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# **Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment**

## Preface

Radio Standards Specification 210, Issue 7, *Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment*, sets out certification requirements for low-power licence-exempt radiocommunication devices that are Category I equipment.

This document will be in force as of the publication date of *Canada Gazette* Notice SMSE-001-07, after which the public has 120 days to make comments. Comments received will be taken into account and a new issue or a revised version of this issue may be developed.

### Changes:

- (1) **Table 1: Restricted Frequency Bands:** A typographical error in the second entry in Table 1 had shown frequency range as 2.1735-2.190 MHz. This was corrected to read 2.1735-2.1905 MHz.
- (2) **Table 3: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz:** A note was added below the table indicating that the emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.
- (3) **Annex 1, Section A1.1.5:** A note has been included to the effect that while unwanted emissions must meet limits in third column of Table 5: Reduced Field Strength Limits for Momentarily Operated Devices, suppression below Table 2: General Field Strength Limits is not required.
- (4) **Annex 1, Section 1.2.1:** The remote control frequency of 27.255 MHz has been added to harmonize with the FCC.

### (5) Annex 8:

Numerous editorial changes made throughout Annex 8 to clarify text.

**Section A8.4:** The e.i.r.p. limits for the band 902-928 MHz were added.

### (6) Annex 9:

**Section A9.2(3):** The e.i.r.p. limit of 200 W specified in Issue 6 for point-to-point operation in the band 5725-5825 MHz has been changed to no e.i.r.p. limit for point-to-point operation, to correspond with e.i.r.p. provisions for the band 5725-5850 MHz set out in Annex 8, since overall requirements are very similar.

**Section A9.4:** A Dynamic Frequency Selection (DFS) test procedure for LE-LAN devices operating in the bands 5250-5350 MHz and 5470-5725 MHz has been specified.

**Section A9.5(5):** To harmonize with FCC Rules Part 15, the requirement to meet the frequency stability figure, stated in Issue 6 has been removed. Applicant now is only required to show that emissions remain completely within the band of operation under all normal operating conditions.

(7) **Annex 11:**

The requirements for devices enclosed in metal containers now apply to containers made of any material (metal, concrete, etc.) having good attenuation properties. The requirement has been removed for a user of a device, which is enclosed in a container, to provide the device supplier with the addresses of his residence and of the location where the device is installed, plus the model number of the device and date of installation. Also, the requirement has been removed for the certification applicant to notify NAV CANADA of the addresses of the distributors of the device, and to instruct the distributors to maintain a record of locations in Canada where the device is installed and submit a copy of this record to NAV CANADA once a year.

(8) **Annex 12:**

**Paragraph (a):** The field strength limit (measured at 3 m) has been increased from 2500 mV/m to 25 V/m. Also, transmitter power delivered to antenna is limited to 1 mW.

**Paragraph (c):** Minimum antenna gain above which transmitter power must be reduced in accordance with requirement to not exceed field strength limit specified in paragraph (a) has been increased from 33 dBi to 53 dBi.

Issued under the authority of  
the Minister of Industry

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R.W. McCaughern  
Director General  
Spectrum Engineering Branch

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## **1. Scope**

This Radio Standards Specification (RSS) sets out requirements for the certification of licence-exempt (i.e. unlicensed) low-power radiocommunication devices (LPDs) defined as Category I equipment as per RSS-Gen.

## **2. General Certification Requirements and Specifications**

### **2.1 Frequency Stability**

When the carrier frequency stability is not specified, it need not be tested, provided that the carrier frequency is chosen such that the fundamental modulation products (meaning the nominal bandwidth) lie totally within the bands listed in Tables 2, 3, 4 and 5 and do not fall into any restricted band listed in Table 1. 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.

### **2.2 Restricted Bands and Unwanted Emission Frequencies**

Restricted bands, identified in Table 1, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy, and some government uses. Except where otherwise indicated, the following restrictions apply:

- (a) Fundamental components of modulation of LPDs shall not fall within the restricted bands of Table 1.
- (b) Unwanted emissions falling into restricted bands of Table 1 shall meet Tables 2 and 3 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 2 and 3 limits.
- (c) Unwanted emissions not falling within restricted frequency bands may also use the limits specified in the applicable annex.

### **2.3 Licence-exempt Receivers**

Category I licence-exempt receivers are required to have their spurious emissions comply with Section 7.2.3 of RSS-Gen.

### **2.4 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 as specified in the annexes.

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 switched network. Cordless telephones operate in a full duplex mode which allows simultaneous conversations between both parties. Note that

cellular and PCS (personal communications services) handsets which operate with hub stations, the latter provided by cellular and PCS companies, are not classified as cordless telephones and RSS-210 cannot be used for equipment certification of these handsets.

The base station shall comply with both this standard (RSS-210) as well as Compliance Specification 03 (CS-03) and be certified under both documents.

### **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:

- (a) Provide a means for the user to readily select one of the security codes. The telephone shall be either in a non-operable mode after manufacture and until the user selects a security code, or the manufacturer must continuously vary the initial security code as each telephone is produced.
- (b) Provide a fixed security code at the time of manufacture that is continuously varied either randomly or sequentially.
- (c) Provide a means for the telephone to automatically select a different security code each time the telephone is activated or dialled.
- (d) 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 7.1.5 (User Manual) in RSS-Gen, 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.

## **2.5 Radio Frequency Identification (RFID) Devices**

An RFID system typically consists of a reader (interrogator) and a tag (transponder). A tag is attached to the item to be identified, and a transmitter/receiver unit interrogates the tag and receives identification data back from the tag.

RFID devices are considered active if they are self-powered, and passive if they receive power from an external source.

This standard only applies to active RFID devices. In the case of passive RFID devices, this standard does not apply and the devices may operate without approval from Industry Canada.

## **2.6 General Field Strength Limits**

Tables 2 and 3 show the general field strength limits of unwanted emissions, where applicable, for transmitters and receivers operating in accordance with the provisions specified in this RSS. Transmitters whose wanted emissions are also within the limits shown in Tables 2 and 3 may operate in any of the frequency bands of Tables 2 and 3, other than the restricted bands of Table 1 and the TV bands, and shall be certified under RSS-210. (**Note:** Devices operating below 490 kHz all of whose emissions are at least 40 dB below the limit given in Table 3 are Category II devices subject to RSS-310.) Unwanted emissions of transmitters and receivers are permitted to fall into Table 1 and TV frequencies but intentional emissions are prohibited. See the note of Table 2 for further details.

## 2.7 Tables

This section includes the tables referenced within this Standard (i.e. Tables 1 to 5).

**Table 1: Restricted Frequency Bands** <sup>(Note)</sup>

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

**Note:** Certain frequency bands listed in Table 1 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard as well as in RSS-310.



