1 s— in the length of one complete pulse train; or (b) if the length of a pulse train exceeds 0.1 s— in the 0.1 s period during which the EIRP is at its maximum value; or (c) if a transmitter operates for more than 0.1 s—in the 0.1 s period during which the EIRP is at its maximum value.

(*continued*)

TABLE 1 (*continued*)

Row	Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Transmitter spurious emissions (EIRP)	Other requirements
41	Radio Local Area Network transmitters used indoors	5150 to 5350	200 mW (averaged over the entire transmission burst)	2μW /MHz	1. If the emission bandwidth is 1 MHz or greater, the radiated power spectral density in any 1 MHz is limited to 10 mW per MHz. 2. If the emission bandwidth is less than 1 MHz, the radiated power spectral density in any 4 kHz is limited to 40μW per 4 kHz.
42	Radiodetermination transmitters	5725 to 5875	1 mW		
43	Radiodetermination transmitters	76 000 to 77 000	25 W		
44	Video Sender transmitters	529 to 806	12μW	3nW	Refer to Note 1 1. Emission bandwidth shall be less than 11.5 MHz, centred on vision carrier. 2. Minimum tuning range shall be 70MHz. 3. The device shall be capable of operation on only one carrier at a time. 4. The device's antenna must be integral only and not more than 0.15 m in length.
45	Digital modulation transmitters	915 to 928	1 W	1. Refer to Note 2. 2. Refer to Note 3.	Refer to Note 4.

(*continued*)

TABLE 1 (*continued*)

Row	Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Transmitter spurious emissions (EIRP)	Other requirements
46	Digital modulation transmitters	2400 to 2483.5	4 W	1. Refer to Note 2. 2. Refer to Note 3.	Refer to Note 4.
47	Digital modulation transmitters	5725 to 5850	4 W	1. Refer to Note 2. 2. Refer to Note 3.	Refer to Note 4.

NOTES:

1 These devices must be capable of being retuned by the operator to comply with the conditions of use prescribed by the LIPD class licence, i.e. 'Transmission in a radio channel must not originate in the Licence area of a radio broadcasting station (including a repeater or translator station) operating in the same channel'.

2 The radiated peak power spectral density in any 3 kHz is limited to 25 mW per 3 kHz.

3 The minimum 6 dB bandwidth shall be at least 500 kHz.

4 In any 100 kHz bandwidth outside the frequency band in which the transmitter is operating, the power shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

TABLE 2

AUSTRALIAN REQUIREMENTS FOR TRANSMITTERS USED FOR THE RADIO CONTROL OF MODEL AIR, WATER AND LAND CRAFT IN THE FREQUENCY BANDS 29.72 TO 30 MHZ AND 36 TO 36.6 MHZ

Row	Transmitter application	Permitted operating frequency band	Maximum EIRP	Transmitter spurious emissions (EIRP)	Limitations prescribed in the 'Radiocommunications (Radio-controlled Models) Class Licence 2002'
1	Model landcraft, model watercraft and model aircraft	29.72 to 30 MHz	Greater than 300 mW and not exceeding 1 W	50µW	Maximum emission bandwidth 10kHz
2	Model watercraft, and model aircraft	36 to 36.6 MHz	Greater than 300 mW and not exceeding 1 W	50µW	1. Maximum emission bandwidth 10kHz. 2. On carrier frequencies in the band as specified by the formula: 35.990 + n(0.020) MHz (for whole numbers of n from 1 to 30 inclusive)
3	Model aircraft	36 to 36.6 MHz	Greater than 300 mW and not exceeding 1 W	50µW	1. Maximum emission bandwidth 10kHz. 2. On carrier frequencies in the band specified by the formula: 36.000 + n(0.020) MHz (For whole numbers of n from 1 to 29 inclusive)

TABLE 3

AUSTRALIAN REQUIREMENTS (REFERENCED BY TRANSMITTER CLASS)

Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Reference	Row
Alarm transmitters (Personal safety)	27.500 to 27.510	100µW	Table 1	38
Alarm transmitters used with personal alarm transmitters	27.500 to 27.510	500 mW	Table 1	39
Alarm transmitters (including security and personal safety transmitters)	303.60 to 304.05	100µW	Table 1	33
Alarm transmitters	344.8 to 345.2	1 mW	Table 1	40
All transmitters	0.000 to 0.014	200 µW	Table 1	1
All transmitters	0.014 to 0.01995	50µW	Table 1	2
All transmitters	0.02005 to 0.07	7.5µW	Table 1	3
All transmitters	0.07 to 0.16	3µW	Table 1	4
All transmitters	0.16 to 0.285	500 nW	Table 1	5
All transmitters	0.325 to 0.415	500 nW	Table 1	5
All transmitters	3.025 to 3.155	7.5 nW	Table 1	6
All transmitters	3.5 to 3.7	30 pW	Table 1	7
All transmitters	3.7 to 3.95	7.5 nW	Table 1	8
All transmitters	4.438 to 4.65	7.5 nW	Table 1	8
All transmitters	13.553 to 13.567	100 mW	Table 1	9
All transmitters	24 to 24.89	10 mW	Table 1	10
All transmitters	26.957 to 27.283	1 W	Table 1	11
All transmitters	29.7 to 29.72	100 mW	Table 1	12
All transmitters	30 to 30.0625	100 mW	Table 1	12
All transmitters	30.3125 to 31	100 mW	Table 1	12
All transmitters	36.6 to 37	100 mW	Table 1	12
All transmitters	39 to 39.7625	100 mW	Table 1	12
All transmitters	40.25 to 40.66	100 mW	Table 1	12
All transmitters	40.66 to 41	1W	Table 1	13
All transmitters	54 to 56	2.5 mW	Table 1	14
All transmitters	70 to 70.24375	100 mW	Table 1	15

