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2 GHz Licence-exempt Personal Communications Service Devices (LE-PCS)

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Canada

Preface

This second issue, Issue 2 of RSS-213 replaces Issue 1 (provisional) of RSS-213 dated August 24, 1999.

RSS-213, Issue 2 must be used in conjunction with RSS-Gen, *General Requirements and Information for the Certification of Radiocommunication Equipment,* for general specification and information relevant to the equipment for which this Standard applies.

This new version will be in force as of the publication date of notice SMSE-014-05 in the *Canada Gazette*. Upon publication, the public has 90 days to make comments. These comments will be taken into account in the preparation of the next version of the document.

The following are the main changes:

(1) General reformatting, editorial changes and updating to reflect the current practice and that material common to most RSSs has been moved to RSS-Gen.

(2) The standard now applies only to the 1920-1930 MHz band, as the 1910-1920 MHz band is no longer available for licence-exempt personal communications services operation.

(3) Both isochronous and asynchronous devices are now permitted in the band 1920-1930 MHz.

(4) Specific requirements for isochronous operation in the 1920-1930 MHz band no longer apply.

(5) The channellization of the 1920-1930 MHz band into eight 1.25 MHz channels has been eliminated. The band now is unchannellized, with occupied bandwidths of between 50 kHz and 2.5 MHz permitted.

(6) Unwanted emissions within the 1920-1930 MHz band are no longer referenced to 1.25 MHz channels, but to band edges and occupied bandwidth.

(7) All references to 1.25 MHz channellization in requirements to verify access protocols for the 1920-1930 MHz band have been eliminated and replaced with appropriate changes.

(8) The limits of AC line conducted emissions have been changed to harmonize with CISPR and FCC limits. (The actual limits have been moved to RSS-Gen.)

(9) The spurious emission limit (using the radiated measurement method) for receivers at frequencies above 1610 MHz has been abolished. The 960-1610 MHz limit is now applicable to all receiver spurious emissions at frequencies above 960 MHz as per RSS-Gen. (The actual limits have been moved to RSS-Gen.)

(10) The requirement for occupied bandwidth has been changed from the 26 dB bandwidth to the 99% bandwidth.

(11) The requirement for coordinatable (non-nomadic) devices to meet Location Verification Process criteria and coordination by the licence-exempt PCS Industry Advisory Group (IAG) has been removed. Both coordinatable (non-nomadic) and non-coordinatable (nomadic) devices can be certified under this Standard.

Issued under the authority of
the Minister of Industry

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R.W. McCaughern
Director General
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Table of Contents

1. Scope

This document sets out standards relating to licence-exempt (unlicensed) personal communications service devices (PCS) in the 1920-1930 MHz band.

2. General Information

PCS equipment is classified as Category I equipment and a Technical Acceptance Certificate (TAC) issued by the Certification and Engineering Bureau of Industry Canada, or a certificate issued by a Certification Body (CB) is required.

2.1 Related Documents

In addition to the related documents listed in RSS-Gen, the following documents should be consulted.

CPC-2-1-20	*Displacement of Fixed Service Stations Operating in the 2 GHz Frequency Range to Accommodate Licence Exempt Personal Communications Services (LE-PCS)*
ANSI C63.17-1998	*American National Standard for Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices*

2.2 Availability of Documents

Document CPC-2-1-20 is available on the Spectrum Management and Telecommunication Web site at: http//strategis.gc.ca/spectrum, in *Official Publications*.

Document ANSI C63.17-1998 is obtainable from IEEE Standards Department.

3. Certification Requirements – User Manual

The device's user manual shall contain the following or equivalent statement in a conspicuous position:

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

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

If the device is a cordless telephone, the 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.

4. Measurement Methods

4.1 General

(a) Where a test method specified in this Standard cannot be followed, a test method given in ANSI C63.17 may be used by quoting the test section number. An equivalent alternative method may also be used provided that it is fully described in the test report.

(b) Where a test is not practicable (e.g. the test for an access protocol of Section 4.3.4), the certification applicant may submit to Industry Canada the manufacturer's declaration that the access protocol has nevertheless been met in the design and prototype tests. Full justification as to why testing is not practicable should be given for Industry Canada's consideration.

