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Radio Standards Specification

Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands)

Canada

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Preface

This issue 5 replaces RSS-210, Issue 4, (December, 2000) entitled *Low Power Licence-Exempt Radiocommunications Devices (All Frequency Bands).*

This document sets out standards for the certification of low power radiocommunication devices (Category I devices), as well as criteria and standards for compliance for certain devices that are certification exempt (Category II devices).

Both Categories of devices are exempt from licensing and operate on a "no-interference no-protection" basis.

Main Changes are:

(1)	Section 5.18	Modular Construction (New)
(2)	Section 6.2.2(L2.1)(a)	FRS Telephones Transition Period (Amended)
(3)	Section 6.2.2(L2.1)(e)	FRS Telephones Unwanted Emissions (Amended)
(4)	Section 6.2.2(o)(a3)	Increased EIRP limit for 2.4 GHz remote stations of point-to-multipoint systems (Amended)
(5)	Section 6.2.2(o)(b)	Increased EIRP limit for 2.4 GHz remote stations of point-to-multipoint systems (Amended)
(6)	Section 6.2.2(o)(d3)	Increased EIRP limit for 2.4 GHz remote stations of point-to-multipoint systems (Amended)
(7)	Section 6.2.2(o)(q1)	Increased EIRP limit for 5 GHz remote stations of point-to-multipoint systems (Amended)
(8)	Section 6.2.2(t1)	Vehicular-Mounted Field Disturbance Sensors (New)
(9)	Section 6.2.2(t2)	Devices in the 59-64 GHz band (New)
(10)	Table 5 and 10	FRS Telephones (New)

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1. Scope

1.1 Categories of Equipment

This Radio Standards Specification (RSS) sets out standards for licence-exempt (i.e. unlicensed) low power radiocommunication (abbreviated to "radio") devices (LPDs).

LPDs will be exempt from the licensing requirement contained in subsection 4(1) of the *Radiocommunication Act* , provided that they meet the standards for LPDs identified as either Category I or II equipment, as the case may be, contained in this document.

The devices (transmitters and receivers, including paging receivers) are permitted to operate in designated frequency bands other than the restricted bands of Table 2. Restricted bands are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite down links, radio astronomy, and some Government uses.

This RSS also sets out standards for receivers not covered by other RSSs, e.g. stand-alone receivers like GPS (Global Positioning System) receivers.

LPDs have intentional and unwanted emissions of very low signal levels such that they can co-exist with licensed radio services. LPDs are required to operate on a **"no-interference no-protection"** basis, i.e. they may not cause radio interference and cannot claim protection from interference (see 2.4 and 5.12).

1.2 Category I Equipment

Category I equipment comprises radio devices where a technical acceptance certificate (TAC) is required, pursuant to subsection 4(2) of the *Radiocommunication Act* and the *Radio Regulations*. Before certification is granted, the applicant shall show that the applicable standards have been complied with.

1.3 Category II Equipment

Category II equipment (a radio transmitter or receiver) comprises radio devices where a standard has been prescribed but for which a TAC is not required, that is, equipment certification by Industry Canada (herein also known as the Department or the Department of Industry) is not required (certification exempt), pursuant to subsection 4(3) of the *Radiocommunication Act*. The manufacturer or importer shall nevertheless ensure that the standards (see section 8) are complied with.

2. General

The rest of this document is set out into sections 2 to 15.

2.1 Categories I and II Standards

Section 6 and its subsections deal with standards for Category I equipment. Section 8 and its subsections deal with standards for Category II equipment. The remaining sections apply generally to both categories.

2.2 Exclusions

2.2.1 Broadcasting Apparatus

Radio devices covered by this RSS do not include radio and TV apparatus intended for broadcasting services. Such apparatus are regulated by the Department's existing broadcasting apparatus regulations.

2.2.2 Interference-Causing Equipment Other Than Radiocommunication Receivers

Unintentional radiators (other than radio receivers) are regulated by the Interference-Causing Equipment Standards published by and obtainable from Industry Canada see Internet address in section 3.

2.3 Inquiries about this Standard

Inquiries about this RSS-210 Standard may be directed to Industry Canada's local office or to:

Manager
Radio Equipment Standards
Industry Canada
300 Slater Street
Ottawa, Canada
K1A 0C8
Tel: (613) 990-4699 / fax: (613) 990-3961
E-mail: res.nmr@ic.gc.ca

However, inquiries concerning **equipment certification** matters should be directed to :
Chief, Certification and Engineering Bureau (see address in section 15).

2.4 Engineering Practice

LPDs should not emit more energy than is required for their intended functions. The field strength limits in this Standard will not prevent harmful interference under all circumstances. Since users of licence-exempt devices complying with this RSS-210 are required to cease operation should harmful interference occur to authorized users (*) of the radio spectrum, the parties responsible for equipment compliance should employ the minimum field strength necessary, and provide greater attenuation of unwanted emissions than required by this standard, in line with good engineering practice. They shall in any case not exceed the permissible limits set out in this RSS.

*__Note:__ Authorized users are listed in the Canadian Table of Frequency Allocations, amended from time to time, obtainable from Industry Canada's Internet site (see address in section 3).

2.5 New Technologies

Systems that cannot conform to this Standard, especially those using new technologies, may be evaluated on a case-by-case basis by the Manager, Radio Equipment Standards; see address in section 2.3.

2.6 Quality Control

Periodic sample testing shall be carried out and the test results retained by the manufacturer or importer to ensure continuing compliance (with standards) of the newly manufactured/imported units intended for sale in Canada. Non-compliance problems shall be corrected by the manufacturer or importer. Industry Canada will conduct audit checks from time to time to ensure compliance.

3. Related Documents

The following are related documents. Radio Standards Procedure 100 (RSP-100) and Telecommunications Regulations Circular 49 (TRC-49) provide guidance and the fee schedule when applying for equipment certification.

If the radio device e.g. the base station of a cordless telephone, is intended for connection to a public switched telecommunication network, the device shall also comply with the standard CS-03 and be certified under both the Terminal Attachment Program procedure CP-01 as well as under the radio equipment certification procedure RSP-100. Common carrier hub station equipment however may be exempt from this requirement; for further details, contact the Certification Bureau.

3.1	RSP-100:	"Radio equipment certification procedure".
3.2	TRC-49:	"Certification service fees" schedule.
3.3	CP-01:	"Procedure to obtain certification for terminal equipment."
3.4	CS-03:	"Certification standard for terminal equipment".
3.5	ICES-003:	"Interference-causing equipment standard - digital apparatus".
3.6	RSS-102:	"Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields"
3.7	RSS-212:	"Test Facilities and Test Methods for Radio Equipment".
3.8	RIC 66:	Radiocommunication Information Circular: "Addresses and Telephone Numbers of Regional and District Offices of Industry Canada".
3.9	TRC-43:	"Notes Regarding Designation of Emission, Class of Station and Nature of Service)".

The above documents are available in English and French on the Internet at :

http://strategis.ic.gc.ca/spectrum (English)
http://strategis.ic.gc.ca/spectre (French)

For assistance regarding this web site, please contact:

DOSP-P
300 Slater Street
Ottawa, Ontario
K1A 0C8
Telephone: (613) 990-4761
Fax: (613) 952-9871
E-mail: spectrum_pubs@ic.gc.ca

4. Test Instruments

4.1 Test Instruments List

The test report shall list all test instruments used. The list shall identify instruments by manufacturer, type and model number.

4.2 Bandwidth of Measurement Meter and CISPR Meter

4.2.1 Bandwidth of Measurement Meter

(Note to reader: This was in section 5.8 of Issue 2).
For power measurements of the wanted and unwanted signals below 1000 MHz, a CISPR meter (see 4.2.2) is to be used, unless an averaging meter has been specified in which case the meter bandwidth shall be wideband, equal to at least the 6 dB bandwidth of the signal to be measured, for measurement of the wanted signal, and 100 kHz bandwidth for measurement of the unwanted signal. However, for radiated measurements below 490 kHz, either a quasi-peak or averaging meter can be used.

Above 1000 MHz, an averaging meter of wide bandwidth, equal to at least the 6 dB bandwidth of the signal to be measured, is to be used for measurement of the wanted signal and 1 MHz bandwidth for measurement of the unwanted signal. The spectrum analyser should be in the averaging mode with an averaging time of 0.1 second, except where specified otherwise. For pulse modulation, see section 6.5.

When using a spectrum analyser to measure power, a resolution bandwidth narrower than that specified, plus numerical integration to sum the power, is permitted. The method used shall be described in the test report.

4.2.2 CISPR Quasi-Peak Meter

The CISPR quasi-peak meter (also known as CISPR meter or quasi-peak meter in this Standard) shall comply with the characteristics given in the publication #16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. It has a detector of 9 kHz bandwidth for the band 150 kHz to 30 MHz and 120 kHz bandwidth for the band 30 to 1000 MHz.

As an alternative to the CISPR meter, a peak signal detector of equal or wider bandwidth can be used.

5. Definitions and Equipment Requirements

5.1 Definitions

Below are some definitions that may be useful. Other definitions are found in the text where needed.

(a) **Auditory assistance device:** A device used to provide auditory assistance to a handicapped person or for auditory assistance in theatres, churches, etc.

(b) **AC wire carrier current device:** A device that is intended for and which transmits RF energy via the AC wire lines in residential and/or office buildings.

(b1) Bandwidth: see section 5.9.

(c) **Class A digital device:** A digital device that is marketed for use in commercial, industrial or business environment, and not intended for use in homes.

(d) **Class B digital device:** A digital device that is marketed for use in any environment: in homes, in commercial, business and industrial environments. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public.

(e) **Field disturbance sensor:** A device that establishes an RF field in its vicinity and detects changes in that field resulting from the movement of persons or objects within its range, e.g. motion detector, burglar alarm.

(f) **Intentional radiator:** A device that generates RF energy which is intended to be received off-air by a radio receiver.

(g) **Perimeter protection system:** A field disturbance sensor that employs a leaky transmission line as antenna that allows detection of movement within the protected range.

(h) **Power line carrier system:** A system employing radio frequencies used by an electric power utility company on AC transmission lines for protective relaying, telemetry, etc., for general supervision of the power system. It excludes the electric lines which connect the distribution transformer to the customer's premises.

(i) **Remote control device:** A device that transmits one-way, non-voice, signal for turning on and off devices by the operator at remote locations.

(j) **Unintentional radiator:** A device that generates RF energy which is not intended to be radiated for reception by a radio receiver. Unintentional radiators are interference-causing equipment.

Note: A radio receiver with a local oscillator is also an unintentional radiator but it is NOT governed by the ICES (Interference Causing Equipment Standard); see section 7.

5.2 Supply Voltage and Temperature

Tests shall be performed at ambient temperature and at the manufacturer's rated supply voltage, except for the frequency stability test of section 6.4. The test voltage shall be stated in the test report.

5.3 Testing Methods

Tests are to be conducted in accordance with good engineering practices.

Test results are to be presented in graphical form wherever possible. The graph shall also include the permissible limits.

The test report shall include a block and/or schematic diagram and a description of the principle of operation of the device.

RF output power and field strength measurements are normally carried out with an unmodulated carrier for transmitters with constant envelope modulation. For amplitude and non-constant envelope modulations, the transmitter shall be modulated with signals representative of those encountered in a real system operation.

For pulse modulated transmitters, see 6.5.

Unless noted otherwise, an antenna conducted measurement (section 10), a radiated measurement (sections 11 and 13), or a DC input power measurement (section 12) may be used to determine the RF output power or field strength of the device.

Where a test method specified in this Standard cannot be followed, an alternative appropriate method may be used provided that it is fully described in the test report.

Industry Canada will also accept the test methods described in the current version of ANSI C63.4, *"Methods of Measurement of RF Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"* (obtainable from IEEE Standards Department, 455 Hoes Lane, P. O. Box 1331, Piscataway, NJ 08855-1331, USA).

5.4 Types of Modulation and Usage Restrictions

This Standard permits any type of modulation (AM, FM, PSK, etc.) except for section 6.2.2(o) which shall employ spread spectrum technology.

The bands can be used for any type of transmission (voice, video and data) unless where indicated otherwise. However, see section 3 if the devices are intended for connection to a public telecommunication network.

The test report shall contain a description of the modulation and coding techniques.

5.5 Transmitter Antenna

The transmitter antenna shall be integral with the device, or the antenna coupling be so designed that no antenna other than that furnished by the party responsible for compliance shall be used.
Example: Special antenna connectors not readily available in retail shops in Canada may be acceptable.

The antenna design may be such as to allow a broken antenna to be replaced by the user, but the use of a standard jack or electrical connector is prohibited. The special antenna connector requirement does not apply to 6.2.2 (a), 6.2.2 (b), and 8.1 to 8.5. Further, this requirement does not apply to transmitters that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to transmitters which require unwanted emission measurements after installation (section 5.15). In the installation/ **user manual**, the user shall be notified that a proper type of antenna must be employed and of the RF field limits to be met. When the standard limits the antenna gain to N dB, this limit applies only to the transmitting antenna system net gain, i.e. antenna gain minus its cabling loss.

When a measurement at the antenna connector (section 10) is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in this Standard for devices of RF output powers 10 milliwatts or less. In the case of devices of output powers more than 10 milliwatts, the total antenna gain shall be added, except for the case of 6.2.2 (o) on spread spectrum systems.

User Manual (for transmitter with detachable antenna): The user manual of transmitter devices equipped with a detachable antenna shall contain the following information in a conspicuous location:

> *"This device has been designed to operate with an antenna having a maximum gain of [x] dB. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is [y] ohms."* Equipment manufacturer shall provide proper values of x and y to comply with the standard.

5.6 Left blank

5.7 Transmitter External Controls

The device shall not have any transmitter external controls accessible to the user that can be adjusted and operated in violation of the limits of this Standard. Furthermore, information on internal adjustments or reconfiguration to the equipment shall only be made available to service depots and agents of the equipment supplier and NOT to the public.

5.8 Accessories

Accessories and peripheral equipment that are normally required to be connected to the device in actual use shall be so connected with representative cable lengths, and to be functioning, for the tests. Only one test configuration using representative peripherals and accessories is required.

The emission tests shall be performed with the device and accessories configured in a manner which tends to produce the maximum level of emissions within the range of variations that can be expected under normal operating conditions.
WARNING: The use of external RF amplifiers with low power devices is strictly prohibited.

5.9 Emission Bandwidth and Designation of Emissions

Note to readers : Some text from *"Bandwidth of Measurement Meter"* found in section 5.8 of issue 2 of this RSS is now located in section 4.2.2.

5.9.1 Emission Bandwidth

Where indicated, the 6 dB (or 20 dB) bandwidth is measured at the points when the spectral density of the signal is 6 dB (or 20 dB) down from the inband spectral density of the modulated signal, with the transmitter modulated by a representative signal. Spectral density (power per unit bandwidth) is to be measured with a meter of 300 Hz resolution bandwidth or alternatively equal to approximately 1.0% of the emission bandwidth. An alternative to the 20 dB bandwidth is the 99% emission bandwidth. This bandwidth is determined 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 the emission.

The bandwidth of the transmitted signal and the type of meter (CISPR quasi-peak or averaging) used in the measurement shall always be stated when submitting information or test report to Industry Canada for equipment certification. However, where a bandwidth value is not specified in this Standard, the transmitted signal bandwidth to be reported is to be its 20 dB or 99% emission bandwidth, as calculated or measured. This is also known as the emission bandwidth, or the occupied bandwidth (for the purpose of Annex A), or the necessary bandwidth (for the purpose of designation of emissions in section 5.9.2, and in Annex A) or the fundamental emission bandwidth.

5.9.2 Designation of Emissions

Emissions are designated in alpha-numeric symbols according to their necessary bandwidth and their service types. In writing the designation of an emission, one first writes 4 symbols which describe the necessary bandwidth. These are followed by 3 to 5 additional symbols to denote the service type. An example of designation of emission is 11K5F3E which represents a signal having a necessary bandwidth of 11.5 kHz, using FM modulation, carrying a single channel containing analogue information, and used for telephony. For more details on designation of emissions refer to TRC-43 *Notes Regarding Designation of Emission, Class of Station and Nature of Service.* The designation of emission is required in the application for certification and on the Attestation form (Annex A).

5.10 Equipment Labels (Category I Equipment)

Equipment that is certified under this Standard shall be permanently labelled on each item or inseparable combination. The label shall contain the following:

(a) The certification number, prefixed by the name "Canada";
(b) Manufacturer's name or trade name or brand name;
(c) A model name or number.

Equipment for which a certificate has been issued but not properly labelled is not considered certified. The Canadian label information can be combined with the manufacturer's other labelling requirements.

Labelling requirements for Category II equipment are found in section 8.9.

5.11 User Manual

The user manual for the LPD shall contain the following or equivalent statements in a conspicuous position:

> *"Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."*

If the antenna is detachable (selectable by the user), see the user manual requirement in section 5.5. The following instructions in the user manual is also required:

> *"To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication".*

The above statements may be placed on the device instead of in the manual.

Other user manual notices may be required and these will be specified in the relevant sections, e.g. 5.13. It is the responsibility of the certification applicant/grantee to ensure that such notices conform to the intent of this RSS and be put conspicuously in the user manual.

5.12 Susceptibility to Interference

Since almost all licence-exempt devices share frequencies with higher power systems, either co-channel or on adjacent channels, when selecting frequencies for LPDs, manufacturers/importers are advised to consider the possibility of interference to LPDs due to high power radio stations. Information on the allocation of frequency bands to high power services such as broadcasting, radiolocation and meteorological aids, can be obtained by consulting the Canadian Table of Frequency Allocations published by and obtainable from Industry Canada (address in section 2.4).