**Table 2: General Field Strength Limits for Transmitters and Receivers at Frequencies Above 30 MHz** <sup>(Note)</sup>

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	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)
Above 960	500 (75 nW)	500 (75 nW)

**Note:** Transmitting devices are not permitted in Table 1 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 momentary devices, or to medical telemetry devices in the band 174-216 MHz, and to 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 3: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)**

Frequency (fundamental or spurious)	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1.705-30 MHz	30	N/A	30

**Note:** The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.

**Table 4: Permissible Field Strength Limits for Momentarily Operated Devices**

<b>Fundamental Frequency (MHz), excluding restricted band frequencies of Table 1</b>	<b>Field Strength of Fundamental <sup>(Note 1)</sup> microvolts/m at 3 metres, (watts, e.i.r.p.)</b>	<b>Field Strength of Unwanted Emissions <sup>(Note 1)</sup> microvolts/m at 3 metres</b>
40.66-40.70	See Section A2.7	
70-130	1,250 (470 nW)	125
130-174	1,250 to 3,750*	125 to 375
174-260 <sup>(Note 2)</sup>	3,750 (4.2 µW)	375
260-470 <sup>(Note 2)</sup>	3,750 to 12,500*	375 to 1,250
Above 470	12,500 (47 µW)	1,250

**Note 1:** Use quasi-peak or average 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.

**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 aircraft and operations using high-power transmitters. Besides avoiding the frequency bands of Table 1, designers of low-power devices are strongly recommended to also avoid wherever possible the entire 225-399.9 MHz band.

**Table 5: Reduced Field Strength Limits for Momentarily Operated Devices**

<b>Fundamental Frequency (MHz), excluding restricted band frequencies of Table 1</b>	<b>Field Strength of Fundamental microvolts/m at 3 m (watts, e.i.r.p.) <sup>(Note 1)</sup></b>	<b>Field Strength of Unwanted Emissions microvolts/m at 3 m</b>
40.66-40.70	See Section A2.7	
70-130	500 (75 nW)	50
130-174	500 to 1,500*	50 to 150
174-260	1,500 (0.68 µW)	150
260-470	1,500 to 5,000*	150 to 500
Above 470	5,000 (7.5 µW)	500

**Note 1:** Use quasi-peak or average 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.

## **Annex 1 - Momentarily Operated Devices and Remote Control**

The requirements of this annex are for momentarily operated transmitters and receivers and remote control devices. Tables 2 and 3 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 are observed.

Operation of momentarily operated devices is prohibited in the restricted bands of Table 1, but is permitted in TV bands, per the conditions in Section A1.1.

### **A1.1 Momentarily Operated Devices**

The frequency bands and field strength limits in Tables 4 and 5 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 are not permitted except as provided in A1.1.5. Data is permitted to be sent with a control signal.

#### **A1.1.1 Types of Momentary Signals**

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

- (a) 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).
- (b) A transmitter activated automatically shall cease transmission within 5 seconds after activation, (i.e. maximum 5 seconds of operation).
- (c) Periodic transmissions at regular predetermined intervals are not permitted, except as provided in A.1.1.5. However, polling or supervision transmissions, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmission does not exceed 2 seconds per hour for each transmitter.
- (d) Intentional radiators employed for radio control purposes during emergencies involving fire, security of goods (e.g. burglar alarms), and safety-of-life, when activated to signal an alarm, may operate during the interval of the alarm condition.

#### **A1.1.2 Field Strengths and Frequency Bands**

- (1) The field strength of emissions from momentarily operated intentional radiators shall not exceed the limits in Table 4.

- (2) Intentional radiators shall demonstrate compliance with the limits on the field strength of emissions, as shown in Table 4, based on the average value of the measured emissions. As an alternative, compliance with the limit in Table 4, may be demonstrated using a CISPR quasi-peak detector. If average emission measurements are employed, the provisions in Section 4.5 (Pulsed Operation) of RSS-Gen for averaging pulsed emissions and for limiting peak emissions apply.
- (3) The limits on the field strength of unwanted emissions in Table 4 are based on the fundamental frequency of the intentional radiator. Unwanted emissions shall be attenuated to the limits shown in Table 2 or to the limits shown in Table 4, whichever are less stringent.

#### **A1.1.3 Bandwidth of Momentary Signals**

For the purpose of Section A1.1, the 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70-900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.

#### **A1.1.4 Frequency Stability**

Carrier frequency stability of devices momentarily operated in the band 40.66-40.70 MHz shall be maintained to  $\pm 0.01\%$  ( $\pm 100$  ppm).

#### **A1.1.5 Reduced Field Strengths**

- (1) Devices may be employed for any type of operation, including operation prohibited in A1.1.1, provided that the device complies with the requirements of Sections A1.1.2 through A1.1.4, and the field strength meets the limits in Table 5.
- (2) In addition, devices operated under the provisions of this section (A1.1.5) shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than 1 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. However, devices that are designed for limited use for the purpose of initial programming, reprogramming or installation, and not for regular operations, may operate up to 5 seconds, provided that such devices are to be used only occasionally in connection with each unit being programmed or installed.
- (3) The limits on the field strength of unwanted emissions in Table 5 are based on the fundamental frequency of the intentional radiator. Unwanted emissions shall be attenuated to the limits shown in Table 2 or to the limits shown in Table 5, whichever are less stringent.

## **A1.2 Remote Control**

### **A1.2.1 26.99-27.255 MHz**

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

- (a) Only the following channel carrier frequencies are permitted: 26.995; 27.045; 27.095; 27.145; 27.195 MHz and 27.255 MHz.
- (b) For single sideband modulation (SSB), the transmitter RF peak envelope power shall not exceed 4 W.

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

- (c) An antenna gain not exceeding that of a half-wave dipole shall be used.
- (d) For the purpose of paragraph (f) 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.
- (e) Carrier frequency stability shall be maintained to  $\pm 0.005\%$  ( $\pm 50$  ppm). However, devices with output powers of 2.5 W or less can have a frequency stability of  $\pm 0.01\%$  ( $\pm 100$  ppm).
- (f) The power of unwanted emissions measured by an average meter with a resolution bandwidth of 300 Hz for (i) and (ii) and 3 kHz for (iii), shall be less than the mean transmitter power (TP, in watts) by at least:
  - (i) 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) 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)  $43 + 10 \log_{10}(TP)$  dB or to Table 2 and Table 3 limits, whichever is less stringent, on any frequency removed from the centre of the authorized bandwidth by more than 250% of the authorized bandwidth.
- (g) Receivers tunable only in this band (26.99-27.255 MHz) are considered Category II equipment, and the applicable requirements are found in RSS-310.

### **A1.2.2 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.

These radios are licence-exempt only for use by the municipalities and road traffic departments. The following list of frequencies can be used:

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).

Although there is no specification on transmitter carrier frequency stability, 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 in-band spectrum.

### **A1.2.3 72-73 MHz (Model Aircraft) and 75.4-76 MHz (General Remote Control)**

#### **A1.2.3.1 Carrier Frequencies**

##### **(1) 72-73 MHz Model Aircraft**

The following frequencies (in MHz) are only for radio control of model aircraft:

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) 75.4-76 MHz General Remote Control**

The following frequencies (in MHz) are 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:

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.

### A1.2.3.2 Standards Specifications

- (1) For single side band modulation, the transmitter RF peak envelope power shall not exceed 0.75 W.

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

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

- (3) For the purpose of paragraph (5) 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.

- (4) Carrier frequency stability shall be maintained to  $\pm 0.002\%$  ( $\pm 20$  ppm).

- (5) The power of unwanted emissions, measured by an average meter with a resolution bandwidth of 300 Hz for (i) to (iii) and 3 kHz for (iv), shall be less than the mean transmitter power (TP, in watts) by at least:

- (i) 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) 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) 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)  $56 + 10 \log_{10}(TP)$  dB, or to Table 2 limits, whichever is less stringent, on any frequency removed from the centre of the authorized bandwidth by more than 250% of the authorized bandwidth.



## **Annex 2 - Devices Operating in Frequency Bands for Any Application**

### **A2.1 160-190 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 3.

Emissions outside of this band shall be attenuated by at least 20 dB below the mean transmitter output power or to Table 3 limits, whichever is less stringent.