(c) A mid-band carrier frequency should normally be used for tests.

(d) Unless the Equipment Under Test (EUT) can provide a continuous transmit signal, synchronized frame triggering pulses should be provided to externally trigger the spectrum analyzer.

(e) When an antenna conducted measurement is used to determine the RF output power of the device, the effective gain of the antenna intended for the device must be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 3 dBi (3 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in this standard.

(f) Accessories and peripheral equipment that are normally required to be connected to the device in actual use, shall be so connected with representative cable lengths for the tests. Only one test using representative peripherals and accessories is required. The emission tests shall be performed with the device and accessories configured in a manner which tends to produce the maximum level of emissions within the range of variations that can be expected under normal operating conditions.

4.2 AC Power Line Conducted Emissions

This is a test for unwanted emissions conducted back onto the AC power lines for devices equipped to operate from the public utility AC power supply. See Radio Standards Specification 212, *Test Facilities and Test Methods for Radio Equipment* (RSS-212) for method of measurement.

4.3 Transmitter Tests

4.3.1 Peak Transmit Power

The transmitter shall be modulated with digital sequence(s) representative of those encountered in a real system operation. The peak transmit power shall be measured and recorded.

4.3.2 Occupied Bandwidth and Power Spectral Density

4.3.2.1 Peak Power Spectral Density Test

This test is to measure the occupied bandwidth and the maximum power spectral density.

With the transmitter modulated as in Section 4.3.1, obtain spectrum plots.

Record the maximum spectral level of the modulated signal as the reference spectral level (dBs).

Measure and record the 99% bandwidth.

Measure and record the power spectral density per 3 kHz.

4.3.2.2 Averaged Power Spectral Density Test

As an alternative to the peak power spectral density, the averaged power spectral density may be measured.

4.3.3 Unwanted Emissions

Use the method of Section 4.3.2.1 to measure the out-of-band power spectral density.

4.3.4 Verification of Access Protocols

The following tests shall be carried out to verify the access protocols (see also Section 4.1(b)).

(a) Devices shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. This is not intended to preclude transmission of control and signalling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

(b) Devices must incorporate a mechanism for monitoring the time and spectrum windows that their transmission is intended to occupy. The following criteria must be met:

(1) Immediately prior to initiating a transmission, devices must monitor the combined time and spectrum window, which they intend to use, to verify if the channel is free, for at least 10 milliseconds for systems designed to use a 10 ms or shorter frame period, or at least 20 ms for systems designed to use a 20 ms frame period.

(2) The monitoring threshold must not be more than 30 dB above the thermal noise power (KTB) of a bandwidth equivalent to the occupied bandwidth of the device.

(3) If no signal above the threshold level is detected, transmission may commence and continue with the same bandwidth in the monitored time and spectrum windows without further monitoring.

Occupation of the same combined time and spectrum windows by a device or group of cooperating devices, continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

(4) Once access to specific combined time and spectrum windows is obtained, an acknowledgement from a system participant must be received by the initiating transmitter within one second or transmission must cease.

Periodic acknowledgements must be received at least every 30 seconds or transmission must cease.

Channels used exclusively for control and signalling information may transmit continuously for 30 seconds without receiving an acknowledgement, at which time the access criteria must be repeated.

(5) If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with a power level below a monitoring threshold of 50 dB above the thermal noise power determined for the occupied bandwidth may be accessed.

A device utilizing the provisions of this paragraph (5) must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 millisecond frame period) immediately preceding actual channel access, that the detected power of the selected time and spectrum windows is no higher than the previously detected value.

The power measurement resolution bandwidth for this comparison must be accurate to within 6 dB.

No device or group of cooperating devices located within 1 metre of each other shall during any frame period occupy more than 6 MHz of aggregate bandwidth, or alternatively, more than one third of the time and spectrum windows defined by the system.

(6) If the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same windows after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing from the time when the channel becomes available.

(7) The monitoring system bandwidth must be equal to or greater than the occupied bandwidth of the intended transmission. **Note:** Testing of the monitoring system bandwidth is not required if the designed bandwidth from the manufacturer is available and given in the test report.