5.13 Cordless Telephones (General Conditions)

This section sets out the general conditions applicable to all cordless telephones regardless of the frequency band of operation. In addition, there are standards specific to those bands that can be used for cordless telephones; e.g. section 6.2.2(g1).

A cordless telephone is a two-way radio communication device comprised of a base station and a portable handset. The handset is intended to operate as an extension of the base station by the elimination of the connecting handset cord of the standard telephone. The base station is intended to be connected to a telephone line which has access to a public telephone network. Cordless telephones operate in a full duplex mode which allows simultaneous conversations between both parties. Note that cellular and PCS (personal communication service) handsets that operate to hub stations, the latter provided by cellular and PCS companies, are not classified as cordless telephones and these handsets cannot use RSS-210 for equipment certification.

The base station shall comply with both this standard (RSS-210) and the CS-03 standard and be certified under both programs; see section 3.

Digital Security Codes:

Cordless telephones shall have circuitry which makes use of a digital code word in the dialling and ringing function to provide protection against unintentional line seizure and dialling, and unintentional ringing of the handset in the following manner:

> Access to the telephone network shall be preceded by the transmission of a code word from the handset. This code word shall be one of at least 256 possible combinations, i.e. 8 or more bits. Access to the telephone network is to occur only if the code word transmitted by the handset matches that used in the base station. Similarly, ringing of the handset shall be permitted to occur only if the code word transmitted by the base station matches the code word in the handset.

For a good geographical distribution of users of the possible combinations of digital security codes the manufacturer must incorporate one of the following provisions:

(1) Provide means for the user to readily select one of the security codes. The telephone shall be either in a non-operable mode after manufacture until the user selects a security code or the manufacturer must continuously vary the initial security code as each telephone is produced.

(2) Provide a fixed security code at the time of manufacture that is continuously varied either randomly or sequentially.

(3) Provide a means for the telephone to automatically select a different security code each time the telephone is activated or dialled.

(4) A combination of the above, or any method satisfying its intent.

Details concerning the means and procedures used to achieve the required geographical distribution shall be described in the product literature for the equipment being evaluated and attested to in the application for equipment certification.

In addition to the requirements of section 5.11, the device's **user manual** shall also contain the following or equivalent statement: "Privacy of communications may not be ensured when using this telephone".

If privacy is provided as a standard feature, the privacy notice may be omitted provided that full justification accompanies the equipment certification application for evaluation by Industry Canada.

5.14 Home Built Devices

Home built devices (not from a kit) in quantities of 5 or less for personal use and not to be marketed are considered as Category II equipment and need not be certified by the Department, except scanner receivers (section 7.5). Home built devices must conform to all the technical standards associated with that frequency band chosen. Good engineering practices are expected so as to conform to the standards given in section 8. There are no requirements for labelling home built devices.

5.15 Measurement After Installation

In the case of equipment for which measurements can be performed only at the installation site, such as perimeter protection systems, and systems employing a leaky cable as an antenna, measurements for compliance shall be performed at a minimum of 3 installations that can be demonstrated to be representative of typical installation sites.

If a device is Category I equipment, measurement results from site No.1 are to be submitted by the equipment certification applicant to the Department for a conditional certificate, unless data from sites Nos. 2 and 3 are to be available at the same time.

5.16 Aggregation of Devices

Devices that aggregate the radio spectrum are not meeting the intent of the standard and are prohibited. For example, a frequency hopping system (section 6.2.2(o)) that synchronizes with another or several other systems (to avoid frequency collision among themselves) via off-air sensing or via connecting cables is not hopping randomly and therefore not meeting the standard.

5.17 Digital Circuits

If the device contains digital circuitry that is not directly associated with the radio transmitter, the device shall also have to comply with the "Interference-Causing Equipment Standard 003 (ICES-003) - *Digital Apparatus,* class A or B as appropriate, except for ICES-003 labelling requirements. The test data obtained (for the ICES-003 tests) shall be kept by the manufacturer or importer whose name appears on the equipment label, and made available to Industry Canada on request, for as long as the model is being marketed in Canada.

5.18 Modular Construction

Transmitters or transceivers that are to be part of a host device may be constructed and certified in modular form, provided that they meet the following conditions:

(a) The module meets all of the technical specifications applicable to the frequency band of operation.

(b) The module has its own RF shielding.

(c) All modulation and data input(s) are buffered.

(d) The module has its own power supply regulation and local reference oscillator.

(e) The certification submission contains a detailed description of the configuration of all antennas that will be used with the module.

(f) The module meets certification labelling requirements.

Host devices that contain separately certified modules do not need to be recertified, provided that they meet the following conditions:

(g) The host device, as a stand alone unit without any separately certified modules, complies with all applicable Radio Standards Specifications.

(h) The host device and all the separately certified modules it contains jointly meet the safety requirements of RSS-102, if applicable.

(i) The host device complies with the certification labelling requirements of each of the modules it contains.

Note 1: Compliance of a module in its final configuration is the responsibility of the applicant. A host device will not be considered certified if the instructions regarding antenna configuration provided in the original description, of one or more separately certified modules it contains, were not followed.

Example: A separately certified low power transceiver module using Bluetooth technology that is housed in a desktop computer, laptop or peripheral does not require the overall system to be re-certified, if the desktop computer, laptop or peripheral, as a stand alone unit, complies with all applicable technical Standards.

6. Transmitter Characteristics and Tests (Category I Equipment)

The following subsections 6.1 to 6.2.3 apply only to Category I equipment. Note that, for all transmitters specified in this section 6 and subsections, unwanted emission suppression to levels lower than Tables 3, 7 and 7.1 is not required.

6.1 Momentarily Operated Devices

The requirements of sections 6.1.1 to 6.1.4 are for momentarily operated transmitters and receivers.

Note that Tables 3, 5, and 7 summarize the bands and field strength levels available to devices that may operate continuously; these bands are also available for momentary operation, provided that usage restrictions in Table 5 are observed.

Operation of momentarily operated devices is prohibited in the restricted bands of Table 2, but is permitted in TV bands, per the conditions of 6.1.1(a) to 6.1.1(f).

6.1.1 (a) Types of Momentary Signals

The frequency bands and field strength limits in Tables 1 and 4 are only for the transmission of a control signal such as that used with alarm systems, door openers, remote switches, etc. Radio control of toys or model aircraft, and continuous transmissions, such as voice or video, and data transmissions are not permitted except as provided in 6.1.1(e). The prohibition against data transmissions does not preclude the use of recognition codes. Those codes are used to identify the sensor that is activated or to identify the particular component as being part of the system.

The following conditions shall be met to comply with the provisions for momentary operation:

(1) A manually operated transmitter shall employ a push-to-operate switch and be under manual control at all transmission times. When released, the transmitter shall cease transmission (holdover time of up to 5 seconds is permitted).

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation, i.e. maximum 5 seconds of operation.

(3) Periodic transmissions at regular predetermined intervals are not permitted, except as provided in 6.1.1(e). However, polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

(4) Intentional radiators employed for radio control purposes during emergencies involving fire, security of goods (e.g. burglar alarm), and safety-of-life, when activated to signal an alarm, may operate during the interval of the alarm condition.

6.1.1 (b) Field Strengths and Frequency Bands (Momentary Operation)

The field strength of emissions from intentional radiators momentarily operated shall not exceed the limits in Table 1.

(1) The field strength limits in Table 1 are specified at a distance of 3 metres.

(2) Intentional radiators shall demonstrate compliance with the limits on the field strength of emissions, as shown in Table 1 based on the average value of the measured emissions. As an alternative, compliance with the limits in Table 1 may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment certification. If average emission measurements are employed, the provisions in section 6.5 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of section 6.3 (restricted bands) shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of unwanted emissions in Table 1 are based on the fundamental frequency of the intentional radiator. Unwanted emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in Table 1 or to the limits shown in Table 3, whichever is the less stringent. The bandwidth of the measurement meter is specified in section 4.2.

6.1.1 (c) Bandwidth of Momentary Signals

For the purpose of sections 6.1.1 (a) to (f) the 20 dB bandwidth (see 5.9 for definition) shall be no wider than 0.25% of the centre frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency. The test report shall indicate the measured bandwidth of the emission.

6.1.1 (d) Frequency Stability (Momentarily Operated Devices)

Carrier frequency stability of devices momentarily operated in the band 40.66-40.70 MHz shall be maintained to ±0.01% (±100 ppm) for temperature and voltage variations specified in section 6.4.

The carrier frequency stability of other momentarily operated devices are specified in sections 6.1.2 to 6.1.4.

6.1.1 (e) Reduced Field Strengths (Momentary Operation)

Intentional radiators may operate at a periodic rate exceeding that specified in section 6.1.1(a)(3) and may be employed for any type of operation, including operation prohibited in 6.1.1 (a), provided that the intentional radiator complies with the requirements of sections 6.1.1(b) through (d), and the field strength Table 1 is replaced by Table 4.

In addition, devices operated under the provisions of this section 6.1.1(e) shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

6.1.1 (f) Other Requirements

Sections 2 to 5, 6.3 to 6.6, 7 to 7.5, and 9 to 15 apply.

6.1.2 (a) 26.99-27.20 MHz (Remote Control)

This band is only for one-way, non-voice usage for remote controls, under the following conditions:

(1) Only the following channel carrier frequencies are permitted: 26.995; 27.045; 27.095; 27.145; 27.195 MHz.

(2) The transmitter RF peak envelope power shall not exceed 4 watts for single sideband (SSB) modulation.

For double sideband (amplitude), digital or frequency modulation, the transmitter unmodulated carrier power shall not exceed 4 watts.

(3) An antenna gain not exceeding that of a half-wave dipole shall be used.

(4) For the purpose of paragraph (6) below, the authorized bandwidth is 8 kHz for double sideband, digital or FM, and 4 kHz for single sideband (SSB) modulations. For SSB, either upper or lower sideband may be used.

(5) Carrier frequency stability shall be maintained to ±0.005% (±50 ppm) for temperature and voltage variations specified in 6.4. However, devices with output powers of 2.5 watts or less can have a frequency stability of ±0.01% (±100 ppm).

(6) The power of unwanted emissions, measured by an averaging meter of 300 Hz resolution bandwidth for (i) and (ii), shall be less than the mean transmitter power (TP, in watts) by:

(i) at least 25 dB on any frequency removed from the centre of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth;

(ii) at least 35 dB on any frequency removed from the centre of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth;

(iii) on any frequency removed from the centre of the authorized bandwidth by more than 250% : at least $43 + 10 \text{Log}_{10}(\text{TP})$ dB or to Table 3 and Table 7 limits, whichever is less stringent, measured with a spectrum analyser of 3 kHz resolution bandwidth (or narrower bandwidth with power integration, see 4.2.1).

See section 6.3(e) for the frequency band to be searched.

(7) Sections 2 to 5, 6.3, 6.4, 6.6 and 9 to 15 apply.

(8) LPD receivers tunable only in this band (26.99 - 27.2 MHz) are considered Category II equipment; see sections 8, 8.7, 8.8 and 8.9.

6.1.2 (b) 47 MHz Road Traffic Controllers

The following is only for self-powered vehicle detector transmitters. They are for one-way communication, buried under the asphalt and use 100 mW power or less, to change traffic lights on streets. Each transmitter is turned on for approximately 28 milliseconds on approach of a vehicle and on again for another 28 mS at the tail of that vehicle, i.e. 56 mS per vehicle. The transmitter output power during transmission is not to exceed 100 mW, with the average power very low and dependent on the traffic flow. Other technologies can be reviewed on a case by case basis.

These radios are licence exempt only for use by the municipalities and road traffic departments. The average intersection would probably use four discrete frequencies. Major intersections could use as much as 16 frequencies, from the following list of frequencies:

47.02; 47.03; 47.05; 47.07; 47.11; 47.13; 47.15; 47.17 (MHz)
47.23; 47.25; 47.27; 47.29; 47.30; 47.31; 47.33; 47.35 (MHz).

There is no specification on transmitter carrier frequency stability; but the equipment should employ good engineering principles with respect to the severe Canadian weather conditions. Emission spectral density outside a nominal bandwidth of 12.5 kHz shall be suppressed by at least 20 dB relative to the inband spectrum.

Section 2 to 5 and 9 to 15 may apply.

6.1.3 72-73 MHz (Model Aircraft)

The following frequencies are only for radio control of model aircrafts and are subject to the following conditions:

(1) **Carrier Frequencies (MHz)**

72.01; 72.03; 72.05; 72.07; 72.09;
72.11; 72.13; 72.15; 72.17; 72.19;
72.21; 72.23; 72.25; 72.27; 72.29;
72.31; 72.33; 72.35; 72.37; 72.39;
72.41; 72.43; 72.45; 72.47; 72.49;
72.51; 72.53; 72.55; 72.57; 72.59;
72.61; 72.63; 72.65; 72.67; 72.69;
72.71; 72.73; 72.75; 72.77; 72.79;
72.81; 72.83; 72.85; 72.87; 72.89;
72.91; 72.93; 72.95; 72.97; 72.99.

(2) The transmitter RF peak envelope power shall not exceed 0.75 watt for single sideband modulation.

For double sideband (amplitude), digital or frequency modulation, the transmitter unmodulated carrier power shall not exceed 0.75 watt.

(3) An antenna gain not exceeding that of a half-wave dipole shall be used.

(4) For the purpose of paragraph (6) below , the authorized bandwidth is 8 kHz for double sideband, digital or FM, and 4 kHz for single sideband (SSB) modulations. For SSB, either upper or lower sideband may be used.

(5) Carrier frequency stability shall be maintained to ±0.002% (±20 ppm) for temperature and voltage variations specified in 6.4.

(6) The power of unwanted emissions, measured by an averaging meter of 300 Hz resolution bandwidth for (i) to (iii), shall be less than the mean transmitter power (TP, in watts) by:

(i) at least 25 dB on any frequency removed from the centre of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth;

(ii) at least 45 dB on any frequency removed from the centre of the authorized bandwidth by more than 100% up to and including 125% of the authorized bandwidth;

(iii) at least 55 dB on any frequency removed from the centre of the authorized bandwidth by more than 125% up to and including 250% of the authorized bandwidth;

(iv) on any frequency removed from the centre of the authorized bandwidth by more than 250%: at least $56 + 10 \text{ Log}_{10}(TP)$ dB, or to Table 3 limits, whichever is less stringent, measured with a spectrum analyser of 3 kHz resolution bandwidth (or narrower bandwidth with power integration, see 4.2.1).

See section 6.3(e) for the frequency band to be searched.

(7) Sections 2 to 5, 6.3, 6.4, 6.6, 7 to 7.5 and 9 to 15 apply.

6.1.4 75.4-76 MHz (Remote Control)

This band is for general usage remote control of any type other than for control of an aircraft model, Voice modulation is permitted for emergency use if it is of the push-to-talk type. The centre or carrier frequencies (30 frequencies spaced in 20 kHz steps) are as follows:

(1) **Carrier Frequencies (MHz) for Remote Control**

75.41; 75.43; 75.45; 75.47; 75.49;
75.51; 75.53; 75.55; 75.57; 75.59;
75.61; 75.63; 75.65; 75.67; 75.69;
75.71; 75.73; 75.75; 75.77; 75.79;
75.81; 75.83; 75.85; 75.87; 75.89;
75.91; 75.93; 75.95; 75.97; 75.99.

(2) The transmitter RF peak envelope power shall not exceed 0.75 watt for single sideband modulation.

For double sideband (amplitude), digital or frequency modulation, the transmitter unmodulated carrier power shall not exceed 0.75 watt.

(3) An antenna gain not exceeding that of a half-wave dipole shall be used.

(4) For the purpose of paragraph (6) below , the authorized bandwidth is 8 kHz for double sideband, digital or FM, and 4 kHz for single sideband (SSB) modulations. For SSB, either upper or lower sideband may be used.

(5) Carrier frequency stability shall be maintained to ±0.002% (±20 ppm)for temperature and voltage variations specified in 6.4.

(6) The power of unwanted emissions, measured by an averaging meter of 300 Hz resolution bandwidth for (i) to (iii), shall be less than the mean transmitter power (TP, in watts) by:

(i) at least 25 dB on any frequency removed from the centre of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth;

(ii) at least 45 dB on any frequency removed from the centre of the authorized bandwidth by more than 100% up to and including 125% of the authorized bandwidth;

(iii) at least 55 dB on any frequency removed from the centre of the authorized bandwidth by more than 125% up to and including 250% of the authorized bandwidth;

(iv) at least $56 + 10 \text{ Log}_{10}(\text{TP})$ dB on any frequency removed from the centre of the authorized bandwidth by more than 250%, or to Table 3 limits, whichever is less stringent, measured with a spectrum analyser of 3 kHz resolution bandwidth (or narrower bandwidth with power integration, see 4.2.1).

See section 6.3(e) for the frequency band to be searched.

(7) Sections 2 to 5, 6.3, 6.4, 6.6, 7 to 7.5 and 9 to 15 apply.

6.2 Non-Momentarily Operated Devices

The provisions of sections 6.2.1 to 6.2.2 (s) and summarized in Tables 3, 5, and 7 apply to transmitters that may transmit continuously or momentarily. The transmitter shall meet all of the applicable characteristics and/or standards described therein. Table 10 lists the Transmitter Consolidated Frequencies (summary of Tables 4.1, 5, 6, and 8 in ascending frequencies), excluding Momentarily Operated Devices.