### **A2.2 510-1705 kHz**

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

- (a) 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; or
- (b) The device shall not radiate more than a field strength of 250 microvolts/m measured at 30 metres.
- (c) 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 microvolts/m, as measured at a distance of  $47715/(\text{frequency in kHz})$  metres (equivalent to  $\text{wavelength}/(2\pi)$ ) from the coaxial cable.
- (d) Emissions outside of this band shall be attenuated by at least 20 dB below the mean transmitter output power, or to the limits of Table 3, whichever is less stringent.

### **A2.3 1.705-10 MHz**

The field strength shall not exceed 100 microvolts/m measured at 30 metres with an average meter (nominally equivalent to 300 nW e.i.r.p.). 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 2 and 3 limits shall apply.

### **A2.4 1.705-37 MHz Swept Frequency**

Notwithstanding that this band encompasses some restricted bands listed in Table 1, swept frequency devices are permitted when all the following conditions are met:

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

- (b) The field strength does not exceed the limits in Sections A2.3, A2.5, A2.6, or Tables 2 and 3, whichever is less stringent, when measured with the sweeping stopped in those bands.
- (c) The fundamental emission dwelling on any restricted band of Table 1 shall not exceed 1.0% of the time that the device is actively transmitting, without compensation for duty cycle.
- (d) Outside of the swept frequency band, the out-of-band emission limits in sections A2.5 and A2.6, or Tables 2 and 3 apply, whichever is less stringent. This test is to be carried out with the frequency sweep in operation.

#### **A2.5 6.765-6.795 MHz**

The field strength of any emission shall not exceed the following limits:

- (a) 15.5 millivolts/m (84 dB $\mu$ V/m) at 30 m, inside the allocated band.
- (b) 334 microvolts/m (50.5 dB $\mu$ V/m) at 30 m, outside the allocated band up to  $F_c \pm 150$  kHz.
- (c) 106 microvolts/m (40.5 dB $\mu$ V/m) at 30 m, between  $F_c \pm 150$  kHz and  $F_c \pm 450$  kHz.
- (d) Tables 2 and 3 limits for frequencies outside  $F_c \pm 450$  kHz, except for harmonics which shall not exceed 316 microvolts/m at 30 m.

where  $F_c = 6.78$  MHz.

Carrier frequency stability shall be maintained to  $\pm 0.01\%$  ( $\pm 100$  ppm).

#### **A2.6 13.110-14.010 MHz**

The field strength of any emission shall not exceed the following limits:

- (a) 15.848 millivolts/m (84 dB $\mu$ V/m) at 30 m, within the band 13.553-13.567 MHz.
- (b) 334 microvolts/m (50.5 dB $\mu$ V/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz.
- (c) 106 microvolts/m (40.5 dB $\mu$ V/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz.
- (d) 30 microvolts/m (29.5 dB $\mu$ V/m) at 30 m, outside the band 13.110-14.010 MHz.

Carrier frequency stability shall be maintained to  $\pm 0.01\%$  ( $\pm 100$  ppm).

## **A2.7 40.66-40.70 MHz**

The field strength shall not exceed 10 millivolts/m (80 dB $\mu$ V/m) measured at 3 metres with an average meter (equivalent to 30  $\mu$ W e.i.r.p.). Alternatively, it shall not exceed 233 mV/m measured with a quasi-peak meter (equivalent to 16 mW e.i.r.p.). (**Note:** Do not use the above to convert average meter readings 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 2 limits shall apply except for harmonics which shall not exceed 225 microvolts/m at 3 metres.

Carrier frequency stability shall be maintained to  $\pm 0.01\%$  ( $\pm 100$  ppm).

## **A2.8 88-108 MHz**

The field strength shall comply with the following:

- (a) not exceeding 250 microvolts/m measured at 3 metres with an average meter (equivalent to 19 nW e.i.r.p.). Any type of modulation (and carrier frequencies within the band 88-108 MHz) may be used for this category; or
- (b) not exceeding 100 microvolts/m measured at 30 metres (equivalent to 1000  $\mu$ V/m measured at 3 metres, equivalent to 300 nW e.i.r.p. ) 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 2 limits apply.

## **A2.9 902-928, 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:

(a) The field strengths measured at 3 metres shall not exceed the following:

Fundamental Frequencies (MHz)	Field Strength (millivolts/m)	
	Fundamental	Harmonics
902-928	50 <sup>(Note 1)</sup>	0.5
2400-2483.5	50 <sup>(Note 1)</sup>	0.5
5725-5875	50 <sup>(Note 1)</sup>	0.5

**Note 1:** Equivalent to 0.75 mW e.i.r.p.

(b) 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 2 limits, whichever is the less stringent.

Section 4.4 of RSS-Gen (Pulsed Operation) does not apply to CISPR measurement for the band 902-928 MHz.

#### **A2.10 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.

(a) 17.15 GHz: 0.3 W e.i.r.p.

(b) 94 GHz: 0.4 W e.i.r.p.

### Annex 3 - 44/49 MHz Cordless Telephones

The provisions shown in this section are for cordless telephones specific to these bands. See also Section 2.4 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)	Transmit Frequencies (MHz)	
	Base	Handset
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. A description of the means and procedures used to achieve automatic channel selection shall be provided in the application for equipment certification.
  - (ii) come 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 will often reduce or eliminate the interference.
- (4) The field strength shall not exceed 10 millivolts/m measured at 3 metres, with an average meter (equivalent to 30  $\mu$ W e.i.r.p.).
- (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 analyzer 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  $\pm 20$  kHz, Table 2 limits apply.
- (7) Carrier frequency stability shall be maintained to within  $\pm 0.01\%$  ( $\pm 100$  ppm).

## **Annex 4 - Medical Telemetry, Wireless Microphones, Auditory Assistance, Goods Tracking and Law Enforcement**

### **A4.1 72-73 MHz, 74.6-74.8 MHz, and 75.2-76.0 MHz (Auditory Assistance and Wireless Microphones)**

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 average meter (equivalent to 1.9 mW e.i.r.p.).

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.

### **A4.2 174-216 MHz (Medical Telemetry)**

Low-power devices in this band are only for medical telemetry usage.

The field strength shall not exceed 1.5 millivolts/m measured at 3 metres with an average meter (equivalent to 675 nW e.i.r.p.).

The occupied bandwidth shall not exceed 200 kHz.

Outside this 200 kHz band (as well as outside the allocated band 174-216 MHz), Table 2 limits apply.

In addition to the labelling requirements in RSS-Gen, 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.*

### **A4.3 216-217 MHz (Auditory Assistance, Medical Telemetry, Goods Tracking and Law Enforcement)**

This band is channellized and available for one-way voice and two-way data transmission, for the usages mentioned in the sub-title. The peak output power will not exceed 100 mW or 160 mW e.i.r.p.

Law enforcement agencies have exclusive use of the sub-band 216.45-216.50 MHz. Auditory assistance, medical telemetry, goods tracking and law enforcement agencies have shared use of the rest of the band 216-217 MHz (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 2.2 concerning restricted frequency bands does not apply to the above devices (medical telemetry) in health care institutions. However, Industry Canada may, if found necessary, impose more attenuation than masks A to D for some restricted bands.

The requirements for the band 216-217 MHz are summarized in the table below.