The monitor shall have a maximum reaction time less than $50\sqrt{}$ (1.25/occupied bandwidth in MHz) microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds.

If a signal is detected that is 6 dB or more above the threshold level, the maximum reaction time shall be 35√ (1.25/occupied bandwidth in MHz) microseconds but shall not be required to be less than 35 microseconds.

(8) The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location. **Note:** A monitoring antenna of the same model (and manufacturer) as the transmitting antenna is considered equivalent. An antenna not of the same model but of the same type (e.g. both are horn antennas of different manufacturers) is considered equivalent if the main beam antenna gains are within 3 dB of each other. Both antennas are to be installed to point at the same general coverage area.

(9) Devices that have a power output lower than the maximum permitted under this standard may increase their detection threshold by 1 dB for each 1 dB that the transmitter power is below the maximum permitted.

(10) A device initiating a communication (hereafter called an initiating device) may attempt to establish a duplex connection by monitoring both its intended transmit and receive time and spectrum windows.

If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window.

If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

(11) An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one metre) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds.

The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within 1.25 MHz of the centre frequency of channel(s) already occupied by that device or co-located co-operating devices.

If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

(12) The provisions of 4.3.4(b)(10) or (11) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

(c) The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in this sub-band shall be 20 milliseconds/X where X is a positive whole number.

Each device that implements time division for the purpose of maintaining a duplex connection on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 50 parts per millions (ppm).

Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 10 ppm.

The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 microseconds for any two consecutive transmissions.

Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

5. General Standard Specifications

If the PCS equipment is a cordless telephone, the following applies.

The base station shall be certified under both this standard (RSS-213) and the Industry Canada standard CS-03 for certification of terminal equipment.

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 (or equivalent) 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:

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

- Provide a fixed security code at the time of manufacture that is continuously varied either randomly or sequentially; or

- Provide a means for the telephone to automatically select a different security code each time the telephone is activated or dialled; or

- Provide 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.

Other methods to satisfy the intent of the digital security code may be employed, subject to the approval of Industry Canada.

6. Transmitter and Receiver Standard Specifications

6.1 Type of Modulation and Access Protocol

Equipment certified under this standard shall use digital modulation.

In order to provide equitable access to the radio frequency spectrum, the licence-exempt PCS device must possess an access protocol. See Section 4.3.4.

6.2 Frequency Stability

The carrier frequency stability shall be maintained within ±10 ppm (±0.001%).

6.3 AC Power Line Conducted Emissions Limits

The limits of AC power line conducted emissions are given in RSS-Gen, Section 7.

6.4 Occupied Bandwidth

The occupied bandwidth shall not be less than 50 kHz nor more than 2.5 MHz.

6.5 Peak Transmit Power

Peak power shall not exceed 100 microwatts multiplied by the square root of the occupied bandwidth in hertz.

6.6 Power Spectral Density

The peak-hold power spectral density shall not exceed 12 milliwatts per any 3 kHz bandwidth.

As an alternative to the peak-hold power spectral density, the time-averaged power spectral density may be measured and it shall not exceed 3 milliwatts per any 3 kHz bandwidth.

6.7 Transmitter Unwanted Emissions

6.7.1 Emissions Outside the 1920-1930 MHz Band

Emissions outside the 1920-1930 MHz band shall be attenuated below a reference power of 112 milliwatts (-9.5 dBW) by at least:

- 30 dB between the band edges and 1.25 MHz above and below the band edges;
- 50 dB between 1.25 MHz and 2.5 MHz above or below the band edges; and
- 60 dB at 2.5 MHz or greater above or below the band edges.

6.7.2 Emissions Inside the 1920-1930 MHz Band

Emissions inside the 1920-1930 MHz band shall be attenuated below the transmit power permitted for that device, as follows:

- 30 dB between the frequencies 1B and 2B measured from the centre of the occupied bandwidth;
- 50 dB between the frequencies 2B and 3B measured from the centre of the occupied bandwidth; and
- 60 dB between the frequencies 3B and band edge,

where B is the occupied bandwidth in hertz.

6.8 Receiver Spurious Emissions

Receiver spurious emissions shall comply with the limits specified in RSS-Gen.