(*continued*)

TABLE 3 (*continued*)

Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Reference	Row
All transmitters	77.29375 to 77.49375	100 mW	Table 1	15
All transmitters	150.7875 to 152.49375	100 mW	Table 1	15
All transmitters	173.29375 to 174	100 mW	Table 1	15
All transmitters	225 to 242	10μW	Table 1	16
All transmitters	244 to 267	10μW	Table 1	16
All transmitters	273 to 303.95	10μW	Table 1	16
All transmitters	304.05 to 328.6	10μW	Table 1	16
All transmitters	335.4 to 399.9	10μW	Table 1	16
All transmitters	433.05 to 434.79	25 mW	Table 1	17
All transmitters	915 to 928	3 mW	Table 1	18
All transmitters	2400 to 2463	10 mW	Table 1	19
All transmitters	10 500 to 10 550	100 mW	Table 1	20
All transmitters	24 000 to 24 250	100 mW	Table 1	20
Aquatic-animal-tracking transmitters	48 to 49	10 mW	Table 1	37
Auditory assistance transmitters	3.155 to 3.4 (on specified channels)	60μW	Table 1	28
Auditory assistance transmitters	41 to 42 (on specified channels)	1.3 mW	Table 1	29
Auditory assistance transmitters	43 to 44 (on specified channels)	1.3 mW	Table 1	29
Biomedical telemetry transmitters	174 to 230	10μW	Table 1	23
Biomedical telemetry transmitters	520 to 668	3 mW	Table 1	24
Digital modulation transmitters	915 to 928	1 W	Table 1	45
Digital modulation transmitters	2400 to 2483.5	4 W	Table 1	46
Digital modulation transmitters	5725 to 5850	4 W	Table 1	47
Home detention monitoring equipment	314.075 to 314.325	200μW	Table 1	34
Radio-controlled Model aircraft, land-craft and watercraft.	29.72 to 30 MHz	Between 300 mW and 1 W	Table 2	1
Radio-controlled Model aircraft and watercraft only.	36 to 36.6 MHz (on specified channels)	Between 300 mW and 1 W	Table 2	2

(*continued*)

TABLE 3 (*continued*)

Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Reference	Row
Radio-controlled Model aircraft only.	36 to 36.6 MHz (on specified channels)	Between 0.3 and 1 Watt	Table 2	3
R-LANS (Radio Local Area Network transmitters used indoors)	5150 to 5350	200 mW (averaged over the entire transmission burst)	Table 1	41
Radio-determination transmitters	5725 to 5875	1 mW	Table 1	42
Radio-determination transmitters	76 000 to 77 000	25 W	Table 1	43
Radio-determination transmitters	24 000 to 24 250	1 W	Table 1	35
Radio-determination transmitters	60 000 to 61 000	20 mW	Table 1	36
Radiofrequency identification transmitters	1.77 to 2.17	100 pW	Table 1	30
Radiofrequency identification transmitters	2.93 to 3.58	100 pW	Table 1	30
Radiofrequency identification transmitters	7.2 to 10.01	100 pW	Table 1	30
Radiofrequency identification transmitters	13.553 to 13.567	1 W	Table 1	31
Radiofrequency identification transmitters	918 to 926	1 W	Table 1	31
Radiofrequency identification transmitters	2400 to 2450	1 W	Table 1	31
Radiofrequency identification transmitters	5725 to 5795	1 W	Table 1	31
Radiofrequency identification transmitters	5795 to 5815	2 W	Table 1	32
Radiofrequency identification transmitters	5815 to 5875	1 W	Table 1	31
Radiofrequency identification transmitters	24 000 to 24 250	1 W	Table 1	31
Telecommand or telemetry transmitters	472.0125 to 472.1125	100 mW	Table 1	25
Telecommand or telemetry transmitters	2400 to 2450	1 W	Table 1	26
Telecommand or telemetry transmitters	5725 to 5795	1 W	Table 1	26

(*continued*)

TABLE 3 (*continued*)

Class of transmitter	Permitted operating frequency band (MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Reference	Row
Telecommand or telemetry transmitters	5795 to 5815	2 W	Table 1	27
Telecommand or telemetry transmitters	5815 to 5875	1 W	Table 1	26
Video Sender transmitters	529 to 806	12μW	Table 1	44
Wireless audio transmitters and auditory assistance transmitters	88 to 108	10μW	Table 1	21
Wireless audio transmitters	174 to 230	3 mW	Table 1	22
Wireless audio transmitters	520 to 820	3 mW	Table 1	22
W-LANS (Wireless -Local Area Network transmitters used indoors)	5150 to 5350	200 mW (averaged over the entire transmission burst)	Table 1	41

10 FURTHER INFORMATION

10.1 General

Further information on the Licences specified in this Standard can be obtained from:

(a) **Australia** Sections 132 and 135 of the Radiocommunications Act 1992 Radiocommunications Class Licence (Low Interference Potential Devices)

More information is available from the Australian Communications Authority at http://www.aca.gov.au/aca_home/licensing/radcomm/class_licensing/index.htm

(b) **New Zealand** Radiocommunications Regulations (General User Radio Licence for Short Range Devices)

More information on the compliance requirements for SRD products is available from the Ministry of Economic Development at http://www.med.govt.nz/rsm/.

NOTES

NOTES

Standards Australia

Standards Australia is an independent company, limited by guarantee, which prepares and publishes most of the voluntary technical and commercial standards used in Australia. These standards are developed through an open process of consultation and consensus, in which all interested parties are invited to participate. Through a Memorandum of Understanding with the Commonwealth government, Standards Australia is recognized as Australia's peak national standards body.

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