Channel Spacing (kHz)	Centre Frequencies	Frequencies Stability (ppm)	Unwanted Emissions
5	$215.9975 + 0.005n$ , $n = 1$ to $200$	$\pm 1.5$	Mask A
12.5	$215.99375 + 0.0125n$ , $n = 1$ to $80$	$\pm 5.0$	Mask B
25	$215.9875 + 0.025n$ , $n = 1$ to $40$	$\pm 50$	Mask C
50	$215.975 + 0.05n$ , $n = 1$ to $20$	$\pm 50$	Mask D

The following unwanted emissions masks shall be measured with the measurement meter in peak mode and a bandwidth of at least 300 Hz. Unwanted emissions shall be attenuated below the peak transmitter output power (P, watts) in accordance with the following masks:

#### Mask A

- (a)  $30 + 20 (f_d - 2)$  dB, or  $55 + 10 \log_{10}(P)$  dB, or 65 dB, whichever is less stringent; for emissions removed from the channel centre frequency (see above table) by a displacement frequency,  $f_d$  in kHz, of more than 2 kHz up to and including 3.75 kHz; and
- (b) at least  $55 + 10 \log_{10}(P)$  dB, or to Table 2 limits, whichever is less stringent; for emissions more than 3.75 kHz away from the channel centre frequency.

#### Mask B

- (a) at least 25 dB; for emissions removed from the channel centre frequency by more than 50%, but not more than 100% of the authorized bandwidth;
- (b) at least 35 dB; for emissions removed from the channel centre frequency by more than 100%, but not more than 250% of the authorized bandwidth; and
- (c) at least  $55 + 10 \log_{10}(P)$  dB or to Table 2 limits, whichever is less stringent; for emissions removed from the channel centre frequency by more than 250% of the authorized bandwidth,

where the authorized bandwidth is 11.25 kHz.



### Mask C

- (a) At least 30 dB; for emissions 12.5 kHz to 22.5 kHz removed from the channel centre frequency; and
- (b) At least  $55 + 10 \log_{10}(P)$  dB or to Table 2 limits, whichever is less stringent; for emissions more than 22.5 kHz removed from the channel centre frequency.

### Mask D

- (a) At least 30 dB; for emissions 25 kHz to 35 kHz removed from the channel centre frequency; and
- (b) At least  $55 + 10 \log_{10}(P)$  dB or to Table 2 limits, whichever is less stringent; for emissions more than 35 kHz removed from the channel centre frequency.

In addition to the labelling requirements of RSS-Gen, 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.*

### A4.4 608-614 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. Systems using wider bandwidth than 120 kHz will be permitted output power proportionate to its bandwidth. Accordingly, the total maximum permissible field strength is  $FS = 200 \times \text{square root}(B/120)$ , 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 the band 608-614 MHz shall not exceed Table 2 limits.

In addition to the labelling requirements of RSS-Gen, 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: 49 ° 19' 12" N, longitude: 118 ° 59'56" W). For medical telemetry systems not meeting this 80 km separation (e.g. the Okanagan 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.)*

## **Annex 5 - Radio Frequency Identification (RFID) Devices in the Band 433.5-434.5 MHz**

The provisions of this annex are for RFID devices used to identify the contents of commercial shipping containers. Operation must be limited to commercial and industrial areas such as ports, rail terminals and warehouses. Two-way operation is permitted to interrogate and to load data into devices. Voice communications is prohibited.

Devices approved under this annex shall comply with the following:

- (a) Devices shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than 60 seconds and be only permitted to reinitiate an interrogation in the case of transmission error. Without such a transmission error, the silent period between transmissions shall not be less than 10 seconds.
- (b) The field strength of any emissions radiated within the band 433.5-434.5 MHz shall not exceed 11,000 microvolts/metre measured at 3 metres with an average detector. The peak level of any emission within this specified frequency band shall not exceed 55,000 microvolts/metre measured at 3 metres. Outside this specified band, Table 2 limits apply.

## **Annex 6 - Family Radio Service (FRS) and General Mobile Radio Service (GMRS)**

### **A6.1 Family Radio Service (FRS) Devices**

#### **A6.1.1 Channel Frequencies**

The following 14 simplex channel carrier frequencies are available for use in the family radio service (FRS), in MHz:

<b>Channel</b>	<b>Frequency</b>
1	462.5625
2	462.5875
3	462.6125
4	462.6375
5	462.6625
6	462.6875
7	462.7125
8	467.5625
9	467.5875
10	467.6125
11	467.6375
12	467.6625
13	467.6875
14	467.7125

#### **A6.1.2 Emission Types and Modulation Requirements**

Only emission types F3E, F1D and F2D are permitted for FRS.

Non-voice emission is only permitted for selective calling or tone-operated squelch to establish or continue a voice communication, digital data transmission of location information or text messaging, and is subject to the following restrictions:

- (a) An FRS unit may transmit tones to make contact or to continue communications with a particular FRS unit. If the tone is audible (greater than 300 Hz), it may be transmitted continuously no longer than 15 seconds at a time. If the tone is inaudible (300 Hz or less), it may be transmitted continuously only while the user is talking.
- (b) The FRS unit may transmit digital data containing location information, or requesting location information from one or more other FRS units, or containing a brief text message to another specific FRS unit. Digital data transmissions must be initiated by a manual action or command of the user. However, an FRS unit receiving an interrogation request may automatically respond with its location. Digital data transmissions shall not exceed 1 second, and shall be limited to one transmission within a 30-second period. However, an FRS unit may automatically respond to more than one interrogation requests received within a 30-second period.
- (c) The peak frequency deviation shall not exceed  $\pm 2.5$  kHz. The limiter shall be followed by a low-pass filter to remove unwanted harmonics

### **A6.1.3 Emission Bandwidth**

The authorized bandwidth for an FRS unit is 12.5 kHz.

### **A6.1.4 Output Power**

The maximum permissible transmitter output power under any operating conditions is 0.5 W effective radiated power (e.r.p.). The radio shall be equipped with an integral antenna.

### **A6.1.5 Unwanted Emissions**

Unwanted emissions shall be attenuated below the unmodulated carrier power in accordance with the following:

- (a) 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;
- (b) 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
- (c)  $43 \text{ dB} + 10 \log_{10}(\text{carrier power in watts}) \text{ dB}$ , measured with a bandwidth of at least 30 kHz for frequencies beyond 31.25 kHz removed from the channel centre frequency.

Unwanted emissions falling within the restricted bands of Table 1 shall be attenuated to the limits provided in this section or to the limits shown in Tables 2 and 3, whichever are less stringent.

### **A6.1.6 Frequency Stability**

The carrier frequency tolerance shall be better than  $\pm 5$  ppm.

### **A6.1.7 Other Restrictions**

- (a) FRS units shall not be designed to interconnect to public switched networks.
- (b) FRS units shall not be designed to transmit data in store-and-forward packet operation mode.

## **A6.2 General Mobile Radio Service (GMRS) Devices**

### **A6.2.1 Channel Frequencies**

The following 15-channel carrier frequencies are available for simplex communications in the General Mobile Radio Service (GMRS), in MHz:

<b>Channel</b>	<b>Frequency</b>
1	462.5500
2	462.5625
3	462.5750
4	462.5875
5	462.6000
6	462.6125
7	462.6250
8	462.6375
9	462.6500
10	462.6625
11	462.6750
12	462.6875
13	462.7000
14	462.7125
15	462.7250

The following 8-channel carrier frequencies are reserved for possible future use as repeater input channels and are not available for simplex communications:

<b>Channel</b>	<b>Frequency</b>
16	467.5500
17	467.5750
18	467.6000
19	467.6250
20	467.6500
21	467.6750
22	467.7000
23	467.7250

### **A6.2.2 Emission Types and Modulation Requirements**

GMRS transmitters are permitted to transmit only the following emission types: A1D, F1D, G1D, H1D, J1D, R1D, A3E, F3E, G3E, H3E, J3E, R3E or F2D. Non-voice emission is only permitted for selective calling or tone-operated squelch to establish or continue a voice communication, digital data transmission of location information or text messaging.

