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# Test report

298118-1TRFWL

Date of issue: February 23, 2016

Applicant:

Compagnie Canadienne d'Électricité Innovante inc.

Product:

Remote control 433MHz

Model:

MPRD0136

FCC ID:

2AF5D-MPRD0136

IC Registration number:

20710-MPRD0136

Specifications:

◆ **FCC 47 CFR Part 15 Subpart C, §15.231**

Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.

◆ **RSS-210, Issue 8, December 2010, Annex 1.1**

Momentarily operated devices

[www.nemko.com](http://www.nemko.com)

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

FCC 15.231 and RSS-210 A1.1.docx; Date: Oct 2014



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**Test location**

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Site number	FCC: 722545; IC: 2040G-5 (3 m semi anechoic chamber)

Tested by	Avul Nzenza, EMC Specialist
Reviewed by	Andrey Adelberg, Senior Wireless/EMC Specialist
Date	February 23, 2016
Signature of reviewer	

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**Limits of responsibility**

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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## Section 1. Report summary

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### 1.1 Applicant and manufacturer

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Company name	Compagnie Canadienne d'Électricité Innovante inc.
Address	1084, rue de L'Église, H4G 2N5 , Montréal , Qc

### 1.2 Test specifications

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FCC 47 CFR Part 15, Subpart C, Clause 15.231 RSS-210, Issue 8, December 2010, Annex 1.1	Periodic operation in the band 40.66–40.70 MHz and above 70 MHz Momentarily operated devices
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### 1.3 Test methods

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ANSI C63.10 :2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
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### 1.4 Statement of compliance

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In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

### 1.5 Exclusions

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None

### 1.6 Test report revision history

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Revision #	Details of changes made to test report
TRF	Original report issued

## Section 2. Summary of test results

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### 2.1 FCC Part 15 Subpart C test results

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**Table 2.1-1: FCC Part 15 – Radio frequency devices results**

Part	Test description	Verdict
§15.31(e)	Variation of power source	See Notes <sup>1</sup>
§15.203	Antenna requirement	See Notes <sup>2</sup>
§15.207(a)	Conducted limits	Not applicable <sup>3</sup>
§15.231(a)	Conditions for intentional radiators to comply with periodic operation	Pass
§15.231(b)	Field strength of emissions	Pass
§15.231(c)	Emission bandwidth	Pass
§15.231(d)	Requirements for devices operating within 40.66–40.70 MHz band	Not applicable <sup>4</sup>
§15.231(e)	Conditions for intentional radiators to comply with periodic operation	Not applicable <sup>5</sup>

Notes: <sup>1</sup> Fundamental field strength was measured with a fresh battery.

<sup>2</sup> The EUT is equipped with an integral antenna.

<sup>3</sup> The EUT is battery powered.

<sup>4</sup> The EUT does not operate in the frequency range of 40.66–40.70 MHz.

<sup>5</sup> The EUT complies with requirement 15.231 (a).

### 2.2 IC RSS-GEN, Issue 4 test results

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**Table 2.2-1: IC RSS-GEN Issue 4 results**

Part	Test description	Verdict
7.1.2	Receiver radiated emission limits	Not applicable <sup>1</sup>
7.1.3	Receiver conducted emission limits	Not applicable <sup>1</sup>
8.8	Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus	Not applicable <sup>2</sup>

Notes: <sup>1</sup> The EUT does not contain a receiver.

<sup>2</sup> The EUT is battery powered.

### 2.3 IC RSS-210, Issue 8 test results

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**Table 2.3-1: IC RSS-210 Issue 8 Annex 1 results**

Part	Test description	Verdict
A1.1.1	Types of momentary signals	Pass
A1.1.2	Field strength and frequency bands	Pass
A1.1.3	Bandwidth for momentary signals	Pass
A1.1.4	Frequency stability within 40.66–40.70 MHz band	Not applicable <sup>1</sup>
A1.1.5	Reduced field strengths	Not applicable <sup>2</sup>

Notes: <sup>1</sup> The EUT does not operate in the frequency range of 40.66–40.70 MHz.

<sup>2</sup> The EUT complies with requirement RSS-210 A1.1.2.