6.2.1 General Field Strength Limits (Tables 3 and 7)

Tables 3, 7 and 7.1 list the permissible levels of unwanted emissions of transmitters and receivers. However, transmitters with field strengths that do not exceed the limits of Tables 3, 7 and 7.1 may also operate in these frequency bands, other than the restricted bands of Table 2 and the TV bands (i.e. unwanted emissions of transmitters and receivers are permitted to fall into Table 2 and TV frequencies but intentional emissions are prohibited). See Note 2 of Table 3 for further details.

Note that the permissible radiated limits are under review to take into account of any cumulative effect of multiple devices.

Sections 2 to 15 apply.

6.2.2 Table 5 Frequency and Field Strength Limits (Non-Momentarily Operation)

Sections 6.2.2(a) to 6.2.2 (s), summarized in Table 5, provide standards for frequency bands that permit non-momentarily operated devices to use field strengths greater than the general limits of Tables 3 and 7.

6.2.2 (a) 160-190 kHz

Systems using this band shall limit the total input power to the final radio frequency stage to 1.0 watt, and the total length of transmission line, antenna and ground lead (if used) to 15 metres. **Example:** A coaxial or twin-wire transmission line of L metres long has wire length of 2L. If a loop antenna of N turns is used with this transmission line, compute the length of wire used by the N turns, then add to 2L. The total shall not exceed 30 metres.

Alternatively, systems may meet the radiated measurement limits of Table 7.

Emissions outside of this band (CISPR or averaging measurement) shall be attenuated by at least 20 dB below the mean transmitter output power or to Table 7 limits, whichever is less stringent.

Sections 2 to 5, 6.3, 6.4, 6.6, 7.4, 7.5 and 9 to 15 apply.

6.2.2 (b) 510-1,705 kHz

Systems using this band shall comply with one of the following limits:

(1) limit the total input power to the final radio frequency stage to 100 milliwatts, and the total length of transmission line, antenna and ground lead (if used) to 3 metres. For an example, see 6.2.2(a). (Measurements indicate that the radiated field at 30 metres is of the order of 250 microvolts/m), or

(2) the device shall not radiate more than a field strength of 250 microvolts/m measured at 30 metres.

(3) As a further alternative to the above, transmitters employing a leaky coaxial cable as the radiating antenna may meet the field strength limit of 15 uV/m, as measured at a distance of 47,715/(frequency in kHz) metres (equivalent to wavelength/(2p)) from the coaxial cable.

(4) Emissions outside of this band (CISPR measurement) shall be attenuated by at least 20 dB below the mean transmitter output power, or to limit of Table 7, whichever is less stringent.

Sections 2 to 5, 6.3, 6.4, 6.6, 7.4, 7.5 and 9 to 15 apply.

6.2.2 (c) 1.705-10 MHz

The field strength shall not exceed 100 microvolts/m measured at 30 metres with an averaging meter (nominally equivalent to 300 nW EIRP). However, if the 6 dB bandwidth of the emission is less than 10% of the centre frequency, the field strength in microvolts/m shall not exceed 15 or (Bandwidth in kHz divided by the Centre frequency in MHz), whichever is the higher level.

Outside of this band, Tables 3 and 7 limits shall apply.
Sections 2 to 5, 6.3 to 6.6, 7.4, 7.5 and 9 to 15 apply.

6.2.2 (c1) 1.705-37 MHz Swept Frequency

Notwithstanding that this band encompasses some restricted bands listed in Table 2, swept frequency devices are permitted when all the following conditions are met:

(1) The sweep is never stopped with the fundamental emission within any restricted band of Table 2;

(2) The field strength does not exceed the limits of sections 6.2.2 (c), (d), (e), or Tables 3 and 7, whichever is less stringent, when measured with the sweeping stopped in those bands.

(3) The fundamental emission dwelling on any restricted band of Table 2 shall not exceed 1.0% of the time that the device is actively transmitting, without compensation for duty cycle.

(4) Outside of the swept frequency band, the out-of-band emission limits of 6.2.2(d)or 6.2.2(e) or Tables 3 and 7 apply, whichever is less stringent. This test is to be carried out with the frequency sweep in operation.

Sections 2 to 5, 6.3, 6.4, 6.6, 7 to 7.4, and 9 to 15 apply.

6.2.2 (d) 6.765-6.795 MHz

The field strength shall not exceed 15.5 millivolts/m (84 dBuV/m) measured at 30 metres with a CISPR quasi-peak meter.

Outside the allocated band up to F_c ±150 kHz, the field strength shall not exceed 334 microvolts/m (50.5 dBuV/m) at 30 m. Between F_c ±150 kHz and F_c ± 450 kHz, the field strength shall not exceed 106 microvolts/m (40.5 dBuV/m) at 30 m.

Outside F_c ±450 kHz, Tables 3 and 7 limits shall apply except for harmonics which shall not exceed 316 microvolts/m at 30 metres. F_c = 6.78 MHz.

Carrier frequency stability shall be maintained to ±0.01% (±100 ppm) for temperature and voltage variations specified in section 6.4.

Sections 2 to 5, 6.3, 6.4, 6.6, 7.4, 7.5 and 9 to 15 apply.

6.2.2 (e) 13.553-13.567 MHz

The field strength shall not exceed 15.5 millivolts/m (84 dBuV/m) measured at 30 metres with a CISPR quasi-peak meter.

Outside the allocated band up to F_c ±150 kHz, the field strength shall not exceed 334 microvolts/m (50.5 dBuV/m) at 30 m. Between F_c ± 150 kHz and F_c ±450 kHz, the field strength shall not exceed 106 microvolts/m (40.5 dBuV/m) at 30 m.

Outside F_c ± 450 kHz Tables 3 and 7 limits shall apply.
F_c= 13.56 MHz.

Carrier frequency stability shall be maintained to ±0.01% (±100 ppm) for temperature and voltage variations specified in section 6.4.

Sections 2 to 5, 6.3, 6.4, 6.6, 7.4, 7.5 and 9 to 15 apply.

6.2.2 (f) - Left blank. (26.99-27.20 MHz Remote Control is found in 6.1.2).

6.2.2 (g) 40.66-40.70 MHz

The field strength shall not exceed 10 millivolts/m (80 dBuV/m) measured at 3 metres with an averaging meter (equivalent to 30 µW EIRP). Alternatively, it shall not exceed 233 mV/m measured with a quasi-peak meter(equivalent to 16 mW EIRP). (Note to readers: Do not use the above to convert averaging meter reading to quasi-peak values.)

The 6 dB bandwidth of the emission shall be confined within the 40.66-40.70 MHz band edges.

Outside the band of 40.65-40.71 MHz, Table 3 limits shall apply except for harmonics which shall not exceed 225 microvolts/m at 3 metres.

Carrier frequency stability shall be maintained to ±0.01% (±100 ppm) for temperature and voltage variations specified in section 6.4.

Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 15 apply.

6.2.2 (g1) 44/49 MHz (Cordless Telephones)

The provisions shown in this section are for cordless telephones specific to these bands. See also section 5.13 on general conditions applicable to all cordless telephones.

(1) An intentional radiator used as part of a cordless telephone system shall operate on one of the following carrier frequency pairs (except as provided in (2) below):

Channel (MHz)	Base Transmit (MHz)	Handset Transmit (MHz)
1	43.720	48.760
2	43.740	48.840
3	43.820	48.860
4	43.840	48.920
5	43.920	49.020
6	43.960	49.080
7	44.120	49.100
8	44.160	49.160
9	44.180	49.200
10	44.200	49.240
11	44.320	49.280
12	44.360	49.360
13	44.400	49.400
14	44.460	49.460
15	44.480	49.500
16	46.610	49.670
17	46.630	49.845
18	46.670	49.860
19	46.710	49.770
20	46.730	49.875
21	46.770	49.830
22	46.830	49.890
23	46.870	49.930
24	46.930	49.990
25	46.970	49.970

(2) Frequencies shall be paired as shown in the table, except that pairing for channels 1 through 15 may be accomplished by pairing any of the 15 base transmitter frequencies with any of the 15 handset transmitter frequencies (flexible pairing).

(3) Cordless telephones operating on channels 1 through 15 shall:

(i) incorporate an automatic channel selection mechanism that will prevent establishment of a link on any occupied frequency;

(ii) be provided with a **user manual** which contains information indicating that some cordless telephones operate at frequencies that may cause interference to nearby TVs and VCRs and that to minimize or prevent such interference, the base station should not be placed near a TV or VCR; if interference is experienced, moving the base station farther away would often reduce or eliminate the interference.

(iii) A description of the means and procedures used to achieve automatic channel selection shall be provided in any application for equipment certification of such a cordless telephone.

(4) The field strength shall not exceed 10 millivolts/m measured at 3 metres, with an averaging meter (equivalent to 30 µW EIRP).

(5) The occupied bandwidth shall not exceed 20 kHz centred on the test carrier frequency. Outside of this band, emissions shall be attenuated at least 26 dB below the level of the unmodulated carrier. A spectrum analyser resolution bandwidth of at least 300 Hz and in the averaging mode is to be used.

(6) On any frequency removed from the centre of the authorized bandwidth by more than ±20 kHz, Table 3 limits apply.

(7) Carrier frequency stability shall be maintained to within ±0.01% (±100 ppm) for temperature and voltage variations specified in 6.4.

(8) Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 15 apply.

6.2.2 (h) 72-73 MHz, 74.6-74.8 MHz, and 75.2-76.0 MHz (Auditory Assistance and Wireless Microphone)

Low power devices in these bands are only for auditory assistance and wireless microphones. The field strength shall not exceed 80 millivolts/m measured at 3 metres with an averaging meter (equivalent to 1.9 mW EIRP).

The occupied bandwidth shall not exceed 200 kHz and shall lie within each permitted band.

Outside this 200 kHz band (as well as outside the specified frequency bands), the emissions shall not exceed 1.5 millivolts/m at 3 metres,

Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 15 apply.

6.2.2 (i) - Left blank. (72-73 MHz Model Aircraft is found in 6.1.3).

6.2.2 (j) - Left blank. (75.4-76 MHz Remote Control is found in 6.1.4)

6.2.2 (k) 88-108 MHz

The field strength shall comply with the following:

(1) not exceeding 250 microvolts/m measured at 3 metres with an averaging meter (equivalent to 19 nW EIRP). Any type of modulation (and carrier frequencies within the 88-108 MHz band) may be used for this category, or

(2) not exceeding 100 microvolts/m measured at 30 metres (equivalent to 1000 µV/m measured at 3 metres, equivalent to 300 nW EIRP) only if the modulation is FM and the carrier frequencies are chosen from the following set: 88.1; 88.3; 88.5; 107.7; 107.9 MHz, i.e. spaced every 200 kHz.

The occupied bandwidth shall not exceed 200 kHz.

Outside this 200 kHz band (as well as outside the band 88-108 MHz), Table 3 limits apply.

Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 15 apply.

6.2.2 (L1) 174-216 MHz (Medical Telemetry)

Low power devices in this band (174-216 MHz) are only for medical telemetry usage.

The field strength shall not exceed 1.5 millivolts/m measured at 3 metres with an averaging meter (equivalent to 675 nW EIRP).

The occupied bandwidth shall not exceed 200 kHz.
Outside this 200 kHz band (as well as outside the band 174-216 MHz), Table 3 limits apply.

In addition to the labelling requirements of section 5.10, the device's **user manual** shall also contain the following or equivalent statement:

> *"The user/purchaser of this device should take note that as **digital TV** broadcasting stations are introduced in the geographical area, the medical telemetry links may be required to be shifted to operate in other (unused) TV channels. They should ensure that the radio device can adapt to this mode of operation."*

Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 15 apply.

6.2.2(L2) 216-217 MHz (Auditory Assistance, Medical Telemetry, Goods Tracking and Law Enforcement)

This band is channelized and available for voice or data transmission but not two-way voice, for the usages mentioned in the sub-title, at a peak output power not exceeding 100 milliwatts or 160 mW EIRP. Law enforcement agencies have exclusive use of the sub-band 216.45-216.50 MHz. Auditory assistance, medical telemetry, good tracking and law enforcement agencies have shared use of the rest of the 216-217 MHz band (i.e. 216-216.45 and 216.50-217 MHz. The channel plan is given in the following table. All transmissions are subject to a no-interference no-protection basis, especially with respect to TV channel 13 (of 210-216 MHz). It is therefore advisable to avoid the band 216-216.3 MHz where channel 13's sound carrier image frequency is located. Furthermore, the output power should be as low as possible for successful communication.

Section 6.3 concerning restricted frequency bands does not apply to the above devices (medical telemetry) in health care institutions. However, manufacturers are reminded about section 2.4 on good Engineering Practice. Industry Canada may, if found necessary, impose more attenuation than masks A to D for some restricted bands.

Table 6.2.2 (L2)

Freq. band (MHz)(note 1)	Ch. spacing (kHz)	Centre freq. (note 1)	Freq. stab. (ppm)	Unwanted emissions
216-217	5	215.9975+0.005n, n = 1 to 200	±1.5	Mask A
216-217	12.5	215.99375+0.0125n, n = 1 to 80	±5.0	Mask B
216-217	25	215.9875+0.025n, n = 1 to 40	±50	Mask C
216-217	50	215.975+0.05n, n = 1 to 20	±50	Mask D

Note 1[a]: 216 - 216.45 MHz and 216.50-217 MHz for auditory assistance, medical telemetry, goods tracking and Law enforcement

Note 1[b]: 216.45-216.5 MHz for **Law enforcement only**

The following unwanted emission masks refer to transmitters that are modulated with signals representative of those encountered in a real system operation. The measurement meter shall be in peak mode and the bandwidth shall be at least 300 Hz.

Mask A

Unwanted emissions shall be attenuated below the peak transmitter output power (P, watts) in accordance with the following:

(i) Emissions removed from the channel centre frequency (see Table above) by a displacement frequency (f_d in kHz) of more than 2 kHz up to and including 3.75 kHz: 30 + 20 (f_d-2) dB, or 55 + 10 $\log_{10}$(P), or 65 dB, whichever is less stringent;

(ii) Emissions more than 3.75 kHz removed from the channel centre frequency: at least 55 + 10 $\log_{10}$(P) dB, or to Table 3 limits, whichever is less stringent.

Mask B

Unwanted emissions shall be attenuated below the peak transmitter output power (P, in watts) in accordance with the following:

(i) Emissions removed from the channel centre frequency by more than 50%, but not more than 100% of the authorized bandwidth: at least 25 dB. Authorized bandwidth is 11.25 kHz.

(ii) Emissions removed from the channel centre frequency by more than 100%, but not more than 250% of the authorized bandwidth: at least 35 dB.

(iii) Emissions removed from the channel centre frequency by more than 250% of the authorized bandwidth: at least $55 + 10 \log_{10}(P)$ dB or to Table 3 limits, whichever is less stringent.

Mask C

Unwanted emissions shall be attenuated below the peak transmitter output power (P, in watts) in accordance with the following:

(i) Emissions 12.5 kHz to 22.5 kHz removed from the channel centre frequency: at least 30 dB;

(ii) Emissions more than 22.5 kHz removed from the channel centre frequency: at least $55 + 10 \log_{10}(P)$ dB or to Table 3 limits, whichever is less stringent.

Mask D

Unwanted emissions shall be attenuated below the peak transmitter output power (P, in watts) in accordance with the following:

(i) Emissions 25 kHz to 35 kHz removed from the channel centre frequency: at least 30 dB;

(ii) Emissions more than 35 kHz removed from the channel centre frequency: at least $55 + 10 \log_{10}(P)$ dB or to Table 3 limits, whichever is less stringent.

In addition to the labelling requirements of section 5.10, the device's **user manual** shall also contain the following or equivalent statement:

> *"If TV channel 13 is used in the area, the installer shall reduce or adjust the RF radiated power so that near-by TV channel 13 receivers do not receive radio interference from the system installed.* ***Suggestions:*** *A test with a TV receiver equipped with "rabbit-ear antenna" and tuned to channel 13 should be conducted, at the perimeter of the user's intended coverage area and not over-lapping other user's areas without the latter's consent. If this does not solve the problem, a channel near the 217 MHz edge and not near 216 MHz should be tried".*

Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 15 apply.

6.2.2 (L2.1) Family Radio Service (FRS) Telephones

(a) General Requirements

Equipment operating on the frequencies 462/467 MHz for the FRS shall comply with the following requirements:

Until December 31, 2001, the application for certification of Family Radio Service (FRS) equipment must be accompanied by a letter from the Electro-Federation of Canada (EFC), stating that the applicant has made a commitment to participate in the Family Radio Service Alliance (FRSA), to ensure that the FRS equipment to be distributed and/or sold in Canada will mitigate potential interference to the most probable affected land mobile base stations (Reference policy document: SP 462 MHz, March 2000, section 4). The Electro-Federation of Canada which operates the FRSA can be reached at the following:

5800 Explorer Drive
Mississauga, Ontario
L4W 5J3
Canada
Tel: (905) 602-8877
Fax: (905) 602-5686
email: kelsey@electrofed.com

(b) Channel Frequencies

The following 14 simplex channel carrier frequencies are available for use in the family radio service (FRS). The channel spacing is 25 kHz in the 462 and 467 MHz subbands, as follows: (in MHz)

ch.1: 462.5625; ch.2: 462.5875; ch.3: 462.6125; ch.4: 462.6375; ch.5: 462.6625; ch.6: 462.6875; ch.7: 462.7125; ch.8: 467.5625; ch.9: 467.5875; ch.10: 467.6125; ch.11: 467.6375; ch.12: 467.6625; ch.13 467.6875; ch.14: 467.7125.

(c) Output Power

The maximum permissible transmitter output power under any operating conditions is 0.5 watt , effective radiated power (ERP), equivalent to 0.5 watt transmitter output power into a dipole antenna. The radio shall be equipped with an integral antenna.