Non-voice communication shall be subject to the following restrictions:

- (a) A GMRS unit may transmit tones to make contact or to continue communications with a particular GMRS unit. If the tone is audible (greater than 300 Hz), it may be transmitted continuously no longer than 15 seconds at a time. If the tone is inaudible (300 Hz or less), it may be transmitted continuously only while the user is talking.
- (b) The GMRS unit may transmit digital data containing location information, or requesting location information from one or more other GMRS units, or containing a brief text message to another specific GMRS unit. Digital data transmissions must be initiated by a manual action or command of the user. However, a GMRS unit receiving an interrogation request may automatically respond with its location. Digital data transmissions shall not exceed 1 second, and shall be limited to one transmission within a 30-second period. However, a GMRS unit may automatically respond to more than one interrogation request received within a 30-second period.

For emission types F1D, G1D, G3E, F3E or F2D, the peak frequency deviation shall not exceed  $\pm 5$  kHz.

GMRS transmitters must include an audio frequency low-pass filter, unless they comply with the appropriate emission masks in Section A6.2.5, below. The filter must be between the modulation limiter and the modulated stage of the transmitter. The filter attenuation must be as follows:

for  $3 \text{ kHz} \leq f \leq 20 \text{ kHz}$ , the attenuation is at least  $60 \log_{10}(f, \text{kHz}/3)$  dB greater than the attenuation at 1 kHz, and for  $f > 20 \text{ kHz}$ , the attenuation is at least 50 dB greater than the attenuation at 1 kHz.

### **A6.2.3 Emission Bandwidth**

The authorized bandwidth for emission types H1D, J1D, R1D, H3E, J3E and R3E is 4 kHz; for emission types A1D and A3E is 8 kHz; and for emission types F1D, G1D, F3E, G3E and F2D is 20 kHz.

### **A6.2.4 Output Power**

A GMRS transmitter may transmit with a maximum power of 2.0 W e.r.p.

### **A6.2.5 Unwanted Emissions**

Unwanted emissions shall be attenuated below the unmodulated carrier power in accordance with the following:

- (a) For emission types A1D, A3E, F1D, G1D, F3E, G3E and F2D with filtering:
  - (i) 25 dB, measured with a bandwidth of 300 Hz, on any frequency removed from the centre frequency of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth;
  - (ii) 35 dB, measured with a bandwidth of 300 Hz, on any frequency removed from the centre frequency of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth; and

- (iii)  $43 \text{ dB} + 10 \log_{10}(\text{carrier power in watts}) \text{ dB}$ , measured with a bandwidth of at least 30 kHz, on any frequency removed from the centre frequency of the authorized bandwidth by more than 250% of the authorized bandwidth.
- (b) For emission types A1D, A3E, F1D, G1D, F3E, G3E and F2D without filtering:
- (i)  $83 \log_{10}(f_d/5) \text{ dB}$ , measured with a bandwidth of 300 Hz, on any frequency removed from the centre frequency of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz, up to and including 10 kHz;
  - (ii)  $116 \log_{10}(f_d/6.1) \text{ dB}$  ( $f_d$  in kHz) measured with a bandwidth of 300 Hz, or if less,  $50 + 10 \log_{10}(TP) \text{ dB}$  (TP is total power in the emission bandwidth), on any frequency removed from the centre of the authorized bandwidth by a displacement frequency  $f_d$  (kHz) of more than 10 kHz, up to and including 250% of the authorized bandwidth; and
  - (iii)  $43 \text{ dB} + 10 \log_{10}(\text{carrier power in watts}) \text{ dB}$ , measured with a bandwidth of at least 30 kHz, on any frequency removed from the centre frequency of the authorized bandwidth by more than 250% of the authorized bandwidth.
- (c) For emission types H1D, J1D, R1D, H3E, J3E and R3E:
- (i) 25 dB, measured with a bandwidth of 300 Hz, on any frequency removed from the centre frequency of the authorized bandwidth by more than 50% up to and including 150% of the authorized bandwidth;
  - (ii) 35 dB, measured with a bandwidth of 300 Hz, on any frequency removed from the centre frequency of the authorized bandwidth by more than 150% up to and including 250% of the authorized bandwidth;
  - (iii)  $43 \text{ dB} + 10 \log_{10}(\text{carrier power in watts}) \text{ dB}$ , measured with a bandwidth of at least 30 kHz, on any frequency removed from the centre frequency of the authorized bandwidth by more than 250% of the authorized bandwidth.

Unwanted emissions falling within the restricted bands of Table 1 shall be attenuated to the limits provided in this section or to the limits shown in Tables 2 and 3, whichever are less stringent.

#### **A6.2.6 Frequency Stability and Other Frequency Capability Requirements**

The carrier frequency tolerance shall be better than  $\pm 5$  ppm.

GMRS transmitters must be crystal controlled.

All frequency determining circuitry, including crystals, and programming controls must be internal to the transmitter and made inaccessible to the user from the exterior of the unit.

#### **A6.2.7 Restrictions**

- (1) GMRS units shall not be designed to interconnect to the public switched network.
- (2) GMRS units shall not be designed to transmit data in store-and-forward packet operation mode.
- (3) GMRS units shall not provide the user with the capability to receive on GMRS channels 16 to 23.



## **Annex 7 - Field Disturbance Sensors Operating in the Bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10.5-10.55 GHz and 24.075-24.175 GHz**

This section provides standards for low-power devices classified as field disturbance sensors which operate under the following conditions. These do not include protection systems employing perimeter antennas.

The field strengths measured at 3 metres shall not exceed the following:

<b>Fundamental Frequencies (MHz)</b>	<b>Field Strength (millivolts/m)</b>	
	<b>Fundamental</b>	<b>Harmonics</b>
902-928	500 <sup>(Note 1)</sup>	1.6
2435-2465	500 <sup>(Note 1)</sup>	1.6
5785-5815	500 <sup>(Note 1)</sup>	1.6
10500-10550	2500 <sup>(Note 2)</sup>	25
24075-24175	2500 <sup>(Note 2)</sup>	25

**Note 1:** equivalent to 75 mW e.i.r.p.

**Note 2:** equivalent to 1.9 W e.i.r.p.

### **Notes:**

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

Those falling into restricted bands above 17.7 GHz shall not exceed the following field strength limits measured at a distance of 3 metres:

- (i) 25 mV/m for the second and third harmonics of field disturbance sensors operating in the 24075-24175 MHz and for devices designed for use only within buildings or for intermittent use such as to open building doors;
  - (ii) 7.5 mV/m; for all other devices.
2. Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emission in the restricted bands of Table 1, other than the second and third harmonics from devices operating in the band 24075-24175 MHz, complies with the limits given in Table 2. Continuous operation of field disturbance sensors designed to be used in farm equipment (i.e. vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations), or railroad locomotives, railroad cars, and other equipment which travels on fixed tracks, is permitted. A field disturbance sensor is considered not to be operating in a

continuous mode if its operation is limited to specific activities of limited duration (e.g. putting a vehicle into reverse gear, activating a turn signal, etc.).