## Section 3. Equipment under test (EUT) details

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### 3.1 Sample information

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Receipt date	January 5, 2016
Nemko sample ID number	133-002083

### 3.2 EUT information

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Product name	Remote control 433MHz
Model	MPRD0136
Hardware revision	0121310A
FW version	None
Serial number	None

### 3.3 Technical information

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Applicant IC company number	20710
IC UPN number	MPRD0136
All used IC test site(s) Reg. number	2040G-5
RSS number and Issue number	RSS-210 Annex A1.1, Issue 8, December 2010
Frequency Min (MHz)	433.91
Frequency Max (MHz)	433.91
RF power Min (W)	N/A
RF power Max (W)	N/A
Field strength, Units @ distance	82.98 dB $\mu$ V/m, Peak field strength @ 3 m, 67.68 dB $\mu$ V/m, Average field strength @ 3 m
Measured BW (kHz) (99 %)	243.38
Calculated BW (kHz), as per TRC-43	N/A
Type of modulation	AM ON/OFF (OOK)
Emission classification (F1D, G1D, D1D)	200KL1D
Transmitter spurious, Units @ distance	56.17 dB $\mu$ V/m (Average) at 1735.67 MHz, @ 3 m
Power requirements	12Vdc, Battery type 23A
Antenna information	The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator . Antenna gain: 0 dBi

### 3.4 Product description and theory of operation

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The transmitter MPRD0136 - AEMX is a remote control which use is intended for opening doors operations, that works in the frequency band 433.05-434.79 MHz. The modulation is AM ON/OFF (OOK). This device may send up to a maximum of 4 non-simultaneous commands in a single frequency (433.920 MHz).

The power supply of the equipment is supplied by a 12 Volt battery of 23A type. The use of this transmitter is extremely simple: one just needs to press the button of the desired command.

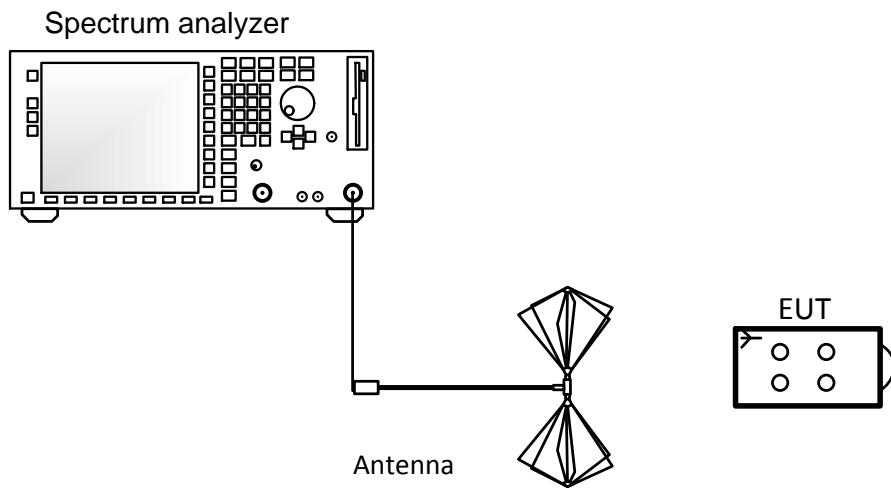
### 3.5 EUT exercise details

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During testing, the unit was set to transmit continuously.

### 3.6 EUT setup diagram

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**Figure 3.6-1: Setup diagram**

## Section 4. Engineering considerations

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### 4.1 Modifications incorporated in the EUT

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There were no modifications performed to the EUT during this assessment.

### 4.2 Technical judgment

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None

### 4.3 Deviations from laboratory tests procedures

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No deviations were made from laboratory procedures.

## Section 5. Test conditions

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### 5.1 Atmospheric conditions

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Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

### 5.2 Power supply range

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The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages  $\pm 5\%$ , for which the equipment was designed.

## Section 6. Measurement uncertainty

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### 6.1 Uncertainty of measurement

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Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of  $K = 2$  with 95% certainty.