(d) Type of modulation

Only emission F3E (i.e. frequency modulation by voice) is permitted for FRS. Non-voice emission is however permitted for selective calling or tone-operated squelch to establish or continue a voice communication.

The peak frequency deviation shall not exceed $\pm$ 2.5 kHz. The limiter shall be followed by a lowpass filter to remove unwanted harmonics.

(e) Unwanted Emissions

The nominal bandwidth is 12.5 kHz. Emissions shall be attenuated below the unmodulated carrier power in accordance with the following:

- at least 25 dB, measured with a bandwidth of 300 Hz, in the band 6.25 kHz to 12.5 kHz removed from the channel centre frequency;

- at least 35 dB, measured with a bandwidth of 300 Hz, in the band 12.5 kHz to 31.25 kHz removed from the channel centre frequency, and

- at least 43 dB + 10 Log(carrier power in watts) dB, measured with a bandwidth of at least 30 kHz for frequencies beyond 31.25 kHz removed from the channel centre frequency (the search shall be from 30 MHz to at least 5 times the highest channel frequency or 5 times the local oscillator frequency, whichever is the higher frequency).

(f) Frequency Stability

The carrier frequency shall be better than $\pm$ 5 ppm between -20°C and +50°C with reference to its value at +20°C, when powered by a new battery.

Exposure of Humans to RF Fields

The Specific Absorption Rate of the device shall comply with RSS-102.

(g) Other Conditions

FRS radios are not permitted to be interconnected to the public telephone networks.

Sections 2 to 5, 6.4, 6.5, 7.0 to 7.5 and 10 to 15, where appropriate, apply.

6.2.2(L3) 608-614 MHz (Medical Telemetry)

Operation in this band is for medical telemetry devices and only for hospitals and health care facilities. The spectral density shall not exceed a field strength of 200 millivolts/m, measured with a quasi-peak meter (nominal 120 kHz bandwidth) at a distance of 3 metres, when the transmitter is modulated with signals representative of those encountered in a real system operation. Systems using wider bandwidth than 120 kHz will be permitted output power proportionate to its bandwidth. Accordingly, the total maximum permissible field strength is FS = 200x square root (B/120), millivolts/m at 3 metres, where bandwidth B is in kHz. (Note: the full value of FS will not show on a quasi-peak meter because of the latter's limited bandwidth. Details of the measurement shall be reported).

Emissions outside 608-614 MHz band shall not exceed Table 3 limits.

In addition to the labelling requirements of section 5.10, the device's **user manual** shall also contain the following or equivalent statement: *"This telemetry device is **only** permitted for installation in hospitals*

*and health care facilities. Devices **shall not** be operated in mobile vehicles (even ambulances and other vehicles associated with health care facilities). The installer/user of this device shall ensure that it is at least 80 km from the Penticton radio astronomy station (British Columbia latitude: 49º 19' 12" N, longitude: 118º 59'56" W). For medical telemetry systems not meeting this 80 km separation (e.g. the Okinagan valley, British Columbia) the installer/ user must coordinate with and obtain the written concurrence of the Director of the Penticton radio astronomy station before the equipment can be installed or operated. **The Penticton contact** is Tel: 250-493-2277/ fax 250-493-7767."* (In case of difficulty, the Manager, Radio Equipment Standards, Industry Canada, may also be contacted, see section 2.3).

Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 15 apply.

6.2.2(m1) 902-902.1/ 927.9-928 MHz (Rural Radiophones)

This category is intended for cordless telephones for rural communities (i.e. sparsely populated areas and small townships) where the risk of radio interference to the licensed services (FIXED service such as per RSS-137, RADIOLOCATION such as Government radars, Radio Amateur, etc per the Canadian Table of Frequency Allocations : see section 2.4)is minimized. Point-to-multipoint and mobile-to-mobile operations are prohibited, i.e. this category is intended for rural homes base station communicating to a mobile or another fixed station telephone. For the definition of the Rural service areas please refer to the document SP 3400-3700 MHz, *Spectrum Policy (SP) and Licensing Conditions for Fixed Wireless Access Systems in Rural Areas in the Frequency Band 3400-3700 MHz", Annex 1, (Rural Service Areas).*

Eight frequencies in each band, channel spacing at 12.5 kHz, are permitted (MHz), with the A and B channels forming a duplex pair:

ch.1A: 902.00625;	ch.1B: 927.00625;
ch.2A: 902.01875;	ch.2B: 927.01875;
ch.3A: 902.03125;	ch.3B: 927.03125;
ch.4A: 902.04375;	ch.4B: 927.04375;
ch.5A: 902.05625;	ch.5B: 927.05625;
ch.6A: 902.06875;	ch.6B: 927.06875;
ch.7A: 902.08125;	ch.7B: 927.08125;
ch.8A: 902.09375;	ch.8B: 927.09375.

If the rural telephone base station is intended to be connected to the public telephone network, see section 3 regarding certification to CP-01.

Permissible Transmitter Power and EIRP

The transmitter output power shall not exceed 500 milliwatts and the EIRP shall not exceed 10 watts.

Unwanted Emissions

Any modulation technique is permitted. If the modulation is FM, the audio signal level shall be limited by a limiter followed by a lowpass filter. A 1.0 kHz (or higher frequency) modulating signal should be used for the unwanted emission test of the FM transmitter. For a digital modulated system: the test signal to be used shall be representative of a real system in operation.

Plot the transmitter output spectrum which shall comply with the following:

The authorized bandwidth is a maximum of 12.5 kHz.

The power of any emission shall be attenuated below the transmitter output power (P, in watts) by:

(1) On any frequency removed from the carrier frequency by more than 50% but not more than 100% of the authorized bandwidth: At least 25 dB, measured with a bandwidth of 300 Hz.

(2) On any frequency removed from the carrier frequency by more than 100% but not more than 250% of the authorized bandwidth: At least 35 dB, measured with a bandwidth of 300 Hz.

(3) On any frequency removed from the carrier frequency by more than 250% of the authorized bandwidth: At least $43 + 10 \log_{10}$ (P) dB, measured with a bandwidth of at least 3 kHz or to Table 3 limits, whichever is less stringent.

Frequency Stability

The frequency stability when tested to the conditions of section 6.4 shall be no worse than ±2.5 ppm.

Exposure of Humans to RF fields (Rural radiotelephone)

Base stations employing yagi antennas for the EIRP mentioned above are considered to meet RF field exposure standards specified in section 14, i.e. exempt from evaluation. For other antenna types, consult Industry Canada's local office.

Handsets and mobile equipment must comply with the standard RSS-102.
Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 15 apply.

6.2.2 (m2) 902-928, 2400-2483.5 and 5725-5875 MHz

This section provides standards for low power devices that can be used for any application provided the following conditions are met.

(1) The field strengths shall not exceed the following:

Fundamental (MHz)	Field strength millivolts/m)	Harmonic (millivolts/m)
902-928	50[(1)]	0.5
2400-2483.5	50[(1)]	0.5
5725-5875	50[(1)]	0.5

[(1)] Equivalent to 0.75 mW EIRP.

Note: Devices for the band 24.0-24.25 GHz at a field strength not exceeding 250 mV/m at 3 metres (equivalent to 19 mW EIRP) are classified as category II and the standard is found in 8.6.3.

(2) Field strength limits are specified at a distance of 3 metres.

(3) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to Table 3 limits, whichever is the less stringent.

(4) The emission limits shown above are based on measurement instrumentation employing a CISPR quasi-peak detector below 1000 MHz and an averaging detector above 1000 MHz.

(5) Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 15 apply.

Section 6.5 does not apply to CISPR measurement for the band 902-928 MHz.

6.2.2 (n) 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10.5-10.55 GHz and 24.075-24.175 GHz (Field Disturbance Sensors)

This section provides standards for low power devices classified as field disturbance sensors (such as burglar alarms or motion detectors which are a type of radar devices) which operate under the following conditions. These do not include protection systems employing perimeter antennas.

The field strengths shall not exceed the following:

Fundamental (MHz)	Field strength millivolts/m)	Harmonics (millivolts/m)
902-928	500 [(i)]	1.6
2435-2465	500 [(i)]	1.6
5785-5815	500 [(i)]	1.6
10.5-10.55 GHz	2500 [(ii)]	25
24.075-24.175 GHz	2500 [(ii)]	25

(i) equivalent to 75 mW EIRP
(ii) equivalent to 1.9 W EIRP

Notes:

1. Additionally, harmonic emissions falling into a restricted band of Table 2 and below 17.7 GHz shall meet the limits of Table 3.

   Those falling into restricted bands above 17.7 GHz and below 40 GHz shall not exceed the following field strength limits:

   (i) For devices designed for use only within buildings or for intermittent use such as to open building doors: 25 mV/m.

   (ii) Devices for farm vehicles, fork lifts, rail track cars: 7.5 mV/m.

   (iii) For other types of vehicles, and aircrafts: 7.5 mV/m if features prevent continuous transmission.

   (iv) For other types of vehicles and aircrafts (continuous transmission): Table 3 limits.

2. Field strength limits are specified at a distance of 3 metres.

3. Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to Table 3 limits, whichever is the less stringent.

4. The emission limits shown above are based on measurement instrumentation employing an averaging detector.

5. Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 15 apply.

6. **Special Conditions Applicable to the Band 2435-2450 MHz**

   The 2435 - 2450 MHz sub-band is used by the radio relay fixed and other services on a licensed basis. Field disturbance sensors (see 5.1 (e) for definition) operating in this sub-band (i.e. the 20 dB bandwidth falls fully or partly into this sub-band) may be subject to licensing and so another standard, RSS-139, will apply for the purpose of equipment certification except as provided below:

   - when the device is designed for intermittent use (indoors or outdoors) such as to open building doors (manual control), or

   - when the device is designed for indoor use (e.g. in non-waterproof casings) and properly labelled. The device's **label** or **user manual** must contain this statement (or equivalent): *"To prevent radio interference to the licensed service, this device must be operated **indoors only** and should be kept away from windows to provide maximum shielding.*

When either condition is met, RSS-210 is applicable for equipment certification, for licence-exempt operation. Otherwise, refer to RSS-139.

Note that field disturbance sensors designed to operate only in the sub-band 2450-2465 MHz are governed by this RSS-210 and are licence-exempt.

6.2.2(o) 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz (Spread Spectrum)

The following describes systems which shall employ the spread spectrum technology. Spread spectrum systems in these bands may employ direct sequence (DS), frequency hopping (FH) or a combination (hybrid) of both techniques, with the characteristics indicated below.

(a) **Frequency Hopping Systems (General Conditions)**

(a1) This is a spread spectrum system in which the carrier is modulated with the coded information in a conventional manner causing a conventional spreading of the RF energy about the frequency carrier. The frequency of the carrier is not fixed but changes at fixed intervals under the direction of a coded sequence. The channel bandwidth is the 20 dB emission bandwidth, measured with the hopping stopped. The system RF bandwidth is equal to the channel bandwidth multiplied by the number of frequencies in the hopset. The frequency hopset shall be such that the near term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hopset while the long term distribution appears evenly distributed.

FH systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

FH systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream.

Incorporation of intelligence into a FH system that enables it to recognize other users of the band and to avoid occupied frequencies is permitted, provided that the FH system does it individually and independently chooses or adapts its hopset. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

(a2) **FH Systems Operating in the 902-928 MHz Band**

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 second within a 20 second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of

occupancy on any frequency shall not be greater than 0.4 second within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Output Power and EIRP Limits

The output power is not to exceed 1.0 watt and the EIRP not to exceed 6 dBW if the hopset uses 50 or more frequencies; not to exceed 0.25 watt and the EIRP not to exceed 0 dBW if the hopset uses less than 50 frequencies.

Out of Band Emissions: See 6.2.2(o)(e1) below.

(a3) **FH Systems Operating in the 2400-2483.5 MHz and 5725-5850 MHz Band**

Except as provided in (d), these systems shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel shall be 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

Frequency hopping systems in the 2400-2483.5 MHz band may utilize hopping channels whose 20 dB bandwidth is greater than 1 MHz provided the systems use at least 15 non-overlapping channels. The total span of hopping channels shall be at least 75 MHz. The time of occupancy on any one channel shall be no greater than 0.4 seconds within the time period required to hop through all channels and each of the hopping channels must be used equally on the average.

Output Power and EIRP Limits

For frequency hopping systems in the band 2400-2483.5 MHz employing at least 75 hopping channels, the transmitter output power shall not exceed 1.0 watt. For all other frequency hopping systems in this band 2400-2483.5 MHz band, the transmitter output power shall not exceed 0.125 watt. See (d) below for special conditions.

For the band 5725-5850 MHz, the transmitter output power shall not exceed 1.0 watt and the EIRP shall not exceed 4 watts. However, point-to-point systems in the 5725-5850 MHz band are permitted any EIRP necessary for satisfactory operation by increase in antenna gain. Point-to-multipoint systems and multiple co-located transmitters transmitting the same information are **prohibited** from using this high EIRP category. However, remote stations of point-to-multipoint systems shall be permitted to operate at the point-to-point EIRP limit provided that the higher EIRP is achieved by employing higher gain directional antennas and not higher transmitter output powers.

Out of Band Emissions: See 6.2.2(o)(e1) below.

(b) **Direct Sequence Systems (902-928, 2400-2483.5 and 5725-5850 MHz)**

The following applies to all the 3 frequency bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz. In addition, special conditions in section (d) apply to 2400-2483.5 MHz.

A direct sequence (DS) system is a spread spectrum (SS) system in which the carrier has been modulated by a high speed spreading code and an information data stream. The high speed code sequence dominates the "modulating function" and is the direct cause of the wide spreading of the transmitted signal.

The transmitter power spectral density (into the antenna) shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0 second duration.

The processing gain shall be at least 10 dB. The processing gain represents (after filtering) the improvement to the received signal-to-noise ratio from the spreading/despreading function. The processing gain may be determined using one of the following methods:

(1) As measured at the demodulated output of the receiver:

The processing gain is the ratio in dB of the signal-to-noise ratio with the system spreading code turned off to the signal-to-noise ratio with the system spreading code turned on.

(2) As measured using the CW (continuous wave) jamming margin method:

The wanted DS signal (of level S) is combined with a jammer signal generator at the input to the DS receiver. This interferer is stepped in 50 kHz frequency increments across the passband of the system, recording at each point the interferer's level (into the receiver) required to produce the recommended Bit Error Rate (BER). This level is the jammer level (J). The output power of the intentional radiator is measured at the same point. The jammer to signal ratio (J/S) is then calculated, discarding the worst 20% of the J/S data points. The lowest remaining J/S ratio is used to calculate the processing gain, as follows: $Gp = (S/N)_0 + Mj + Lsys$, where Gp = processing gain of the system, $(S/N)_0$ = signal to noise ratio required for the chosen BER, Mj = J/S ratio, and Lsys = system losses. Note that total losses in a system, including intentional radiator and receiver, should be assumed not to exceed 2 dB.

The test report shall indicate the value of the processing gain and how it is determined.

Output Power and EIRP Limits

For the band 2400-2483.5 MHz, the transmitter output power shall not exceed 1.0 watt. See (d) below for special conditions.

For the bands 902-928 MHz and 5725-5850 MHz, the transmitter output power shall not exceed 1.0 watt and the EIRP shall not exceed 4 watts. However, point-to-point systems in the 5725-5850 MHz band are permitted any EIRP necessary for satisfactory operation by increase in antenna gain. Point-to-multipoint systems and multiple co-located transmitters transmitting the same information are **prohibited** from using this high EIRP category. However, remote stations of point-to-multipoint systems shall be permitted to operate at the point-to-point EIRP limit provided that the higher EIRP is achieved by employing higher gain directional antennas and not higher transmitter output powers.

Out of Band Emissions: See 6.2.2(o)(e1) below.

(c) **Hybrid Systems**

(c1) Direct sequence systems as described above are permitted to employ frequency hopping as and when required. A Direct Sequence system is also permitted to hop to a new frequency, say, when the system senses high interference. The rate of hopping in either case is not restricted, but the system shall conform to the Direct Sequence characteristics listed above.

(c2) Hybrid systems that do not meet the 10 dB processing gain requirement from direct sequence operation as listed above are permitted provided they meet a combined minimum processing gain, from direct sequence and frequency hopping operation, of 17 dB. The applicable provisions of subparagraph 6.2.2(o) for direct sequence and frequency hopping operation must be met, except as follows:

(1) there is no required minimum number of hopping channels;

(2) there is no specification on the minimum processing gain of the direct sequence operation;

(3) notwithstanding clauses (1) and (2), each processing gain from the hopping and the direct sequence functions must not be zero;

(4) the processing gain contribution from frequency hopping operation is equal to 10 log(number of hopping channels);

(5) the 20 dB bandwidth of the hopping channel shall not exceed 1 MHz;

(6) the average time of occupancy on any frequency shall not exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4;

(7) compliance with the power density requirements for direct sequence operation must be shown with the hopping operation turned off.

(d) **Special Conditions (Applicable to the Bands 2400-2450 and 2450-2483.5 MHz)**

(d1) The 2400 - 2450 MHz band is used in Canada by the radio relay fixed and other services on a licensed basis. Spread spectrum systems (DS or FH) operating in this band (i.e. the 20 dB bandwidth falling fully or partly into this sub-band) may be subject to licensing and so the standard RSS-139 will apply for the purpose of equipment certification except as provided below.

When **ALL** the following conditions are met, RSS-210 can be used for equipment certification:

- it is designed for indoor use only (e.g. in non-waterproof casings), and

- the spectral density shall not exceeding 50 milliwatts per MHz. (**Note:** Spectral density = transmitter output power in milliwatts at antenna terminals divided by the spread spectrum (SS)

bandwidth in MHz for direct sequence systems. For Frequency Hopping: SS bandwidth = Channel Bandwidth multiplied by Number of Distinct Frequencies in the hopset).