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 2 limits, whichever is the less stringent.
4. The emission limits shown above are based on measurement instrumentation employing an average detector.

## **Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz**

This section applies to systems that employ frequency hopping (FH) and digital modulation technology in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz. Systems in these bands may employ frequency hopping, digital modulation and or a combination (hybrid) of both techniques.

A frequency hopping system that synchronizes with another or several other systems (to avoid frequency collision among them) via off-air sensing or via connecting cables is not hopping randomly and therefore is not in compliance with RSS-210.

### **A8.1 Frequency Hopping Systems**

Frequency hopping systems are spread spectrum systems in which the carrier is modulated with coded information in a conventional manner causing a conventional spreading of the RF energy about the carrier frequency. The frequency of the carrier is not fixed but changes at fixed intervals under the direction of a coded sequence.

Frequency hopping systems are not required to employ all available hopping frequencies 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 frequency hopping system that enables it to recognize other users of the band and to avoid occupied frequencies is permitted, provided that the frequency hopping 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.

The following applies to frequency hopping systems in each of the three bands:

- (a) The bandwidth of a frequency hopping channel 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 channels in the hopset. The 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.
- (b) Frequency hopping 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. Alternatively, frequency hopping systems operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W. 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.
- (c) For frequency hopping systems in the band 902-928 MHz: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time

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

- (d) Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.
- (e) Frequency hopping systems operating in the band 5725-5850 MHz shall use at least 75 hopping channels. 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.

## **A8.2 Digital Modulation Systems**

These include systems employing digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to all three bands:

- (a) The minimum 6 dB bandwidth shall be at least 500 kHz.
- (b) The transmitter power spectral density conducted from the transmitter to 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. This power spectral density shall be determined in accordance with the provisions of Section A8.4(4); (i.e. the power spectral density shall be determined using the same method for determining the conducted output power).

## **A8.3 Hybrid Systems**

Hybrid systems employ a combination of both frequency hopping and digital modulation techniques.

- (1) With the digital modulation operation of the hybrid system turned off, the frequency hopping operation shall have an average time of occupancy on any frequency not exceeding 0.4 seconds within a duration in seconds equal to the number of hopping frequencies multiplied by 0.4.
- (2) With the frequency hopping turned off, the digital modulation operation shall comply with the power spectral density requirements for digital modulation systems set out in (b) of A8.2 above.

#### A8.4 Transmitter Output Power and e.i.r.p. Requirements

- (1) For frequency hopping systems operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W, if the hopset uses 50 or more hopping channels; the maximum peak conducted output power shall not exceed 0.25 W, and the e.i.r.p. shall not exceed 1 W, if the hopset uses less than 50 hopping channels.
- (2) For frequency hopping systems operating in the band 2400-2483.5 MHz employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4W.
- (3) For frequency hopping systems operating in the band 5725-5850 MHz, the maximum peak conducted output power shall not exceed 1 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4 W.
- (4) For systems employing digital modulation techniques operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz, the maximum peak conducted output power shall not exceed 1 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4 W.

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power (see RSS-Gen).

- (5) Point-to-point systems in the bands 2400-2483.5 MHz and 5725-5850 MHz are permitted to have an e.i.r.p. higher than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain directional antennas and not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4 W e.i.r.p. However, remote stations of point-to-multipoint systems shall be allowed to operate at greater than 4 W e.i.r.p, under the same conditions as for point-to-point systems.

**Note:** “Fixed point-to-point operation”, excludes point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information.

- (6) Transmitters may operate in the band 2400-2483.5 MHz, employing antenna systems that emit multiple directional beams, simultaneously or sequentially, for the purpose of directing signals to individual receivers or to groups of receivers, provided the emissions comply with the following:
  - (i) Different information must be transmitted to each receiver.
  - (ii) If the transmitter employs an antenna system that emits multiple directional beams but does not emit multiple directional beams simultaneously, the total output power conducted to the array or arrays that comprise the device (i.e. the sum of the power supplied to all antennas, antenna elements, staves, etc. and summed across all carriers or frequency channels) shall not exceed the applicable output power limit specified in Sections A8.4(2) and (4).

- (iii) If a transmitter employs an antenna that operates simultaneously on multiple directional beams using the same or different frequency channels, the power supplied to each emission beam is subject to the applicable power limit specified in Sections A8.4(2) and (4). If transmitted beams overlap, the power shall be reduced to ensure that their aggregate power does not exceed the applicable limit specified in Sections A8.4(2) and (4). In addition, the aggregate power transmitted simultaneously on all beams shall not exceed the applicable limit specified in Sections A8.4(2) and (4) by more than 8 dB.
- (iv) Transmitters that transmit a single directional beam shall operate under the provisions of Sections A8.4(2), (4) and (5).

### **A8.5 Out-of-band Emissions**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under Section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

## Annex 9 - Local Area Network Devices

This annex provides standards for licence-exempt local area network (LE-LAN) devices operating in the bands 5150-5350 MHz and 5470-5825 MHz.

Devices operating in the 5250-5350 MHz which do not comply with the provisions in this annex but only with the requirements in RSS-210, Issue 5 will be allowed to be certified until May 1, 2008. After that date, devices operating in this band shall be certified only if they comply with the provisions in this annex.

Within the band 5150-5250 MHz, LE-LAN devices are restricted to indoor operation only.

### A9.1 Definitions

**Channel closing time** is the aggregate duration of transmissions by LE-LAN devices during the channel move time which starts upon detection of an interfering signal above the Interference Detection Threshold. This aggregate includes the normal transmission time and the intermittent signals required to facilitate changes. The aggregate duration of all transmissions shall not count quiet periods in between transmissions.

**Channel move time** is the time needed by an LE-LAN device to cease all transmissions on the current channel upon detection of a radar signal.

**Dynamic frequency selection (DFS)** is a mechanism that dynamically detects signals from other systems and avoids co-channel operation with those systems, notably radar systems.

**DFS detection threshold** is the required detection level defined by detecting a received signal strength that is greater than a threshold specified, within the device channel bandwidth.

**In-service monitoring** is a mechanism to check a channel in use by the LE-LAN device for the presence of a radar signal.

**Maximum conducted output power:** see RSS-Gen.

**Master mode** is an operating mode in which the LE-LAN device has the capability to transmit without receiving an enabling signal. In this mode, the device is able to select a channel and initiate a network by sending enabling signals to other LE-LAN devices.

**Slave mode** is an operating mode in which the transmissions of the LE-LAN device are under control of the master.

**Transmitter power control (TPC)** is a feature that enables a LE-LAN device to dynamically switch between several transmission power levels in the transmission process.

## A9.2 Transmitter Power and e.i.r.p. Limits

- (1) For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or  $10 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.
- (2) For the bands 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output 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 e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

In addition, devices with maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

In addition to the above requirements, devices operating in the band 5250-5350 MHz with maximum e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. elevation mask where  $\theta$  is the angle above the local horizontal plane (of the earth) as shown below:

- |  |  |
|--|--|
| (i) -13 dB(W/MHz)                            | for $0^\circ \leq \theta < 8^\circ$      |
| (ii) $-13 - 0.716 (\theta - 8)$ dB(W/MHz)    | for $8^\circ \leq \theta < 40^\circ$     |
| (iii) $-35.9 - 1.22 (\theta - 40)$ dB(W/MHz) | for $40^\circ \leq \theta \leq 45^\circ$ |
| (iv) -42 dB(W/MHz)                           | for $\theta > 45^\circ$                  |

- (3) For the band 5725-5825 MHz, the maximum conducted output power shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever power is less. The power spectral density shall not exceed 17 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 4.0 W or  $23 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

Fixed point-to-point systems for this band are permitted to have an e.i.r.p. greater than 4 W, provided that the higher e.i.r.p. is achieved 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 from exceeding 4 W e.i.r.p. However, remote stations of point-to-multipoint systems shall be permitted to operate at greater than 4 W e.i.r.p. under the same conditions as for point-to-point systems.