Test name	Measurement uncertainty, dB
All antenna port measurements	0.55
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	3.55

## Section 7. Test equipment

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### 7.1 Test equipment list

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**Table 7.1-1: Equipment list**

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002532	1 year	May. 25/16
Flush mount turntable	Sunol	FM2022	FA002550	—	NCR
Controller	Sunol	SC104V	FA002551	—	NCR
Antenna mast	Sunol	TLT2	FA002552	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 40	FA002071	1 year	April 7/16
Bilog antenna (20–2000 MHz)	Sunol	JB1	FA002517	1 year	Sept. 29/16
Horn antenna (1–18 GHz)	EMCO	3115	FA001452	1 year	Sept. 29/16
Pre-amplifier (0.5–18 GHz)	COM-POWER	PAM-118A	FA002561	1 year	May 6/16

Notes: NCR - no calibration required

**Table 7.1-2: Test software details**

Test description	Manufacturer of Software	Details
Radiated emissions	Rhode & Schwarz	EMC32, Software for EMC Measurements, Version 8.53.0

Notes: None

## Section 8. Testing data

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### 8.1 FCC 15.231(a) and RSS-210 A1.1.1 Conditions for intentional radiators to comply with periodic operation

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#### 8.1.1 Definitions and limits

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##### FCC:

- (a) The provisions of this section are restricted to periodic operation within the band 40.66–40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:
- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
  - (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
  - (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
  - (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.
  - (5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

##### IC:

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

- (a) A manually operated transmitter shall be equipped with 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 Section 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.

#### 8.1.2 Test summary

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Test date	January 4, 2016
Test engineer	Avul Nzenza
Verdict	Pass

#### 8.1.3 Observations, settings and special notes

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None

#### 8.1.4 Test data

- 1) The EUT is a manually operated transmitter; it uses switches to automatically deactivate the transmitter within not more than 5 seconds of being released. (See Figure 8.1-1)
- 2) The EUT is activated. Transmission ceases within 5 seconds. (See Figure 8.1-1)
- 3) The total transmission does not exceed 2 seconds of transmission per hour.
- 4) The EUT usage is not employed for radio purposes during emergencies involving fire, security and safety of life
- 5) The EUT does not transmit set-up information