- the device's **label** or the **user manual** contains this statement (or equivalent): *"To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing."*

(d2) If the spread spectrum system bandwidth lies totally in the sub-band 2450-2483.5 MHz, it can be certified (to RSS-210) for use indoor or outdoor. In the case of the frequency hopping type, the minimum permissible number of hops in the hopset is 25 for this special case because of the reduced available bandwidth. The certification application shall include details on safeguards to prevent the user from using frequencies below 2450 MHz. Frequencies shall not be reprogrammable except by trained representative of the manufacturer/importer/distributer.

To provide some interference protection to TV pick-up licensed receiver stations operating in this sub-band of 2450-2483.5 MHz, a license is required if the SS device EIRP is in excess of 4 watts. The **user manual** shall contain this statement (or equivalent): *"This device may employ a transmitter antenna of gain up to [X dB]. Systems employing antenna gains above this value require a radio license.*" **NOTE to manufacturer:** insert appropriate value for X into the square bracket to correspond to 4 watts EIRP. Licensing procedure similar to that given (section on "Licensing Requirements") in document RSS-139 should be provided to the user.

(d3) Summary of the Certification and Licensing Criteria is given in the table below:

Table 6.2.2(o)(d3)
Certification & Licensing Criteria for the Band 2400-2483.5 MHz for Spread Spectrum technology

Equipment tunable to	Certification[1] to		Licensing[1]	
	RSS-210	RSS-139	Licence-exempt	Licence[4] required
2450-2483.5 MHz only	Yes		If EIRP # 4W	If EIRP > 4W
2400-2483.5 MHz	If spectral density[2] # 50 mW/MHz and designed for indoor[3] use only		If antenna is indoor	If antenna is outdoor
		If designed for outdoor use (for any spectral density)	!	Yes

(1) Read the Table horizontally to determine the applicable RSS for certification and the licensing requirements.

(2) Spectral density measured at the transmitter output connector.

(3) A unit is not considered an indoor device if it is weatherproof. However, a cordless phone handset intended to operate to a base station that is installed indoor can be certified to RSS-210 even though it could be used occasionally outdoors, **but only if** the handset RF signal has a spectral density **not exceeding 1.3 mW/MHz EIRP**. Similarly, a laptop computer can be so certified to RSS-210.

(4) Maximum EIRP in a licence should be limited to **200 watts** (23 dBW). Systems above 4 watts EIRP are permitted only for point-to-point systems, i.e. point-to-multipoint systems and multiple co-located transmitters transmitting the same information are **prohibited** from using this high EIRP category. However, remote stations of point-to-multipoint systems shall be permitted to operate at the point-to-point EIRP limit provided that the higher EIRP is achieved by employing higher gain directional antennas and not higher transmitter output powers.

(e) **Other Requirements for Spread Spectrum (DS or FH) Equipment**

(e1) **Out of Band Emissions:** In any 100 kHz bandwidth outside the operating frequency bands, between 30 MHz and 5 times the carrier frequency, the unwanted emission spectral density shall be either at least 20 dB below the inband spectral density, or shall not exceed the levels specified in Table 3, whichever is less stringent. **Note:** For frequency hopping systems, the inband density S_i shall be measured with the hopping sequence stopped at the lowest channel and the highest channel in turn, as well as with the hopping running normally. The 20 dB shall be with reference to the lowest of the three S_i values.

(e2) **Special Antenna Connector:** Note that special antenna connectors are required for spread spectrum systems (with respect to section 5.5).

(e3) Sections 2 to 5, 6.3 (except the restricted band requirement) to 6.6, 7 to 7.5, and 9 to 15 apply.

6.2.2(p) Left blank

6.2.2 (q) 2900-3260 MHz, 3267-3332 MHz, 3339-3345.8 MHz and 3358-3600 MHz (Vehicle Identification)

The LPDs in these bands are only for automatic vehicle identification systems (AVIS) employing swept frequency techniques to automatically identify transportation vehicles (cars, trucks or rail) and under the following conditions:

(1) The field strength in the antenna main beam shall not exceed 3 millivolts/m, per each 1.0 MHz bandwidth, measured at 3 metres with an averaging meter (equivalent to 2.7 µW/MHz EIRP).

(2) The AVIS shall employ a horn antenna or other comparable directional antenna pointing upwards to attenuate the RF field in the horizontal direction. The field strength shall not be greater than 400 microvolts/m/MHz at 3 metres in any direction within ±10 degrees of the horizontal plane of the antenna.

The **user manual** shall provide proper installation instructions to comply with this requirement. A copy of the installation instructions shall accompany any request for equipment certification.

(3) Emissions outside of each band shall meet Table 3 limits.

(4) The signal sweep rate shall not be less than 4,000 nor greater than 50,000 sweeps per second.

(5) Signal emission from the AVIS shall only occur when the vehicle to be identified is within the radiated field of the system.

(6) Sections 2 to 5, 6.3 to 6.6, 7.4, 7.5 and 9 to 15 apply.

Note: The sub-band 3500-3600 MHz is within the restricted bands of Table 2 and Industry Canada may impose further restrictions if it is shown to be necessary.

6.2.2 (q1) 5150-5350 MHz and 5725-5825 MHz (Local Area Network Devices)

Licence-exempt local area network (LELAN) devices are permitted in these bands. The bands may be known as bottom band 5150-5250 MHz, middle band 5250-5350 MHz and top band 5725-5825 MHz.

The bottom band (5150-5250 MHz)is only for devices with integral antennas and for indoor operation. The other two bands are for both indoor and outdoor operations. Other parameters are given below.

(i) 5150-5250 MHz (for indoor only)

The maximum equivalent isotropically radiated power (EIRP) shall not exceed 200 mW or 10 + 10 Log_{10} B, dBm, whichever power is less. B is the 99% power bandwidth in MHz. The power spectral density shall not exceed 10 dBm in any 1.0 MHz band (EIRP).

All emissions outside the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz.

The band 5150-5250 MHz is only for indoor operation and the transmitter must be equipped with an integral antenna. Conditions (iv) apply.

(ii) 5250-5350 MHz

The maximum transmitter power shall not exceed 250 mW or 11 + 10 Log_{10} B, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum EIRP shall not exceed 1.0 watt or 17 + 10Log_{10} B, dBm, whichever power is less. B is the 99% power bandwidth in MHz.

All emissions outside the 5250-5350 MHz band shall not exceed -27 dBm/MHz at the transmitter output antenna connector.

Devices may operate across the bottom/middle frequency boundary of 5250 MHz provided that the device is labelled "for indoor use only" and the power spectral density within 5150-5250 MHz complies with the limit for that band. Conditions (iv) apply.

(iii) 5725-5825 MHz

The maximum transmitter power shall not exceed 1.0 watt or $17 + 10 \text{ Log}_{10}$ B, dBm, whichever power is less. The power spectral density shall not exceed 17 dBm in any 1.0 MHz band. The maximum EIRP shall not exceed 4.0 watts or $23 + 10 \text{ Log}_{10}$ B, dBm, whichever power is less. B is the 99% power bandwidth in MHz.

All emissions within the frequency range from the band edges to 10 MHz above or below the band edges shall not exceed -17 dBm/MHz at the transmitter output antenna connector. For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27 dBm/MHz.

Fixed **point-to-point** devices for this band are permitted up to 200 watts EIRP by employing higher gain antennas, but not higher transmitter output powers. Point-to-**multipoint** systems, omni-directional applications and multiple co-located transmitters transmitting the same information are **prohibited** under this high EIRP category. However, remote stations of point-to-multipoint systems shall be permitted to operate at the point-to-point EIRP limit provided that the higher EIRP is achieved by employing higher gain directional antennas and not higher transmitter output powers. Conditions (iv) apply.

(iv) Other Conditions for All 3 Bands

(a) Digital modulation shall be used. The power measurements (transmitter output power and EIRP, or unwanted emissions) are in terms of average value (i.e. using an averaging meter). If the transmission is in burst, section 6.5 applies.

(b) Within the emission bandwidth, when the peak spectral density per MHz over any continuous transmission exceeds the average (10 Log_{10} B) value by more than 3 dB, the permissible power spectral density shall be reduced by the excess amount.

Use of a measurement/resolution bandwidth narrower than 1.0 MHz is permitted provided that power integration over 1.0 MHz is performed. On the other hand, if the emission bandwidth of the signal is less than 1.0 MHz, the measurement bandwidth should be reduced to that of the emission bandwidth to obtain the proper power spectral density; alternatively, the measured value could be normalized to 1.0 MHz. (**Note:** B has been defined above as the 99% power bandwidth, but a 26 dB emission bandwidth may also be used).

(c) The outermost carrier frequencies or channels, as permitted by the design of the equipment, shall be used when measuring unwanted emissions. Such carrier or channel centre frequencies are to be indicated in the test report.

(d) The device shall automatically discontinue transmission in case of absence of information to transmit or operational failure. A description on how this is met shall accompany the application

for equipment certification. Note that this is not intended to prohibit transmission of control or signalling information or the use of repetitive codes where required by the technology.

(e) The transmitter frequency stability shall be better than ±10 ppm when tested to the conditions of section 6.4. Alternatively, it shall be tested to show that the unwanted emission masks of the outermost channels are complied with when tested under all conditions of normal operation as specified in the **user manual**.

(f) Mobile Satellite Service operators may monitor emissions from LELAN devices in the 5150-5250 MHz band and, if emissions approach the 10 watts/MHz aggregate ground level emission, request Industry Canada to reassess the technical parameters of LELAN devices. The aggregation may be from all devices within the footprint of the MSS satellite antenna beam and not just from Canadian devices.

(g) User Manual (Local Area Network Devices)

The **user manual** of local area network devices shall contain clear instructions on the restrictions mentioned above, namely:

- that the device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel Mobile Satellite systems;

- the maximum antenna gain permitted (5250-5350 MHz devices) to comply with the EIRP limit, and

- other conditions as in (iii) above (5725-5825 MHz devices).

In addition, users should also be cautioned to take note that high power radars are allocated as primary users (meaning they have priority) of 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to LELAN devices.

The notice specified in section 14 concerning Human Exposure to RF Fields shall be given in the **user manual** as if the device is for the general population.

(v) Other Requirements

Sections 2 to 5, 6.3 (except the restricted band requirement) to 6.6, 7 to 7.5, and 9 to 15 apply.

6.2.2 (r) 8.5-10.55 GHz swept frequency inside metal containers

Notwithstanding that this band encompasses two restricted bands listed in Table 2, swept frequency devices are permitted when all the following conditions are met:

(1) The device shall be installed completely inside a metal container by qualified installers.

(2) The transmitter output power shall not exceed 8 milliwatts at the connector to the antenna.

(3) The antenna shall be installed pointing downwards.

(4) The sweep is never stopped with the fundamental emission within any restricted band of Table 2.

(5) The leakage of RF field outside the container at 3 metres from the container walls, at the fundamental frequency with the sweeping stopped, shall not exceed Table 3 limits, to be measured above the tank (i.e zenith direction), and in the horizontal plane at each 45 degrees azimuth. This measurement is only required for the test report for the purpose of equipment certification (3 installations, see section 5.15) and not for every installation. Since radio leakage depends on the type of metal wall and its thickness, field installations must use similar construction and the radio device manufacturer shall provide proper instructions to the end-user. Container walls made of material other than metal may be evaluated on a case by case basis, see section 2.5.

(6) **User Manual**

The **user manual** of a swept frequency device shall clearly carry this notice or equivalent:

(i) This device shall be installed and operated in a completely enclosed metal container to prevent RF emission which otherwise can interfere with aeronautical navigation. Installation shall be done by trained installers, in strict compliance with the manufacturer's instructions. The container walls must be made of .....(manufacturer of the radio device to insert the type of material and minimum thickness).

(ii) The use of this device is on a "no-protection non-interference" basis. That is, the user shall accept Government and NAV CANADA operations of high powered radar in the same frequency band which may interfere with or damage this device. On the other hand, devices found to interfere with Government and NAV CANADA operations will be required to be removed at the user's expense.

(iii) The user is required to notify the device supplier at (give address) ..... of the postal address of the user, the address where the device is installed, the device model number, and the date of installation.

(7) **Special Instructions:**

The applicant for equipment certification is required to notify NAV CANADA, Manager, Flight Inspection and Radio Communications Engineering, 280 Hunt Club Road, Ottawa, Ontario K1V 1C1; Telephone: (613) 248-7132 and of the address of the distributor of the device, and to instruct the distributor to maintain a record of where the devices are installed in Canada and to submit a copy of this record once a year to NAV CANADA. The party responsible for equipment compliance shall verify NAV CANADA’s current address before submitting the information.

(8) Sections 2 to 5 and 9 to 15 apply.

6.2.2(r1) Other Devices Totally Enclosed in Metal Containers (for non-restricted Frequencies)

Devices that are totally enclosed in metal containers can be certified when the frequency is narrowband or wideband, swept or unswept, provided that the emission bandwidth does not fall into restricted bands of Table 2. Other conditions such as output power are as given in section 6.2.2(r) with the exception of subsection (7). Furthermore, factory testing in one metal container instead of three is acceptable.

When a restricted band is involved (e.g. above 38.6 GHz), the device can be evaluated on a case by case basis; see section 2.5.

6.2.2(s) 17.15 GHz and 94 GHz

The following carrier frequencies are available for use by radar and other mobile devices; their parameters such as occupied bandwidths and permissible out of band emissions will be evaluated on a case-by-case basis; see section 2.5.

(1) 17.15 GHz: 0.3 watt eirp.
(2) 94 GHz: 0.4 watt eirp.

6.2.2 (t1) 46.7-46.9 GHz and 76.0-77.0 GHz (Vehicle-Mounted Field Disturbance Sensors)

(1) **General Restrictions**

Operation within the bands 46.7-46.9 GHz and 76.0-77.0 GHz is restricted to vehicle-mounted field disturbance sensors used as vehicle radar systems. The transmission of additional information, such as data, is permitted provided the primary mode of operation is as a vehicle-mounted field disturbance sensor. Operation under the provisions of this section is not permitted on aircraft or satellites.

(2) **Limits of Radiated Emissions**

(i) **In-Band Emissions:** The radiated emission limits within the bands 46.7-46.9 GHz and 76.0-77.0 GHz are as follows:

(a) If the vehicle is moving less than 1 km/hour, the power density of any emission within the bands specified in this section shall not exceed 200 nW/cm^2 at a distance of 3 meters from the radiating source.

(b) For forward-looking vehicle-mounted field disturbance sensors, if the vehicle is in motion the power density of any emission within the bands specified in this section shall not exceed 60 W/cm^2 at a distance of 3 meters from the radiating source.

(c) For side-looking or rear-looking vehicle-mounted field disturbance sensors, if the vehicle is in motion the power density of any emission within the bands specified in this section shall not exceed 30 W/cm^2 at a distance of 3 meters from the radiating source.

(ii) **Spurious Emissions:** Any emissions outside the operating band shall consist solely of spurious emissions and shall not exceed the following limits:

(a) Radiated emissions below 40 GHz shall not exceed the limits given in the table below.

Table 6.2.2(t1)

Frequency (MHz)	Field Strength (microvolts/meter)[1]	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. **Exception:** Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

[1] The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(b) Radiated emissions outside the operating band and between 40 GHz and 200 GHz shall not exceed the following:

(1) For vehicle-mounted field disturbance sensors operating in the band 46.7-46.9 GHz: 2 pW/cm^2 at a distance of 3 meters from the radiating source.

(2) For forward-looking vehicle-mounted field disturbance sensors operating in the band 76-77 GHz: 600 pW/cm^2 at a distance of 3 meters from the radiating source.

(3) For side-looking or rear-looking vehicle-mounted field disturbance sensors operating in the band 76-77 GHz: 300 pW/cm^2 at a distance of 3 meters from the radiating source.

(c) For radiated emissions above 200 GHz from field disturbance sensors operating in the 76-77 GHz band: the power density of any emission shall not exceed 1000 pW/cm^2 at a distance of 3 meters from the radiating source.

(3) **Peak Transmitter Output Power**

No limit on peak transmitter output power.

(4) **Measurement Requirements**

1. Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

(ii) For field disturbance sensors operating in the 76-77 GHz band, the spectrum shall be investigated up to 231 GHz.

(iii) Emissions from transmitters operating above 30 GHz shall be measured to the fifth harmonic of the highest operating frequency or up to 200 GHz, whichever is lower.

(iv) For measurement of emissions above 1000 MHz, a measuring instrument having a 1 MHz resolution bandwidth shall be used.

(v) The measurement of conducted emissions above 40 GHz could accurately portray the radiated RF fields, provided that the antenna characteristics can be determined accurately. Accordingly, conducted measurements that are to be employed in order to facilitate measurements will be permitted.

(5) **Frequency Stability**

Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. For certification purposes, the equipment will be presumed to operate over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage. Should the equipment operate at temperatures lower than the tested range, it is expected that this requirement is still met.

6.2.2(t2) Devices in the 59-64 GHz Band

(1) **General Restrictions**

Operation within the band 59-64 GHz under the provisions of this section is not permitted for the following products:

(i) Equipment used on aircraft or satellites.

(ii) Field disturbance sensors, including vehicle radar systems, unless the field disturbance sensors are employed for fixed operation. For the purposes of this section, the reference to fixed operation includes field disturbance sensors installed in fixed equipment, even if the sensor itself moves within the equipment.