## A9.3 Out-of-band Emission Limits

- (1) For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p.
- (2) For transmitters operating in the band 5250-5350 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. Devices operating in the band 5250-5350 MHz that generate emissions in the band 5150-5250 MHz shall not exceed an out-of-band emission limit of -27 dBm/MHz e.i.r.p. in the band 5150-5250 MHz in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the band 5150-5250 MHz and shall be labelled “for indoor use only”.



- (3) For transmitters operating in the band 5470-5725 MHz, all emissions outside that band shall not exceed -27 dBm/MHz e.i.r.p.
- (4) For transmitters operating in the band 5725-5825 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 e.i.r.p. For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27 dBm/MHz.

#### **A9.4 Dynamic Frequency Selection (DFS) for devices operating in the bands 5250-5350 MHz and 5470-5725 MHz**

Devices operating in the bands 5250-5350 MHz and 5470-5725 MHz shall comply with the following:

- (a) Devices shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems (see **Note** below). The minimum DFS radar signal detection threshold is -62 dBm for devices with a maximum e.i.r.p. less than 200 mW and -64 dBm for devices with a maximum e.i.r.p. of 200 mW to 1 W. The detection threshold power is the received power averaged over 1 microsecond reference to a 0 dBi antenna. The DFS process shall be required to provide a uniform spreading of the loading over all the available channels.
- (b) **Operational requirements:** the requirement for channel availability check time applies in the master operational mode. The requirement for channel move time applies in both the master and slave operational modes.
  - (i) **In-service monitoring:** an LE-LAN device should be able monitor the operating channel to check that a co-channel radar has not moved or started operation within range of the LE-LAN device. During in-service monitoring, the LE-LAN radar detection function continuously searches for radar signals in between normal LE-LAN transmissions.
  - (ii) **Channel availability check time:** the device shall check if there is a radar system already operating on the channel before it can initiate a transmission on a channel and when it has to move to a channel. The device may start using the channel if no radar signal with a power level greater than the interference threshold value specified in A9.4(a) above, is detected within 60 seconds.

**Additional requirements for the band 5600-5650 MHz:** Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650 MHz, so that Environment Canada weather radars operating in this band are protected.

**Note:** Test procedures for demonstrating compliance with the DFS radar detection requirements set out in this section are being evaluated by Industry Canada. As an interim measure, Industry Canada will, until further notice, accept utilization of the DFS test procedures published by the U.S. Federal Communications Commission (FCC)<sup>1</sup> to demonstrate compliance with the requirements of this section.

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<sup>1</sup> FCC 06-96 - APPENDIX: Compliance Measurement Procedures for Unlicensed-National Information Infrastructure Devices Operating in the 5250-5350 MHz and 5470-5725 MHz Bands Incorporating Dynamic Frequency Selection  
[http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-06-96A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-06-96A1.doc)

- (iii) **Channel move time:** after a radar's signal is detected, the device shall cease all transmissions on the operating channel within 10 seconds. Transmission during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel.
- (iv) **Channel closing time:** the maximum channel closing time is 260 ms.
- (v) **Non-occupancy period:** a channel that has been flagged as containing a radar signal, either by a channel availability check or in-service monitoring, is subject to a 30-minute non-occupancy period where the channel can not be used by the LE-LAN device. The non-occupancy period starts at the time when the radar signal is detected.

### A9.5 Other Requirements for All Bands

- (1) Digital modulation shall be used. The power measurements (transmitter output power and e.i.r.p., or unwanted emissions) are in terms of average value (i.e. using an average meter). If the transmission is in bursts, Section 4.4 (Pulsed Operation) of RSS-Gen applies.
- (2) 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.

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% emission bandwidth).

- (3) 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.
- (4) The device shall automatically discontinue transmission in case of absence of information to transmit, or operational failure. A description on how this is done 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.
- (5) The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.
- (6) Mobile satellite service (MSS) operators may monitor emissions from LE-LAN devices in the band 5150-5250 MHz and, if emissions approach the 10 W/MHz aggregate ground level emission, may request that Industry Canada reassess the technical parameters of LE-LAN devices. The aggregation may be from all devices within the footprint of the MSS satellite antenna beam and not just from Canadian devices.

(7) User Manual

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

- (i) 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;
- (ii) the maximum antenna gain permitted (for devices in the bands 5250-5350 MHz and 5470-5725 MHz) to comply with the e.i.r.p. limit; and
- (iii) the maximum antenna gain permitted (for devices in the band 5725-5825 MHz) to comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate, as stated in section A9.2(3).

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

## Annex 10 - Vehicle Identification

The provisions in this section are only for automatic vehicle identification systems (AVIS) which operate in the frequency bands 2900-3260 MHz, 3267-3332 MHz, 3339-3345.8 MHz and 3358-3600 MHz employing swept frequency techniques to automatically identify transportation vehicles (cars, trucks or rail) and under the following conditions:

- (a) The field strength in the antenna main beam shall not exceed 3 millivolts/m, per each 1.0 MHz bandwidth, measured at 3 metres (equivalent to 2.7  $\mu$ W/MHz e.i.r.p.).
- (b) 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  $\pm 10$  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.

- (c) Emissions outside of each band shall meet Table 2 limits.
- (d) The signal sweep rate shall not be less than 4,000 or greater than 50,000 sweeps per second.
- (e) Signal emission from the AVIS shall only occur when the vehicle to be identified is within the radiated field of the system.

**Note:** The sub-band 3500-3600 MHz is within the restricted bands of Table 1 and Industry Canada may impose further restrictions if it is shown to be necessary.

## **Annex 11- Devices Enclosed in Containers**

The provisions in this section are for devices installed in closed metallic tanks, reinforced concrete tanks or similar enclosed structures made of comparable attenuating material, containing liquids or solids.

### **A11.1 8.5-10.55 GHz Swept Frequency Inside Containers**

Notwithstanding that this band encompasses two restricted bands listed in Table 1, swept frequency devices are permitted when all the following conditions are met:

- (a) The device shall be installed completely inside a closed container by qualified installers.
- (b) The transmitter output power shall not exceed 8 milliwatts at the connector to the antenna.
- (c) The antenna shall be installed pointing downwards.
- (d) The sweep is never stopped with the fundamental emission within any restricted band of Table 1.
- (e) 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 2 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 and not for every installation. Since radio leakage depends on the type of container wall and its thickness, field installations must use similar construction and the radio device manufacturer shall provide proper installation instructions to the end-user.
- (f) User Manual

The user manual of a swept frequency device shall clearly carry these notices or equivalent:

- (i) *This device shall be installed and operated in a completely enclosed 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.*
- (ii) *The use of this device is on a "no-interference, no-protection" basis. That is, the user shall accept 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 primary licensing operations will be required to be removed at the user's expense.*

### **A11.2 Other Devices Totally Enclosed in Containers (for Non-restricted Frequencies)**

Devices that are totally enclosed in containers can be certified when the frequency is narrowband or wideband, swept or unswept, provided that the emission bandwidth does not fall into the restricted bands of Table 1. Other conditions such as output power are as given in Section A11.1. Furthermore, factory testing in one container instead of three is acceptable.