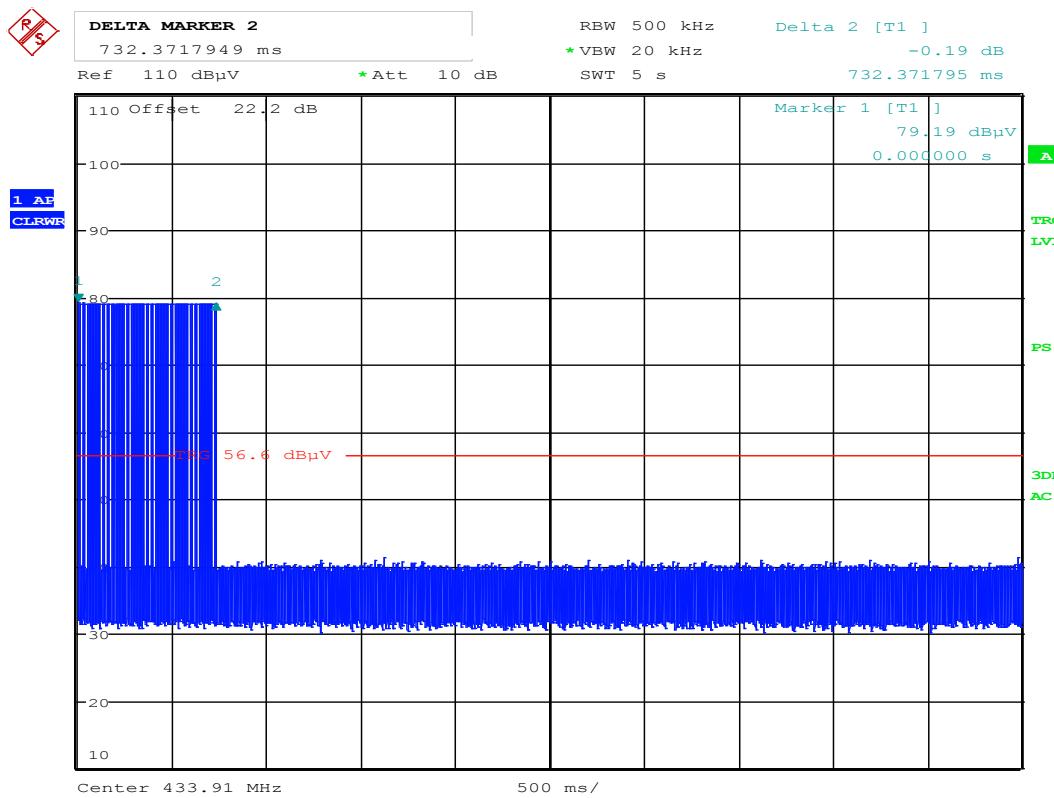


Figure 8.1-1: Transmission time

## 8.2 FCC 15.231(b) and RSS-210 A1.1.2 Field strength of emissions

### 8.2.1 Definitions and limits

#### FCC:

- (b) In addition to the provisions of §15.205 the field strength of emissions from intentional radiators operated under this section shall not exceed the following table.
- 1) The field strength limits in the table are specified at a distance of 3 meters. The tighter limits apply at the band edges.
  - 2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.
  - 3) The limits on the field strength of the spurious emissions in the table below are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

#### IC:

- 1) The field strength of emissions from momentarily operated intentional radiators shall not exceed the limits in Table A.
- 2) Intentional radiators shall demonstrate compliance with the field strength limits shown in Table A, based on the average value of the measured emissions. Alternatively, compliance with the limit in Table A may be demonstrated using a CISPR quasi-peak detector. If average measurements are employed, the requirements of Pulsed Operation of RSS-Gen apply regarding pulsed operation for averaging pulsed emissions and for limiting peak emissions.
- 3) The field strength limits shown in Table A are based on the fundamental frequency of the intentional radiator. Unwanted emissions shall be attenuated to the limits listed in RSS-Gen or to the limits shown in table below, whichever are less stringent.

**Table 8.2-1: Field strength limits**

Fundamental frequency (MHz)	Field strength of fundamental (µV/m)	Field strength of fundamental (dBµV/m)	Field strength of spurious emissions (µV/m)	Field strength of spurious emissions (dBµV/m)
40.66–40.70 <sup>1</sup>	2,250	67	225	47
70–130	1,250	61.9	125	41.9
130–174	1,250 to 3,750*	61.9 to 71.5*	125 to 375*	41.9 to 51.5*
174–260	3,750	71.5	375	51.5
260–470	3,750 to 12,500*	71.5 to 81.9*	375 to 1,250*	51.5 to 61.9*
Above 470	12,500	81.9	1,250	61.9

Notes: <sup>1</sup>The levels applicable to FCC only. For IC field strength shall not exceed 10 µV/m (80 dBµV/m) measured at 3 m with an average meter. Alternatively, it shall not exceed 233 mV/m measured with a quasi-peak meter. (Note: Do not use the above to convert average meter readings to quasi-peak values.) Outside the 40.65–40.71 MHz band, the general field strength limits listed in RSS-Gen shall apply, except for harmonics, which shall not exceed 225 µV/m at 3 m.

\* Linear interpolation with frequency F in MHz:

For 130–174 MHz: FS (microvolts/m) = (56.82 × F) – 6136

For 260–470 MHz: FS (microvolts/m) = (41.67 × F) – 7083

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 restricted frequency bands listed in RSS-Gen, it is recommended that the entire 225–399.9 MHz band be avoided.

### 8.2.1 Definitions and limits, continued

**Table 8.2-2: FCC §15.209 and RSS-Gen – Radiated emission limits**

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
0.009–0.490	2400/F	67.6 – 20 × log <sub>10</sub> (F)	300
0.490–1.705	24000/F	87.6 – 20 × log <sub>10</sub> (F)	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes:

- F = fundamental frequency in kHz
- In the emission table above, the tighter limit applies at the band edges.
- For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

**Table 8.2-3: IC restricted frequency bands**

MHz	MHz	MHz	GHz
0.090–0.110	12.51975–12.52025	399.9–410	5.35–5.46
2.1735–2.1905	12.57675–12.57725	608–614	7.25–7.75
3.020–3.026	13.36–13.41	960–1427	8.025–8.5
4.125–4.128	16.42–16.423	1435–1626.5	9.0–9.2
4.17725–4.17775	16.69475–16.69525	1645.5–1646.5	9.3–9.5
4.20725–4.20775	16.80425–16.80475	1660–1710	10.6–12.7
5.677–5.683	25.5–25.67	1718.8–1722.2	13.25–13.4
6.215–6.218	37.5–38.25	2200–2300	14.47–14.5
6.26775–6.26825	73–74.6	2310–2390	15.35–16.2
6.31175–6.31225	74.8–75.2	2655–2900	17.7–21.4
8.291–8.294	108–138	3260–3267	22.01–23.12
8.362–8.366	156.52475–156.52525	3332–3339	23.6–24.0
8.37625–8.38675	156.7–156.9	3345.8–3358	31.2–31.8
8.41425–8.41475	240–285	3500–4400	36.43–36.5
12.29–12.293	322–335.4	4500–5150	Above 38.6