(2) **Limits of Radiated Emissions**

(i) **In-Band Emissions**

Within the 59-64 GHz band, emission levels shall not exceed the following:

(a) For products other than fixed field disturbance sensors, the average power density of any emission, measured during the transmit interval, shall not exceed 9 W/cm^2, as measured 3 meters from the radiating source, and the peak power density of any emission shall not exceed 18 W/cm^2, as measured 3 meters from the radiating source.

(b) For fixed field disturbance sensors that occupy 500 MHz or less of bandwidth and that are contained wholly within the frequency band 61.0-61.5 GHz, the average power density of any emission, measured during the transmit interval, shall not exceed 9 W/cm^2, as measured 3 meters from the radiating source, and the peak power density of any emission shall not exceed 18 W/cm^2, as measured 3 meters from the radiating source. In addition, the average power density of any emission outside of the 61.0-61.5 GHz band, measured during the transmit interval, but still within the 59-64 GHz band, shall not exceed 9 nW/cm^2, as measured 3 meters from the radiating source, and the peak power density of any emission shall not exceed 18 nW/cm^2, as measured three meters from the radiating source.

(c) For fixed field disturbance sensors other than those operating under the provisions of subsection 2(i)(b) of this section, the peak transmitter output power shall not exceed 0.1 mW and the peak power density shall not exceed 9 nW/cm^2 at a distance of 3 meters.

(ii) **Spurious Emissions**

Any emissions outside the 59-64 GHz band shall consist solely of spurious emissions and shall not exceed the following limits:

(a) Radiated emissions below 40 GHz shall not exceed the limits in Table 6.2.2(t).

(b) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm^2 at a distance of 3 metres.

(c) Within the 59.0-59.05 GHz band, only spurious emissions related to a publicly-accessible coordination channel are permitted. NOTE: The band 59-59.05 GHz is reserved exclusively for a publicly-accessible coordination channel.

(d) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

(3) **Peak Transmitter Output Power**

(i) The total peak transmitter output power shall not exceed 500 mW., with the exception that transmitters with an emission bandwidth of less than 100 MHz must limit their peak transmitter output power to the product of 500 mW times their emission bandwidth divided by 100 MHz.

(ii) For purposes of demonstrating compliance with this Standard, corrections to the transmitter output power may be made due to the antenna and circuit loss.

(4) **Measurement Requirements**

(i) Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

(ii) Emissions from transmitters operating above 30 GHz shall be measured to the fifth harmonic of the highest operating frequency or up to 200 GHz, whichever is lower.

(iii) For measurement of emissions above 1000 MHz, a measuring instrument having a 1 MHz resolution bandwidth shall be used.

(iv) Peak power density shall be measured with an RF detector that has a detection bandwidth that encompasses the 59-64 GHz band and has a video bandwidth of at least 10 MHz, or using an equivalent measurement method.

(v) Peak transmitter output power shall be measured with an RF detector that has a detection bandwidth that encompasses the 59-64 GHz band and that has a video bandwidth of at least 10 MHz, or using an equivalent measurement method.

(vi) The measurement of conducted emissions above 40 GHz could accurately portray the radiated RF fields, provided that the antenna characteristics can be determined accurately. Accordingly, conducted measurements that are to be employed in order to facilitate measurements will be permitted.

(vii) The average emission limits shall be calculated, based on the measured peak levels, over the actual time period during which transmission occurs.

(5) **Frequency Stability**

Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. For certification purposes, the equipment will be presumed to operate over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage. Should the equipment operate at temperatures lower than the tested range, it is expected that this requirement is still met.

(6) **Group Installations**

Any transmitter that has received the necessary IC certification under this Standard may be mounted in a group installation for simultaneous operation with one or more transmitter(s) that have received the necessary IC authorization, without any additional equipment authorization. However, no transmitter operating under the provisions of this section may be equipped with external phase-locking inputs that permit beam-forming arrays to be realized.

(7) **Transmitter Self-Identification Transmission**

For all transmissions that emanate from inside a building, within any one second interval of signal transmission, each transmitter with a peak output power equal to or greater than 0.1 mW or a peak power density equal to or greater than 3 nW/cm^2, as measured 3 meters from the radiating source, must transmit a transmitter identification at least once. Each application for equipment approval must declare that the equipment that will be used inside a building contains the required transmitter identification feature and must specify a method whereby interested parties can obtain sufficient information, at no cost, to enable them to fully detect and decode this transmitter identification information. Upon the completion of decoding, the transmitter identification data block must provide the following fields:

1. Industry Canada certification number, which shall be programmed at the factory.

2. Manufacturer's serial number, which shall be programmed at the factory.

3. Provision for at least 24 bytes of data relevant to the specific device, which shall be field programmable. The applicant must implement a method that makes it possible for users to specify and update this data. The recommended content of this field is information to assist in contacting the operator.

6.2.3 Other Licence-Exempt Bands

The bands in Table 6 may be used for equipment that are licence-exempt and governed by other Standards. Table 6 is given only as a cross-reference; the quoted documents should be consulted for technical requirements governing these devices.

6.3 Restricted Bands and Unwanted Emission Frequencies

Restricted bands, identified in Table 2, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite down links, radio astronomy, and some Government uses.

(a) Fundamental components of modulation of LPDs shall not fall within the restricted bands of Table 2.

(b) Unwanted emissions in this Standard include out-of-band products of modulation, carrier harmonics and spurious emissions.

(c) Except as provided in 6.2.2(L2), 6.2.2(o) and 6.2.2(q1), unwanted emissions falling into restricted bands of Table 2 shall meet Tables 3 and 7 limits. It should also be noted that unwanted emissions falling in non-restricted bands do not need to be suppressed to a level lower than the Table 3 and 7 limits. The measurement instrumentation shall employ a CISPR quasi-peak detector for frequencies 490 kHz to 1000 MHz. Above 1000 MHz, compliance shall be based on the average value of measured emissions. Below 490 kHz, either a CISPR quasi-peak or an averaging meter may be used.

For Category II equipment, either a CISPR quasi-peak or an averaging meter can be used; see section 8.

(d) Unwanted emissions **not** falling within restricted frequencies may also use the limits specified in sections 6.1 to 6.2.2 (s).

(e) The search for unwanted emissions (from the transmitter) shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), to the 5th harmonic of the highest frequency generated or used, without exceeding 40 GHz. See section 5.9 for resolution bandwidth to be used.

(f) If the device contains digital circuitry, see 5.17.

6.4 Frequency Stability

When the carrier frequency stability is not specified, it need not be tested, provided that the carrier frequency is so chosen that the **fundamental** modulation products (meaning the nominal bandwidth) lie totally within the bands of Tables 1, 3, 4, 5 and 7 and do not fall into any restricted band given in Table 2. Due account shall be taken of carrier frequency drift as a result of aging, temperature, humidity, and supply voltage variations when using frequencies near the band edges. Therefore, the test report shall show that the selected carrier frequency and the frequency stability (measured or estimated) comply with the above when submitting a certification application to Industry Canada.

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20°C and rated supply voltage.

The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up.

Where frequency stability is specified (e.g. in Table 5) the frequency shall be measured:

(a) at temperatures of -20°C, +20°C, and +50°C at the manufacturer's rated supply voltage, and
(b) at 85% and 115% of supply voltages when the temperature is +20°C.

For handheld equipment that is only capable of operating from internal batteries, the frequency stability tests shall be performed using a new battery without any further requirement to vary the supply voltage. Alternatively, an external supply voltage can be used and set at the battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

Transmitters may be either crystal controlled or frequency synthesized.

6.5 Pulsed Operation

When the field strength (or envelope power) is not constant or when it is in pulses, and an averaging detector is specified to be used, the current or voltage over one complete pulse train, including blanking intervals, shall be averaged as long as the pulse train does not exceed 0.1 second. Where the pulse train exceeds 0.1 second, the average value (of field strength or output power) shall be determined over the 0.1 second interval during which the field strength is at its maximum.

With pulsed operation, the peak power is allowed a limit 20 dB above the 0.1 second average power limit. Spurious emissions are also allowed a similar 20 dB limit. Both the average and the peak limits shall be met.

A drawing or photograph of a typical encoded pulse train showing pulse widths and amplitudes in the time domain, the method of power calculation, and the type of meter used shall be given in the test report.

6.6 Transmitter AC Wireline Conducted Emissions

This is a measurement of the extent of unwanted emissions conducted back into the AC electrical network by LPDs. Note that this test is only for unwanted emissions and not the wanted conducted emissions of AC Carrier Current devices described in section 8.3.

This test applies when the device has any one or more of the following characteristics:

(i) The carrier frequency is within 0.45-30 MHz;

(ii) The equipment power supply contains switching circuitry (any frequency);
(iii) Internal clock or local oscillator frequency is within 0.45-30 MHz.

To claim test exemption, the engineering brief or test report shall contain a statement that the conditions of test exemption are met.

More information on this is in section 9. The test on the transmitter may be combined with the test of section 7.4 on the receiver.

Minimum Standard

(a) On any frequency or frequencies within the band of 0.45-30 MHz, the measured RF voltage (CISPR meter) shall not exceed 250 microvolts (across 50 ohms).

(b) Transmitters marketed for use only in a commercial, industrial or business environment and not intended for use in homes are permitted a limit of 1000 microvolts (0.45 - 1.705 MHz) and 3000 microvolts (1.705 - 30 MHz).

7. Receiver Tests and Certification

It is to be noted that receivers **tunable** to (operate) above 30 MHz and below 40 GHz are required to have their spurious emissions measured. This requirement, however, does not apply to regular FM broadcast receivers.

7.1 Receiver Categories

The technical requirements in sections 7.1 to 7.5 apply to (a) receivers intended to be used in conjunction with transmitters of low power devices governed by this Standard, (b) to paging receivers, (c) to "receive-only" earth stations operating with satellites approved by Industry Canada and (d) to receivers not covered by other RSSs, e.g. stand-alone receivers like GPS (Global Positioning System) receivers.

These receivers can be classified as either Category I or Category II as specified below (see definitions in 1.2 and 1.3). The receiver characteristics given below are summarized in Table 9.

Note: Standards for radio apparatus capable of receiving television broad-casting, such as TV and satellite receivers, VCRs, etc, that are intended and used for the purpose of home entertainment can be found in the Broadcasting Equipment Technical Standard, BETS-7, and are not covered by this RSS.

Category I Receivers: Except as provided for in section 8.7, a receiver that is tunable to any frequency in the band 30 - 960 MHz is a Category I receiver.

Category II Receivers: A receiver that is only tunable to frequencies below 30 MHz or above 960 MHz is a Category II receiver (see section 1.3 for definition) with the exception of a scanner receiver. Scanner receivers are category I equipment and requires equipment certification no matter what frequency band it is capable of tuning to (see section 7.5).

Category II receivers are governed by 8 and 8.7 to 8.9.

Method of Measurement

Receiver emissions are to be measured by a radiated measurement except as provided in section 7.2. The receiver shall be operated in the normal receive mode and tuned (in turn) to the mid-range of each of its switchable bands.

The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (local oscillator frequency, intermediate frequency or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tunable and local oscillator frequencies, without exceeding 40 GHz.

If the device contains digital circuitry, see 5.17

7.2 Receiver Spurious Emissions (Antenna Conducted)

This is an alternative measurement method permitted in lieu of a radiated measurement, and under the following conditions:

(a) If the device normally has a detachable antenna of known antenna impedance.

(b) The device does not contain digital circuitry.

Note: Audit testing by the Department to check compliance will use the RF field method. If the radiated limit is exceeded or, as a result of an interference complaint, it is determined that the device's spurious emissions cause harmful interference to other authorized users of the spectrum, the Department may require that the party responsible for compliance take corrective action. Therefore, RF emission from the cabinet should be checked wherever possible.

Method of Measurement

Replace the antenna by a spectrum analyser of resistance equal to the impedance specified for the antenna.

If the receiver is super-regenerative, stabilize it by coupling to it an unmodulated carrier on the receiver frequency. Taking care not to overload the receiver, vary the amplitude and frequency of the stabilizing signal to obtain the highest level of the spurious emission from the receiver.

Minimum Standard

Receiver spurious emissions at any discrete frequency shall not exceed 2 nanowatts in the band 30-1000 MHz), or 5 nanowatts above 1 GHz.

7.3 Receiver Spurious Emissions (Radiated)

This measurement is to be performed, with the device's antenna connected in its place, at a calibrated Open Area Test Site (see section 11).

If the receiver is super-regenerative, stabilize it by transmitting an unmodulated carrier on the receiver frequency from an antenna in the proximity of the receiver. Taking care not to overload the receiver, vary the amplitude and frequency of the stabilizing signal to obtain the highest level of the spurious emission from the receiver.

Minimum Standard

Receiver radiated spurious emissions in each polarization (vertical and horizontal polarization) shall not exceed the limits in Table 3. The resolution bandwidth of the spectrum analyser shall be 100 kHz for measuring spurious emissions below 1 GHz, and 1 MHz for above 1 GHz. Alternatively, a CISPR quasi-peak detector may be used for measurement below 1 GHz.

7.4 Receiver AC Wireline Conducted Emissions

Same requirements as 6.6 for transmitters.

7.5 Scanner Receivers

Scanner receivers are any receivers that scan a frequency band or bands and demodulate and/or decode the signals. Receivers used for the purpose of detecting RF energy and avoiding occupied frequencies are not classified as scanner receivers. See RSS-135 for scanner standards and certification requirements for digital scanner receivers, and RSS-215 for analogue scanner receivers.

8. Standards for LPDs Identified as Category II Equipment

Standards in this section apply to category II equipment (transmitters and receivers), which does not require certification by Industry Canada, i.e. certification exempt (see also section 1.3 and 7.1). Such equipment must nonetheless be tested to demonstrate that it fully complies with the standards described below. Table 8 provides a summary of equipment classified as category II equipment.

8.1 Underground and Tunnel Radios

Equipment used in a tunnel or underground radio system is permitted under the following conditions:

(1) When it is for installation in a fixed underground location or tunnel or on a vehicle that does not exit the openings above-ground. Additionally, the equipment shall be labelled "For underground installations only". The **user manual** shall caution the user not to install the transmitter near any opening above-ground and to provide instructions to comply with the requirements of (3), (4) and (5) below.

Note: Portable radio transceivers used in underground mines and structures are not classified as underground radios and are subject to other Standards and/or certification requirements. They may also be subject to licensing regulations.

(2) The fundamental frequency components of transmission shall not fall within the restricted bands of Table 2.

(3) The transmitter output power should not be greater than necessary for its intended function. It shall in any case not exceed 110 watts. The **user manual** shall list the carrier frequency and the transmitter output power.

(4) The leakage of RF field at the fundamental frequency shall be checked at each above-ground opening. The limits of leakage field strength are given in Tables 3 and 7.

(5) Sections 2 to 15, except the labelling requirements of section 8.9, do not apply.

(6) Records of site measurements shall be kept on site and made available to Industry Canada on request.

8.2 Cable Locating Equipment (9-490 kHz)

This is a device used to locate buried cables or pipes by coupling a radio frequency signal onto the cable or pipe, and using a receiver to detect the location of that structure. It may operate on any frequency within the bands 9-490 kHz, subject to the following power limits:

9 - 45 kHz : 10 watts peak output power.
45 - 490 kHz: 1.0 watt peak output power.

Sections 2 to 5, and 9 to 14 apply.

The **user manual** shall contain the following or equivalent notice:

"Equipment is for use by trained operators only and not for general household use. Usage duration shall be as short as possible to prevent possible radio interference to authorized services, especially the 100 kHz Loran-C frequency."

8.3 AC Wire Carrier Current Devices and Power Line Carrier Systems

8.3.1 AC Wire Carrier Current Devices (0-535 kHz, 535 kHz-30 MHz)

These are devices for business and residential buildings for signal transmission over the AC wires. They are classified as:

(a) **Interference causing equipment** when both the exciter (transmitter) and the receiver are connected to the AC wireline, and any emission of radio frequency energy is unintentional. Such systems are governed by the "Interference-causing equipment" regulations of Industry Canada (not part of this Standard). However, limits for (c) and (a) will be harmonized.

(b) **AC wire carrier current devices operating in the AM broadcast band** of 535-1705 kHz and intended for AM broadcast receivers. For technical standards, refer to the Industry Canada's existing broadcast apparatus regulations (not part of this Standard).

(c) **AC wire carrier current devices of the intentional radiator type,** where the exciter is connected to the AC wireline but the receiver is not (e.g. a magnetic loop is used to pick up the receive signal). These devices must comply with the limits given in section (c1) below.

(c1) Conducted Limits

(i) **0 to 535 kHz:** For AC wire carrier current devices having fundamental frequencies of 0 to 535 kHz, their harmonics and unwanted emission frequencies falling within 535-1705 kHz shall not exceed 1000 microvolts measured across a 50 ohm line impedance stabilization network (LISN); see section 9 for the measurement method.

Carrier current devices intended for residential and office buildings are permitted the output voltages listed in the table below, when measured, in turn, with 5 ohms and 50 ohms resistive loads. If the duty cycle is not determined by the manufacturer of the device (i.e. duty cycle is system dependent), then the **user manual** shall provide clear instructions to the system designer about how to compute the permissible output voltage of the system, based on the table below.

Permissible Carrier Current Output Voltages for Installation in Residential and Office Buildings

Below 9 kHz:	No limits;
9 to 95 kHz (see Note 1):	15.0 volts pk-pk (or 5.3 volts rms);
105 to 185 kHz (see Note 1):	15.0 volts pk-pk (or 5.3 volts rms);
185-535 kHz:	$0.45(B/D)^{½}$ volts pk-pk for devices intended for connection to 120 VAC lines and $0.90(B/D)^{½}$ volts pk-pk for devices intended for connection to 240 VAC lines, or 15 volts pk-pk, whichever is the lesser voltage (for 120 VAC and 240 VAC systems). B= bandwidth in kHz (-6 dBs points, i.e. when the spectral density has decreased by 6 dB). D = duty cycle, e.g. D = 1.0 for continuous transmission. When B is less than 4.8 kHz, B=4.8 may be used.