## **Annex 12 - Fixed Point-to-point in the Band 24.05-24.25 GHz**

The band 24.05-24.25 GHz may be used for fixed, point-to-point systems that comply with the standards set out in this section. Fixed, point-to-point operation under this section is limited to systems employing a fixed transmitter transmitting to a fixed remote location. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited.

**Note:** Devices operating in band 24.0-24.25 GHz at a field strength not exceeding 250 mV/m at 3 metres (equivalent to 19 mW e.i.r.p.) are classified as Category II, the requirements of which are found in RSS-310.

Fixed, point-to-point operation is permitted in the band 24.05-24.25 GHz under the following conditions:

- (a) The field strength of emissions in this band shall not exceed 25 V/m measured at a distance of 3 metres. The power delivered to the antenna shall not exceed 1 mW.
- (b) The frequency of the carrier is maintained within a tolerance of  $\pm 0.001\%$ .
- (c) The antenna gain must be at least 33 dBi. Alternatively, the beam width of the main lobe shall not exceed 3.5 degrees, in both the azimuth and elevation planes. For antenna gains greater than 53 dBi, the output power must be reduced as necessary such that the field strength limit is not exceeded.
- (d) Except for harmonics, out-of-band emissions shall be attenuated by at least 50 dB below the level of the fundamental or to Table 2 limits, whichever is less stringent. Harmonics shall be limited to a maximum level of 2.5 mV/m measured at 3m.
- (e) The field strength limit in (a) of this section is based on average limit. However, the peak field strength shall not exceed 25 V/m measured at 3 metres along the antenna boresight.

## **Annex 13 - Devices Operating in the Bands 46.7-46.9 GHz, 57-64 GHz and 76.0-77.0 GHz**

### **A13.1 Vehicle-Mounted Field Disturbance Sensors in the Bands 46.7-46.9 GHz and 76.0-77.0 GHz**

#### **A13.1.1 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.

#### **A13.1.2 Limits of Radiated Emissions**

- (1) **In-band Emissions:** The power of any emission within the bands 46.7-46.9 GHz and 76.0-77.0 GHz shall not exceed the following limits at a distance of 3 metres from the radiating source:
  - (a) 200 nW/cm<sup>2</sup>; if the vehicle is moving less than 1 km/hour.
  - (b) 60 µW/cm<sup>2</sup> for forward-looking vehicle-mounted field disturbance sensors, if the vehicle is in motion.
  - (c) 30 µW/cm<sup>2</sup> for side-looking or rear-looking vehicle-mounted field disturbance sensors; if the vehicle is in motion.
- (2) **Spurious Emissions:** Any emissions outside the operating band shall consist solely of spurious emissions and shall comply with the following:
  - (a) Radiated emissions below 40 GHz shall not exceed the limits given in Tables 2 and 3.
  - (b) For radiated emissions outside the operating band and between 40 GHz and 200 GHz, the power density of any emission at a distance of 3 metres from the radiating source shall not exceed the following limits:
    - (i) 2 pW/cm<sup>2</sup>; for vehicle-mounted field disturbance sensors operating in the band 46.7-46.9 GHz;
    - (ii) 600 pW/cm<sup>2</sup>; for forward-looking vehicle-mounted field disturbance sensors operating in the band 76-77 GHz;
    - (iii) 300 pW/cm<sup>2</sup>; for side-looking or rear-looking vehicle-mounted field disturbance sensors operating in the band 76-77 GHz.
  - (c) For radiated emissions above 200 GHz from field disturbance sensors operating in the band 76-77 GHz: the power density of any emission shall not exceed 1000 pW/cm<sup>2</sup> at a distance of 3 metres from the radiating source.

### **A13.1.3 Peak Transmitter Output Power**

There is no limit on peak transmitter output power.

### **A13.1.4 Measurement Requirements**

- (1) For field disturbance sensors operating in the band 76-77 GHz, the spectrum shall be investigated up to 231 GHz.
- (2) 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.
- (3) Conducted measurement for emissions above 40 GHz will be permitted provided that the antenna characteristics can be determined accurately.

### **A13.1.5 Frequency Stability**

Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation.

## **A13.2 Devices in the Band 57-64 GHz**

### **A13.2.1 General Restrictions**

Operation within the band 57-64 GHz under the provisions of this section is not permitted for the following products:

- (a) Equipment used on aircraft or satellites.
- (b) 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.

### **A13.2.2 Limits of Radiated Emissions**

- (1) **In-band Emissions:** Within the band 57-64 GHz, emission levels measured 3 metres from the radiating source shall not exceed the following:
  - (i) For products other than fixed field disturbance sensors, the average power density of any emission, measured during the transmit interval, shall not exceed  $9 \mu\text{W}/\text{cm}^2$ , and the peak power density of any emission shall not exceed  $18 \mu\text{W}/\text{cm}^2$ .
  - (ii) 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  $9 \mu\text{W}/\text{cm}^2$ , and the peak power density of any emission shall not exceed  $18 \mu\text{W}/\text{cm}^2$ .



In addition, the average power density of any emission outside of the band 61.0-61.5 GHz, measured during the transmit interval, but still within the band 57-64 GHz, shall not exceed 9 nW/cm<sup>2</sup>, and the peak power density of any emission shall not exceed 18 nW/cm<sup>2</sup>.

- (iii) For fixed field disturbance sensors other than those operating under the provisions of subsection A13.2.2(1)(ii) 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<sup>2</sup>.

(2) **Spurious emissions:** Any emissions outside the band 57-64 GHz shall consist solely of spurious emissions and shall not exceed:

- (i) the limits shown in Tables 2 and 3 for emissions below 40 GHz;

- (ii) 90 pW/cm<sup>2</sup> at a distance of 3 metres for emissions between 40 GHz and 200 GHz;

Within the band 57.0-57.05 GHz, only spurious emissions related to a publicly-accessible coordination channel are permitted. The band 57-57.05 GHz is reserved exclusively for a publicly-accessible coordination channel.

### **A13.2.3 Peak Transmitter Output Power**

- (1) 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.
- (2) For purposes of demonstrating compliance with this RSS, corrections to the transmitter output power may be made due to the antenna and circuit loss.

### **A13.2.4 Measurement Requirements**

- (1) 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.
- (2) Peak power density and peak transmitter output power shall be measured with an RF detector that has a detection bandwidth that encompasses the band 57-64 GHz and has a video bandwidth of at least 10 MHz, or using an equivalent measurement method.
- (3) Conducted measurement for emissions above 40 GHz will be permitted provided that the antenna characteristics can be determined accurately.
- (4) The average emission limits shall be calculated based on the measured peak levels, over the actual time period during which transmission occurs.

### **A13.2.5 Frequency Stability**

Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation.

### **A13.2.6 Group Installations**

Any transmitter that has received the necessary IC certification under this RSS 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.

### **A13.2.7 Transmitter Self-identification Transmission**

For all transmissions that emanate from inside a building, within any 1 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<sup>2</sup>, as measured 3 metres 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:

- (a) Industry Canada certification number, which shall be programmed at the factory;
- (b) Manufacturer's serial number, which shall be programmed at the factory; and
- (c) 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.