Notes:

Certain frequency bands listed in Table 8.2-3 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

**Table 8.2-4: FCC restricted frequency bands**

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

Notes:

None

### 8.2.2 Test summary

Verdict	Pass		
Test date	January 4, 2016	Temperature	23.6 °C
Test engineer	Avul Nzenza	Air pressure	1018 mbar
Test location	Montreal	Relative humidity	34 %

### 8.2.3 Observations, settings and special notes

- The spectrum was searched from 30 MHz to the 10<sup>th</sup> harmonic.
- Average radiated emissions were obtained by subtracting duty cycle / correction factor from the peak measurement results.

Spectrum analyser settings for radiated measurements within restricted bands below 1 GHz:

Resolution bandwidth	100 kHz
Video bandwidth	300 kHz
Detector mode	Peak
Trace mode	Max Hold

Spectrum analyser settings for peak radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak
Trace mode	Max Hold

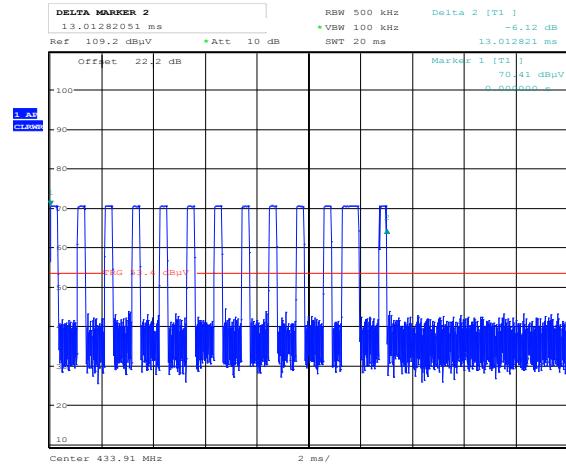
Setup details

EUT setup configuration	Table top
Test facility	3 m Semi anechoic chamber
Measuring distance	3 m
Antenna height variation	1–4 m
Turn table position	0–360°

#### 8.2.4 Test data

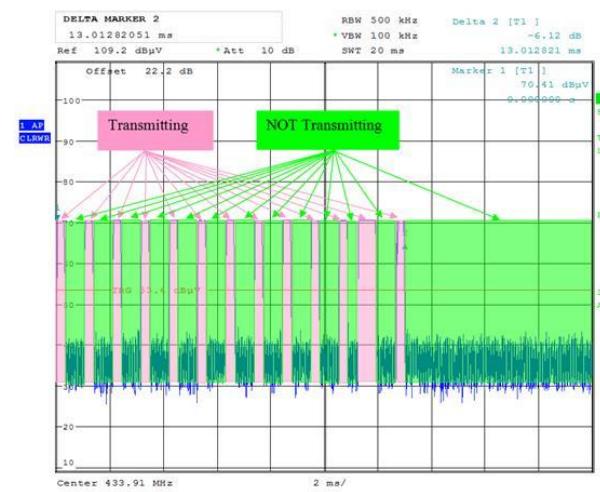
§15.35(c) When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed; the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

$$\text{Duty cycle or average factor} = 20 \times \log_{10} \left( \frac{T_{x_{100ms}}}{100ms} \right)$$