Note 1: The frequency table above does not include 100 kHz because it is a restricted frequency of Table 2; it is the LORAN C time signal frequency. Carrier current devices using the band 95-105 kHz, or carrier current spread spectrum systems that include this band, may do so subject to section 2.4 and cease operation if found to cause interference.

If the aggregate interference in any area or city is found to cause unacceptable interference to the authorized users (see section 2.4 for definition), Industry Canada will review the permissible voltage levels given in the above Table. Therefore, manufacturers should limit the duty cycle (transmission on-time) of their devices wherever possible.

The frequencies: 260, 262, 450, 455 and 500 kHz are being investigated by the carrier current industry in collaboration with NAV CANADA (for approval by Industry Canada), for possible use of higher output voltages for carrier current devices in some geographical areas. Effects on the A.M. broadcast receiver I.F. frequency of 455 kHz are also being studied. Other frequencies can also be investigated by the carrier current industry in collaboration with NAV CANADA.

(ii) **535-1705 kHz:** The level of the fundamental or harmonics falling within this band shall not exceed 1000 microvolts when measured across a 50 ohm LISN except for transmissions intended for AM broadcast receivers in which case see (b) above.

(iii) **Above 1705 kHz:** No conducted limits can be established at this time as it is for further study.

(c2) **Radiated limits:** Subject to further study by Industry Canada on cumulative effects of multiple devices, the following applies to an AC carrier current device operating above 1705 kHz:

Emission of the fundamental frequencies from AC Wire carrier current systems shall not exceed the limits in Tables 3, 7, 7.1, or sections 6.2.2(c), 6.2.2(d), 6.2.2(e), and 8.6.1.

Note: A line impedance stabilization network shall not be used in this radiated emission test.

(c3) Sections 2 to 5, 11 and 13 may apply.

8.3.2 Power Line Carrier Systems (9-490 kHz)

These are systems operated by public electric utility companies on their transmission lines, within the band 9-490 kHz. They are governed by the "Interference-causing equipment" regulations of Industry Canada (not part of this Standard).

8.4 Transmitters of Input Power 6 Nanowatts or Less

Any transmitter that has a power consumption (total input power into the device) not exceeding 6 nanowatts may operate on any radio frequency, including Table 2 frequencies, without an authorization from Industry Canada, i.e. no other standards to comply.

8.5 0-9 kHz, and Infra-red Frequencies

Radio frequency devices at 9 kHz or less and those at infra-red frequencies may operate without an authorization from Industry Canada, i.e. no other standards to comply.

8.6 26.96-27.28 MHz, 49.82-49.90 MHz, 24-24.25 GHz

Low power devices for the bands 26.96-27.28 MHz, 49.82-49.90 MHz, and 24-24.25 GHz shall comply with the following:

8.6.1 26.96-27.28 MHz

The field strength shall not exceed 10 millivolts/m measured at 3 metres with an averaging or a CISPR quasi-peak meter (equivalent to 30 µW EIRP).

Outside of this band, Tables 3 and 7 limits shall apply.

Sections 2 to 5, 6.3 to 6.6, 7.4 and 9 to 14 apply.

8.6.2 49.82-49.90 MHz

The field strength shall not exceed 10 millivolts/m measured at 3 metres with an averaging or a CISPR quasi-peak meter (equivalent to 30 µW EIRP).

Outside of the band of 49.81-49.91 MHz, Table 3 limits apply.

Sections 2 to 5, 6.3 to 6.6, 7 to 7.5 and 9 to 14 apply.

Cordless telephones are not permitted to operate under the above provisions.
Note: Both transmitters and receivers operating within the above conditions are category II (certification exempt) equipment.

8.6.3 24.0-24.25 GHz

The field strength shall not exceed 250 millivolts/m measured at 3 metres with an averaging meter (equivalent to 19 mW EIRP).

The fundamental components of modulation shall lie within this band. Emissions radiated outside of the specified frequency band, shall be attenuated by at least 50 dB below the level of the fundamental or to Table 3 limits, whichever is the less stringent.

Sections 2 to 5, 6.3 to 6.6, 7.4, 7.5 and 9 to 14 apply. However, the search for spurious emissions above 24.25 GHz is not required.

8.7 Receivers Not Requiring Certification

In addition to category II receivers associated with items 8.1 to 8.6, the following are category II receivers:

(i) A receiver that is only tunable to frequencies below 30 MHz or above 960 MHz, with the exception of scanner receivers. Sections 7 to 7.5 apply, a summary of which is given in Table 9.

(ii) Home built receivers that comply with section 5.14.

8.8 Availability of Test Results

Although Category II equipment is not required to be certified by the Department, proper testing of samples of the equipment shall still be performed to verify that the devices (transmitters and receivers) do comply with all the standards. Testing may be done by any party including the manufacturer.

The test data obtained shall be compiled in a proper manner and kept by the manufacturer or agent whose name appears on the equipment label, and made available to Industry Canada on request, for as long as the model is being marketed in Canada.

8.9 Labelling and User Manual (Category II Equipment)

Category II equipment described in 8.1, 8.6 and 8.7 shall be labelled with the manufacturer's name or brand name, and model identification number and these words "**Canada 210**" to indicate compliance with this RSS-210.

The **user manual** shall contain the statement specified in 5.11. In the case of a transmitter, the carrier frequency and the RF output power (or field strength and measurement distance) shall also be stated.

8.10 Data Modem

Previously, the requirements of Industry Canada on data modems were given in RSS-119 and equipment certification was required. Data modems will henceforth be exempt from equipment certification.

Testing of the modem is nevertheless required to verify that unwanted emissions outside its intended bandwidth are adequately suppressed. The test data are to be kept by the manufacturer (for audit purposes by Industry Canada), but the test report is not required to be submit to Industry Canada. Modems may be classified into two classes described below.

8.10.1 Data Modem for Connection to the Public Telecommunication Network

If the data modem is intended to be connected to a public switched telecommunication network (PSTN) then it has to comply with the Standard CS-03 mentioned in section 3 above.

8.10.2 Data Modem for Connection to Radio Transmitter

If the data modem is a stand-alone unit (or part of a radio transmitter) and intended for connection to the data port of a radio transmitter, then it has to be tested to comply with the standard ICES-003 as well as the test described below. The data modem must also contain suitable audio filters or employ pulse shaping to limit the frequency spectrum, has level adjustment capability for the user to set the frequency deviation of the radio transmitter, and (preferably) impedance matching to the radio transmitter data port. A suitable test method is given below. The purpose of the test is for the modem manufacturer to ascertain that the pulse shaping/audio filtering, together with the appropriate frequency deviation, will limit the wanted signal bandwidth, and for the modem manufacturer to issue out proper instructions to the user to adjust the frequency deviation:

Method of Measurement

Connect a data generator to the modem.

Connect the modem to the data port of any type of radio transmitter that has been certified by Industry Canada. Connect a spectrum analyser to the RF output point of the transmitter.

Set the data generator rate to the maximum for which the modem is rated and the bit pattern to be pseudo-random of at least 2047 bits.

The following information should be marked on the spectrum plots and kept by the manufacturer with the test report: data bit and symbol rates, input voltage to the radio transmitter data port, manufacturer's name and model number.

Minimum Standard

The spectral density (e.g. dBW/kHz) of unwanted emissions outside the intended passband of the radio channel shall be at least 20 dB below the in-band (or passband) spectral density, measured with spectrum analyser of resolution bandwidth of approximately 1.0% of the radio transmitter's occupied bandwidth.

Labelling and User Manual of Data Modem

Labelling should conform with the CS-03 or ICES-003 standard, as appropriate, mentioned above. In addition, the data modem user manual shall contain instructions on how to adjust the frequency deviation, and notify the user concerning the maximum bit and symbol rates that the modem is capable of handling.

9. AC Wireline Conducted Measurement Method

The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network.

The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network. A description of the method of measurement that is acceptable to Industry Canada is found in RSS-212.

Only those devices which are equipped to operate from AC power directly or indirectly through battery chargers and have the characteristics given in sections 6.6, 7.4 and 8.3.1(c1)(i) are subject to this test.

10. Antenna Conducted Measurement Method

When the antenna is detachable, the transmitter output power and the unwanted emissions may be measured by replacing the antenna with a power meter or a spectrum analyser of resistance equal to the impedance specified for the antenna. For measurement of receiver spurious emissions see section 7.1.

11. RF Field Measurement Method

A description of the method of RF field measurement that is acceptable to Industry Canada is found in RSS-212. The following formula may be used to convert field strength (FS) in volts/m to transmitter output power (TP) in watts:

$$TP = \frac{(FS \times D)^2}{30 \times G}$$

where D is the distance in metres between the two antennas and G is the antenna numerical gain referenced to isotropic gain.

12. DC Power Consumption Method

An indirect transmitter mean output power measurement is also permitted for LPDs if the transmission can be made continuous during the measurement. The average input power into the final RF stage is to be measured, i.e. measure the DC input power. The transmitter mean output power is then taken as 50% of this input power unless noted otherwise.

13. Near-Field Measurement Method Below 30 MHz

Pending the development of a method for measurement below 30 MHz, the field strength may be measured in its near field (measurement distance less than wavelength/(2p)). The measured field strength shall be extrapolated to the distance specified in Tables 5 and 7 using the formula that the field strength varies as the inverse distance square (40 dB per decade of distance). Measurements at a minimum of two distances on at least one radial to determine the proper extrapolation formula instead of 40 dB is also permitted.

Below 1.705 MHz, the magnetic or H-field shall be used in making the measurement and the field intensity meter (FIM) is to be equipped with a loop antenna. The permissible limits are given in Table 7.1 when the FIM is calibrated in microamperes/metre. Alternatively, the FIM can be calibrated to read in microvolts/m where E/H = 377 is used. In this case, Table 7 gives the permissible field strength limits.

14. Exposure of Humans to RF Fields

Before equipment certification is granted, the procedures of RSS-102 must be followed concerning exposure of humans to RF fields.

For systems that do not employ low gain integral antennas (e.g. spread spectrum systems of section 6.2.2(o)), a notice in the **user manual** is required, as follows or equivalent:

> *"The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc.ca/rpb"*

15. Equipment Certification and Test Report Submission

With the exception of category II equipment, the test report, complete with measurement results that addresses the requirements of this Standard, should be submitted with the application for certification of a transmitter.

For receiver certification, a detailed test report and documentation (e.g. schematics, user manual, etc.) are not necessary; it is only required to report the receiver tuning range or ranges, the spurious emission and AC wireline conducted emission levels.

In addition to the above, a summary of Test Results and Attestation form, as given in Annex A of this Standard, shall be included for each model of equipment to be certified.

The application for certification should be prepared in accordance with RSP-100 and sent to:

Chief, Certification and Engineering Bureau
Industry Canada
3701 Carling Avenue (Building 94)
P.O. Box 11490, Station "H"
Ottawa, Ontario
Canada, K2H 8S2
Tel: (613) 990-4389 / Fax: (613) 990-4752
E-mail: certification.bureau@ic.gc.ca

Issued under the authority of
the Minister of Industry

R.W. McCaughern
Director General
Spectrum Engineering

Annex A

Summary of Test Results

Equipment model : _____ Test report page or reference

Transmitter tested to RSS-210 section _____

Field strength _____ FV/m at a distance of _____ metres _____
or
RF power _____ watts _____

Peak-to-average ratio _____ dB or G CISPR _____

Test conditions: G Radiated (sections 11 & 13)
G At antenna (section 10) _____
G DC input power (section 12)

Transmitter frequency _____ _____

Designation of Emission (see section 5.9.2) _____ _____

Occupied Bandwidth (measured) _____ _____

Frequency tuning range: Min. _____ Max. _____ _____

Frequency stability _____% _____

Transmitter spurious (worst case)

Field strength _____ FV/m at a distance of _____ metres _____

Frequency _____ _____

Momentary operation? G Yes G No _____

Holdover time after manual release: _____ seconds _____
or
Duration of transmission after
automatic activation: _____ seconds _____

Transmitter/receiver AC wireline conducted emissions (worst case)

Transmitter: RF level _____ microvolts, frequency _____ _____

Receiver: RF level _____ microvolts, frequency _____ _____

Receiver spurious (worst case)

Field strength _____ FV/m at a distance of _____ metres _____
or
RF power _____ nanowatts _____

Frequency _____ _____

Attestation:

The radio device identified in this application has been subject to all the applicable test conditions specified in RSS-210 and all of the requirements of the Standard have been met.

except as noted, _____ pages attached.

_____
Title

_____ _____ _____
Name(print) Signature Date

Introduction to the Tables

Available frequencies for **transmitters** are arranged as follows:

- Table 1 (very low power, momentary operation);
- Table 3 (very, very low power);
- Table 4 (supplementary to Table 1, at approximately 8 dB power reduction);
- Table 4.1 (specific for remote controls);
- Table 5 (low power, for listed frequency bands);
- Table 6 (bands for specific usage, higher power governed by other RSSs, for licence-exempt devices);
- Tables 7 and 7.1 (joins with Table 3 to cover the band below 30 MHz);
- Table 8 (a few bands for certification-exempt);
- Table 10 Transmitter Consolidated Frequency Table (summary of Tables 4.1, 5, 6, and 8 in ascending frequencies).

Receiver spurious emission: Table 3.
Receiver categories : Table 9.

Table 1:
Permissible Field Strength Limits
(Momentarily Operated Devices, section 6.1)

FUNDAMENTAL FREQUENCY (MHz), excluding restricted band frequencies of Table 2	**FIELD STRENGTH OF FUNDAMENTAL microvolts/m at 3 metres, (watts, EIRP)[(1)]**	**FIELD STRENGTH OF UNWANTED EMISSIONS[(1)] microvolt/metre at 3 metres**
40.66-40.70	See section 6.2.2(g).	
70-130	1,250 (470 nW)	125
130-174	1,250 to 3,750*	125 to 375
174-260 (note 1)	3,750 (4.2 uW)	375
260-470 (note 1)	3,750 to 12,500*	375 to 1,250
Above 470	12,500 (47 uW)	1250

Note 1: Use quasi-peak or averaging meter.
* Linear interpolation with frequency F in MHz:
For 130-174 MHz: FS (microvolts/m) = (56.82 x F) - 6136
For 260-470 MHz: FS (microvolts/m) = (41.67 x F) - 7083
nW = nanowatt (EIRP); uW = microwatt (EIRP);

Note 2: The frequency band 225-399.9 MHz is allocated for Government of Canada usage. There are different types of operations in different parts of this band of frequencies, including communications with aircrafts and operations using high power transmitters. Besides avoiding the frequency bands of Table 2, designers of Low Power Devices are strongly recommended to also avoid wherever possible the frequency sub-bands of 285-299 MHz, 320-322 MHz, and 335.4-350 MHz which are heavily used for such Government of Canada operations.

Table 2:
Restricted Frequency Bands (section 6.3)

MHz	MHz	MHz	MHz	GHz
0.090-0.110	8.37625-8.38675	--	1718.8-1722.2	9.0-9.2
--	8.41425-8.41475	156.52475-156.52525	2200-2300	9.3-9.5
2.1735-2.1905	12.29-12.293	156.7-156.9	2310-2390	10.6-12.7
3.020-3.026	12.51975-12.52025	--	--	13.25-13.4
4.125-4.128	12.57675-12.57725	--	2655-2900	14.47-14.5
4.17725-4.17775	13.36-13.41	240-285	3260-3267	15.35-16.2
4.20725-4.20775	16.42-16.423	322-335.4	3332-3339	17.7-21.4
5.677-5.683	16.69475-16.69525	399.9-410	3345.8-3358	22.01-23.12
6.215-6.218	16.80425-16.80475	608-614	3500-4400	23.6-24.0
6.26775-6.26825	25.5-25.67	960-1427	4500-5150	31.2-31.8
6.31175-6.31225	37.5-38.25	1435-1626.5	5350-5460	36.43-36.5
8.291-8.294	73-74.6; 74.8-75.2	1645.5-1646.5	7250-7750	Above 38.6
8.362-8.366	108-138	1660-1710	8025-8500	

See section 6.3 for more details on restricted bands.

Table 3:
General Field Strength Limits (for transmitter and receiver)(section 6.2.1)

FREQUENCY (MHz)	FIELD STRENGTH[1] microvolts/m at 3 metres (watts, EIRP)	
	Transmitter[2]	Receivers
30-88	100 (3 nW)	100 (3 nW),
88-216	150 (6.8 nW)	150 (6.8 nW),
216-960	200 (12 nW)	200 (12 nW),
960 - 1610	500 (75 nW)	500 (75 nW)
above 1610	500 (75 nW)	1000 (300 nW)

Note 1 : Use quasi-peak below 1000 MHz and averaging meter above 1000 MHz.

Note 2 : Transmitting devices are not permitted in Table 2 bands or in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, and 614-806 MHz). Prohibition of operation in TV bands does not apply to section 6.1 on momentary devices, or to 6.2.2(Ll) on medical telemetry devices in the band 174-216 MHz), and perimeter protection systems in the bands 54-72 and 76-88 MHz. The perimeter protection devices are to meet Table 3 field strengths limits.