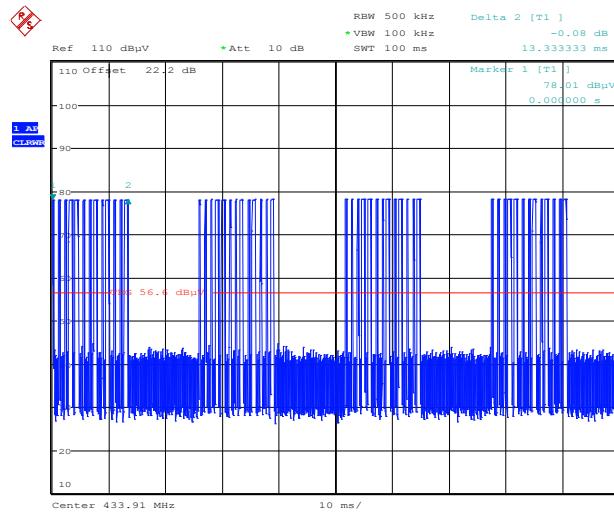
Date: 5.JAN.2016 13:26:15

Figure 8.2-1: Pulse width



Transmission time is about only 33% of the 13ms

Figure 8.2-2: Pulse width



Date: 7.JAN.2016 11:18:48

Figure 8.2-3: 100 ms transmission time frame

$$\text{DCCF (dB)} = 20 \times \log_{10} (T_{x_{100ms}} / 100 \text{ ms}) = 20 \times \log_{10} [(33\% * 13) * 4 / 100] = -15.3 \text{ dB}$$

#### 8.2.4 Test data, continued

**Table 8.2-5: Field Strength of Fundamental results**

Freq. (MHz)	Ant. Pol. (V/H)	Meas. peak field strength <sup>1</sup> (dB $\mu$ V/m)	Peak field strength limit (dB $\mu$ V/m)	Peak field strength margin <sup>3</sup> (dB)	Duty cycle correction factor (dB)	Calculated average field strength <sup>2</sup> (dB $\mu$ V/m)	Average field strength limit (dB $\mu$ V/m)	Average field strength margin <sup>3</sup> (dB)
433.91	H	82.98	100.83	17.85	-15.3	67.68	80.83	13.15
	V	72.35	100.83	28.48	-15.3	57.05	80.83	23.78

Notes: <sup>1</sup> Field strength (dB $\mu$ V/m) = spectrum analyzer value (dB $\mu$ V) + correction factor (dB)

Correction factor = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)

Sample calculation: 66.68 dB $\mu$ V/m (field strength) = 77.58 dB $\mu$ V (receiver reading) + (-10.9 dB) (Correction factor)

<sup>2</sup> Calculated average field strength (dB $\mu$ V/m) = measured Peak field strength (dB $\mu$ V/m) + Duty cycle correction factor (dB). Duty cycle correction factor as calculated from §15.35 (c)

<sup>3</sup> Margin (dB) = field strength limit – field strength measurement

**Table 8.2-6: Field Strength of Spurious emissions (Harmonic) results**

Freq. (MHz)	Ant. Pol. (V/H)	Meas. peak field strength <sup>1</sup> (dB $\mu$ V/m)	Peak field strength limit (dB $\mu$ V/m)	Peak field strength margin <sup>3</sup> (dB)	Duty cycle correction factor (dB)	Calculated average field strength <sup>2</sup> (dB $\mu$ V/m)	Average field strength limit (dB $\mu$ V/m)	Average field strength margin <sup>3</sup> (dB)
867.81	H	55.91	80.83	24.92	-15.3	40.61	60.83	20.22
1735.67	H	71.47	80.83	9.36	-15.3	56.17	60.83	4.66
2603.47	H	56.98	80.83	23.85	-15.3	41.68	60.83	19.15
3037.54	H	66.27	80.83	14.56	-15.3	50.97	60.83	9.86
3471.34	H	61.6	80.83	19.23	-15.3	46.3	60.83	14.53

Notes: <sup>1</sup> Field strength (dB $\mu$ V/m) = spectrum analyzer value (dB $\mu$ V) + correction factor (dB)

Correction factor = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)

<sup>2</sup> Calculated average field strength (dB $\mu$ V/m) = measured Peak field strength (dB $\mu$ V/m) + Duty cycle correction factor (dB). Duty cycle correction factor as calculated from §15.35 (c)

<sup>3</sup> Margin (dB) = field strength limit – field strength measurement

**Table 8.2-7: Field Strength of Spurious emissions falling within restricted bands FCC and IC results**

Freq. (MHz)	Ant. Pol. (V/H)	Meas. peak field strength <sup>1</sup> (dB $\mu$ V/m)	Peak field strength limit (dB $\mu$ V/m)	Peak field strength margin <sup>3</sup> (dB)	Duty cycle correction factor (dB)	Calculated average field strength <sup>2</sup> (dB $\mu$ V/m)	Average field strength limit (dB $\mu$ V/m)	Average field strength margin <sup>3</sup> (dB)
1301.34	H	56.54	80.83	24.29	-15.3	41.24	60.83	19.59
3905.11	H	29.61	80.83	51.22	-15.3	14.31	60.83	46.52