Table 4:
Reduced Field Strength Limits
(Momentarily Operated Devices, section 6.1.1(e))

FUNDAMENTAL FREQUENCY (MHz), excluding restricted band frequencies of Table 2.	FIELD STRENGTH OF FUNDAMENTAL microvolts/m at 3 m (watts, EIRP) (note 1)	FIELD STRENGTH OF UNWANTED EMISSIONS microvolt/m at 3 m
40.66-40.70	See section 6.2.2(g).	
70-130	500 (75 nW)	50
130-174	500 to 1,500*	50 to 150
174-260	1,500 (0.68 uW)	150
260-470	1,500 to 5,000*	150 to 500
Above 470	5,000 (7.5 uW)	500

Note 1: Use quasi-peak or averaging meter.
* Linear interpolation with frequency F in MHz:
For 130-174 MHz: FS (microvolts/m) = (22.73 x F) - 2454.55
For 260-470 MHz: FS (microvolts/m) = (16.67 x F) - 2833.33
nW = nanowatt (EIRP); uW or µW = microwatt (EIRP).

Table 4.1:
Remote Control* Devices (sections 6.1.2 to 6.1.4)

Section	Freq. Band Limits (MHz)	Transmitter Output Power	Unwanted Emissions (dB)	BW (kHz)	Frequency Stab. (%)	Usage For Only
6.1.2	26.99-27.20	4 W, pk (or 2.5 W, pk for ±0.01% freq. stab.)	sect. 6.1.2	8	±0.005 ±0.01	Remote Control
6.1.3	72.0-73.0	0.75 W, pk	sect. 6.1.3	8	±0.002	Model aircraft
6.1.4	75.4-76.0	0.75 W, pk	sect. 6.1.4	8	±0.002	remote control except model aircraft control

*The transmitter for remote control is to be used solely by the operator to turn on and off a device at a remote location.

Table 5:
Frequencies and Field Strength Limits
(Non-momentarily Operated Devices, section 6.2)

Sect 6.2.2	TRANSMITTER FUNDAMENTAL FREQUENCY (MHz)	FS in mV/m at 3 m (watts, EIRP) Note 1	UNWANTED EMISSIONS (dB)	BW (kHz) Note 2	FREQ. STAB. in % or (ppm)	USAGE FOR ONLY Note 3
a	0.160-0.190	(1.0 W Final Stage)	-20 (*A or *Q)			
b	0.510-1.705	0.25 at 30 m *Q (or 0.1 W Final Stage)	-20 *Q			
c	1.705-10.0	0.1 at 30 m. *A (300 nW)	TBL 3 & 7			
c1	1.705-37.0 swept frequency	see text	see text			
d	6.765-6.795	15.5 at 30 m. *Q (7.2 mW)	see text		±0.01 (±100 ppm)	
e	13.553-13.567	15.5 at 30 m. *Q (7.2 mW)	see text		±0.01 (±100 ppm)	
f	Left Blank					
g	40.66-40.70	10 (30 uW) *A or 233 *Q (16 mW)	TBL 3		±0.01 (±100 ppm)	

g1	44/49	10 (30 uW) *A	TBL 3, see text.			Cordless Telephones
h	72.0-73.0; 74.6-74.8; 75.2-76.0	80 (1.9 mW) *A	1.5 mV/m at 3 m	200		Auditory/ Wireless microphone
i, j	Left blank					
k	88-108	0.25 (19 nW) *A	TBL 3	200		
k	88-108	1.0 (300 nW)*A	TBL 3	200		see text
L1	174-216	1.5 (675 nW) *A	TBL 3	200		medical telemetry
L2	216-216.450 and 216.500-217	100 mW Tx pwr (160 mW)	see text	5, 12.5, 25, 50	(±1.5 to ±50 ppm)	auditory assistant medical telemetry, goods tracking, Law enforcement
L2	216.450-216.500	100 mW Tx pwr (160 mW)	see text	5, 12.5, 25, 50	(±1.5 to ±50 ppm)	law enforcement
L2.1	462.5625-462.7125 and 467.5625-467.5625	0.5 W Tx pwr	see text	12.5	(±5 ppm)	
L3	608-614	200 (12 mW) *Q	TBL 3			hospital & health care
m1	902-902.1/927.9- 928	500 mW Tx pwr (10 W)	see text	12.5	(±2.5 ppm)	rural radiophones
m2	902-928	50 (0.75 mW) *Q	see text			
n	902-928	500 (75 mW) *A	see text			Field disturb.sens/ radar
o	902-928	1.0 W Tx power spread spectrum	-20 rel. to inband			
m2	2400-2483.5	50 (0.75 mW) *A	see text			
n	2435-2465	500 (75 mW) *A	see text			Field disturb. sens/ radar
o	2400-2450	see text	-20 rel. to inband		see 6.2.2(o)	see RSS-139
o	2450-2483.5	see text	-20 rel. to inband			
q1	5150-5250	200 mW EIRP	see text			Local Area Network
q1	5250-5350	250 mW Tx pwr (1.0 W)	see text			Local Area Network
q1	5725-5825	1.0 W Tx power	see text			Local Area Network
m2	5725-5875	50 (0.75 mW) *A	see text			
n	5785-5815	500 (75 mW) *A	see text			Field disturb. sens/radar
o	5725-5850	1.0 W Tx power spread spectrum (see text)	-20 rel. to inband			
n	10.5-10.55 GHz	2500 (1.9 W) *A	see text			Field disturb. sens/ radar
see 8.6.3	24.00-24.25 GHz	250 (19 mW) *A	2.5 mV/m			see 8.6.3
n	24.075-24.175 GHz	2500 (1.9 W) *A	see text			Field disturb. sens/ radar
q	2900-3260	3/MHz (2.7 uW) *A	TBL 3			Vehicle Identi.

q	3267-3332	3/MHz (2.7 uW) *A	TBL 3			Vehicle Identi.
q	3339-3345.8	3/MHz (2.7 uW) *A	TBL 3			Vehicle Identi.
q	3358-3600	3/MHz (2.7 uW) *A	TBL 3			Vehicle Identi.
r	8.5-10.55 GHz (swept frequency)	8 mW peak Tx power	TBL 3			Inside metal containers
r1	Any freq. except Table 2 freq	8 mW peak Tx power	TBL 3			Inside metal containers
s	17.15 GHz; 94 GHz	0.3 w EIRP; 0.4 w EIRP				

Note 1: Unless specified otherwise a value in parenthesis means an EIRP power value
nW = nanowatt; uW = microwatt; mW = milliwatt; W = watt
Tx power = transmitter output power.
FS in mV/m at 3 m =field strength in millivolts/m measured at 3 metres, except where otherwise specified
*A = Averaging Detector; *Q = CISPR Quasi-peak; refer to sections 4.2 and 5.9.

Note 2: Where in Table 5 the bandwidth is not specified, wideband systems can be used.

Note 3: The bands can be used for any type of service if there is no restriction in the USAGE FOR ONLY column. See also section 5.4.

TBL 3 = Table 3 limits.

Table 6:
Other Licence-Exempt Bands

FREQUENCY (MHz)	Transmitter output power or EIRP (watts)	USAGE FOR ONLY
26.96-27.41	4-6 Watts maximum	General Radio Service, see RSS-136
121.5	25-50 mW minimum	Radiobeacon, see RSS-187
243	25-50 mW minimum	Radiobeacon, see RSS-187
406-406.1	25-50 mW minimum	Radiobeacon, see RSS-187
944-948.5	10 mW maximum	CT2Plus Cordless Telephones, RSS-130*/ SRSP-508
1910-1930	112 mW maximum	RSS-213 (Unlicensed Personal Comm. Service)

* Use of cordless telephones certified under RSS-130 is licence-exempt, except for usage by service providers for general access by the public.

Table 7:
General Field Strength Limits Below 30 MHz (Transmit)
(see sections 6.2.1 and 13)

FREQUENCY (fundamental or spurious)	FIELD STRENGTH microvolts/m	MEASUREMENT DISTANCE metres
9-490 kHz	2,400/F (F in kHz) Note 1	300
490-1,705 kHz	24,000/F (F in kHz)	30
1.705-30 MHz	30	30

Note 1: Field strength for the band 9-490 kHz to be measured with a quasi-peak or averaging meter. For other frequencies in Table 7 the field strength is to be measured by quasi-peak meter.

Table 7.1:
General Magnetic Field Strength Limits Below 1.7 MHz (Transmit)
(see section 13)

FREQUENCY (fundamental or spurious)	MAGNETIC H-FIELD microamperes/metre	MEASUREMENT DISTANCE metres
9-490 kHz	2,400/(377F) (F in kHz) Note 1	300
490-1,705 kHz	24,000/(377F) (F in kHz)	30

Note 1: Field strength for the band 9-490 kHz to be measured with a quasi-peak or averaging meter. For other frequencies in Table 7.1 the field strength is to be measured by quasi-peak meter.

Table 8:
Category II Equipment (Certification-Exempt, section 8)

SECTION AND USAGE	FUNDAMENTAL FREQUENCIES	FIELD STRENGTH OR POWER LIMITS	UNWANTED EMISSIONS
8.1. Underground radio	Any frequency except restricted bands of Table 2	<110 Watts	See section 8.1
8.2. Cable Locating	9-45 kHz 45-490 kHz	10 watts, peak 1 watt, peak	Section 6.6 may apply
8.3. AC wire systems, Power Line Carrier Systems.	See text	see text	
8.4. Transmitters consuming 6 nanowatts maximum.	Any frequency	max. 6 nW input power (battery consumption)	
8.5. Below 9 kHz, and Infrared	0-9 kHz and infrared		

8.6.1	26.96-27.28 MHz	10 millivolts/m at 3 m(1)	Tables 3 & 7
8.6.2	49.82-49.90 MHz	10 millivolts/m at 3 m(1)	Table 3
8.6.3	24.0-24.25 GHz	250 millivolts/m at 3 m(1)	Table 3 or 50 dB below fundamental
8.7 LPD Receivers not tunable to 30-960 MHz	Below 30 MHz Above 960 MHz		See Table 9
Home built transmitters and receivers. (note 2)	See section 5.14		See section 5.14

Note 1: Use quasi-peak or averaging meter.

Note 2: Home built scanner receivers tunable outside amateur radio bands are category I equipment

Table 9:
Summary of Receiver Characteristics (section 7)

TUNABLE FREQUENCY RANGE	CLASSIFICATION(1)	SPURIOUS EMISSIONS FREQUENCIES
9 kHz - 30 MHz	Category II	No limits but section 2.4 applies.
30 - 960 MHz	Category I, (except section 8.6.2 receivers)	See Table 3 for radiated limits. Alternatively, 2 nanowatts (30-960 MHz) and 5 nW (above 1 GHz) at antenna connector.
Above 960 MHz (i.e. not tunable below 960 MHz)	Category II	same limits as receivers tunable to 30-960 MHz.

(1) This classification only applies to non scanner receivers (see text section 7.5)

Table 10:
Transmitter Consolidated Frequency Table
(Summary of Tables 4.1, 5, 6, and 8 in Ascending Frequencies)

TRANSMITTER FREQUENCY (MHz), except shown otherwise (note 1)	Field Strength millivolts/m @ 3 m (Watts, EIRP) (note 2)	UNWANTED EMISSIONS (dB)	USAGE	Reference / Notes
Any except Table 2 frequencies	<110 W Tx power		Underground and tunnel Radio	8.1 CAT II
Any frequency	(6 nW i/p power - battery consumption)		Any	8.4 CAT II
0-9 kHz	N/A		Any	8.5 CAT II
9-490 kHz, except Table 2 frequencies	2.4/F(kHz)@ 300 m *A*Q	TBL 3 & 7	Any	6.2.1 & 13
9-45 kHz	10 W peak Tx power		Cable Locating	8.2 CAT II
45-490 kHz	1 W peak Tx power		Cable Locating	8.2 CAT II
160-190 kHz	1 W Final Stage	-20 *A*Q	Any	6.2.2(a)
490-1705 kHz, except Table 2 frequencies	24/F(kHz)@ 30 m *Q	TBL 3 & 7	Any	6.2.1 & 13
510-1705 kHz	0.1 W Final Stage or 0.25 @ 30 m *Q	-20 *Q, Table 7	Any	6.2.2(b)
1.705-10	0.1 @ 30 m *A (300 nW)	TBL 3 & 7	Any	6.2.2 (c)
1.705-30, except Table 2 frequencies	30 uV/m @ 30 m *Q	TBL 3 & 7	Any	6.2.1 & 13
1.705-37.0 swept frequency	See text	TBL 3 & 7	Any	6.2.2 (c1)
6.765-6.795	15.5 at 30 m *Q(7.2 mW)	see text	Any	6.2.2 (d)
13.553-13.567	15.5 at 30 m *Q(7.2 mW)	see text	Any	6.2.2 (e)
26.96-27.41	4-6 W Tx power		General Radio Service	RSS-136
26.96-27.28	10 (30 uW)	TBL 3 & 7	Any	8.6.1 CAT II
26.99-27.20	2.5-4 W pk Tx power		Remote Control	6.1.2
30-88, except Table 2 frequencies	0.1 (3 nW)	TBL 3 & 7	Any	6.2.1
40.66-40.70	10 (30 uW) *A or 233 *Q (16 mW)	TBL 3	Any	6.2.2 (g)
44/49	10 (30 uW) *A	TBL 3, see text.	Cordless Telephones	6.2.2 (g1)
49.82-49.90	10 (30 uW)	TBL 3	Any	8.6.2 CAT II
72.0-73.0	0.75 W pk Tx power	see text	Model Aircraft	6.1.3
72.0-73.0 74.6-74.8; 75.2-76.0	80 (1.9 mW) *A	1.5 mV/m at 3 m.	Auditory/ Wireless microphone	6.2.2(h)
75.4-76.0	0.75 W pk Tx power	see text	Remote control	6.1.4

88-108	0.25 (19 nW)*A and 1.0 (300 nW) see text	TBL 3	Any	6.2.2(k)
88-216, except Table 2 frequencies	0.15 (6.8 nW)	Table 3	Any	6.2.1
121.5	see RSS-187		Radiobeacon	RSS-187
174-216	1.5 (675 nW) *A	TBL 3	Medical telemetry	6.2.2 (L1)
216.000-216.450 and 216.500-217.000	100 mW Tx pwr, (160 mW)	see text	audit. assist, medical telemetry, goods tracking, law enforce.	6.2.2(L2)
216.45-216.50	100 mW Tx pwr, (160 mW)	see text	law enforcement	6.2.2(L2)
216-960, except Table 2 frequencies	0.2 (12 nW)	Table 3	Any	6.2.1
243	see RSS-187		Radiobeacon	RSS-187
406-406.1	see RSS-187		Radiobeacon	RSS-187
462.5625-462.7125 and 467.5625-467.7125	0.5 W Tx power	see text	Family Radio Service (FRS)	6.2.2(L2.1)
608-614	200 (12 mW) *Q	Table 3	Medical telemetry	6.2.2(L3)
902-902.1/927.9-928	0.5 W Tx power (10 W)		rural radiophones	6.2.2(m1)
902-928	50 (0.75 mW) *Q	see text	Any	6.2.2 (m2)
	500 (75 mW) *A	see text	Field disturb./radar	6.2.2 (n)
	1.0 W Tx power, spread spectrum	-20 rel. Inband	Any	6.2.2 (o)
944-948.5	10 mW Tx power		CT2+ Cordless Telephone (Private/Commerc. Use)	RSS-130 SRSP-508
above 960, except Table 2 frequencies	0.5 (75 nW)	Table 3		6.2.1
1910-1930	112 mW Tx power		Personal Comm. Service	RSS-213
2400-2483.5	50 (0.75 mW) *A	see text	Any	6.2.2 (m2)
2400-2483.5	see text	-20 rel. Inband	see text	6.2.2 (o)
2435-2465	500 (75 mW) *A	see text	Field disturb./radar, see text	6.2.2 (n)
2900-3260; 3267-3332; 3339-3345.8; 3358-3600	3/MHz (2.7 uW) *A	TBL 3	Vehicle Identification	6.2.2 (q)
5150-5250	200 mW EIRP	see text	Local Area Network	6.2.2(q1)
5250-5350	250 mW Tx power, (1.0 W)	see text	Local Area Network	6.2.2(q1)
5725-5825	1.0 W Tx power, see text	see text	Local Area Network	6.2.2(q1)
5725-5850	1.0 W Tx power, spread spectrum (see text)	-20 rel. inband	Any	6.2.2 (o)
5725-5875	50 (0.75 mW) *A	see text	Any	6.2.2 (m2)
5785-5815	500 (75 mW) *A	see text	Field disturb./radar	6.2.2 (n)
8.5-10.55 GHz (swept frequency)	8 mW peak Tx power	TBL 3	Inside metal container	6.2.2 (r)

10.5-10.55 GHz	2500 (1.9 W) *A	see text	Field disturb./radar	6.2.2 (n)
17.15 GHz	0.3 W EIRP		Any	6.2.2 (s)
24.0-24.25 GHz	250 (19 mW)	TBL 3 or 50 dB below fundamental	Any	8.6.3 CAT II
24.075-24.175 GHz	2500 (1.9 W) *A	see text	Field disturb./radar	6.2.2 (n)
94 GHz	0.4 W EIRP		Any	6.2.2 (s)
Infrared	N/A		Any	8.5 Cat. II

Note 1: Tables 3 and 7 are also available for use in transmitters, excluding the restricted bands listed in Table 2

Note 2: C Unless specified otherwise, values that do not have a unit are values in mV/m.
C Unless specified otherwise, a value in parenthesis means an EIRP power value.
nW = nanowatt; uW = microwatt; mW = milliwatt; W = watt
Tx power = transmitter output power
ERP = effective radiated power; EIRP = equivalent isotropically radiated power
*A = Averaging Detector; *Q = CISPR Quasi-peak (see sections 4.2 and 5.9).

TBL 3 = Table 3 limits