Notes: <sup>1</sup> Field strength (dB $\mu$ V/m) = spectrum analyzer value (dB $\mu$ V) + correction factor (dB)

Correction factor = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)

<sup>2</sup> Calculated average field strength (dB $\mu$ V/m) = measured Peak field strength (dB $\mu$ V/m) + Duty cycle correction factor (dB). Duty cycle correction factor as calculated from §15.35 (c)

<sup>3</sup> Margin (dB) = field strength limit – field strength measurement

#### 8.2.5 Setup photos

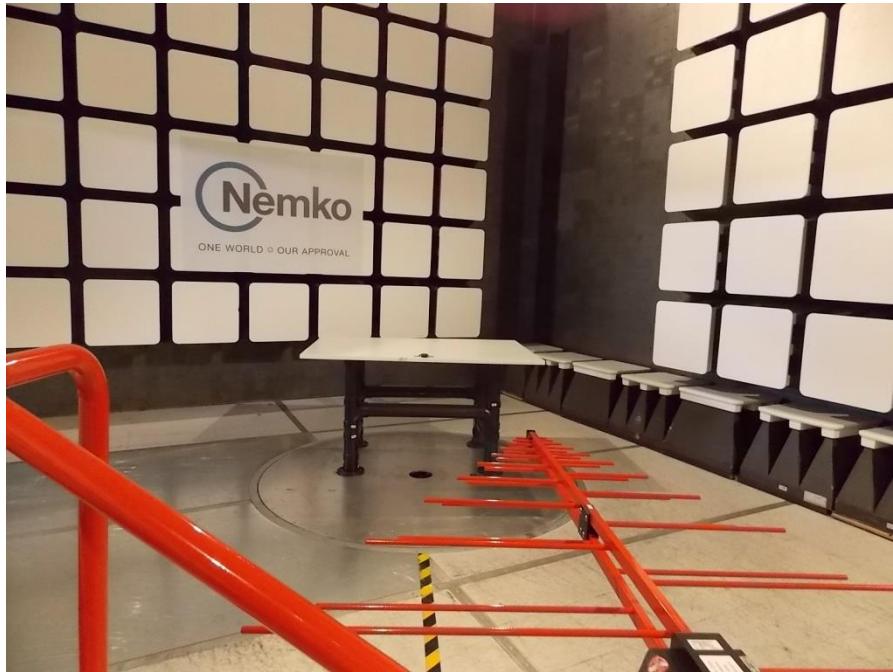


Figure 8.2-1: Emissions setup photo



Figure 8.2-2: Emissions setup photo

## 8.3 FCC 15.231(c) and RSS-210 A1.1.3 Emission bandwidth of momentary signals

### 8.3.1 Definitions and limits

**FCC:**

The bandwidth of the emission shall be no wider than 0.25 % of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5 % of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

**IC:**

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 MHz and 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5 % of the centre frequency.

### 8.3.2 Test summary

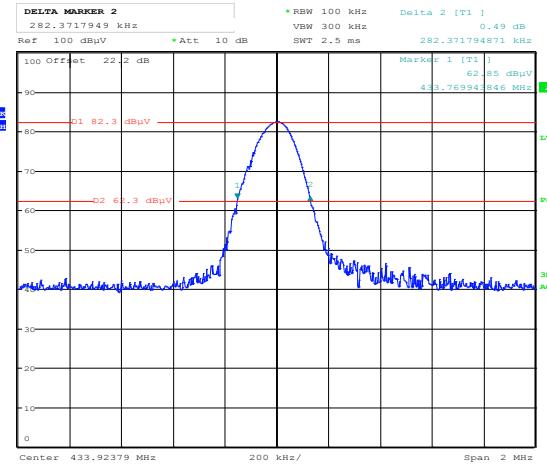
Verdict	Pass	Temperature	23.6 °C
Test date	January 4, 2016	Air pressure	1018 mbar
Test engineer	Avul Nzenza	Relative humidity	34 %
Test location	Montreal		

### 8.3.3 Observations, settings and special notes

Spectrum analyser settings:

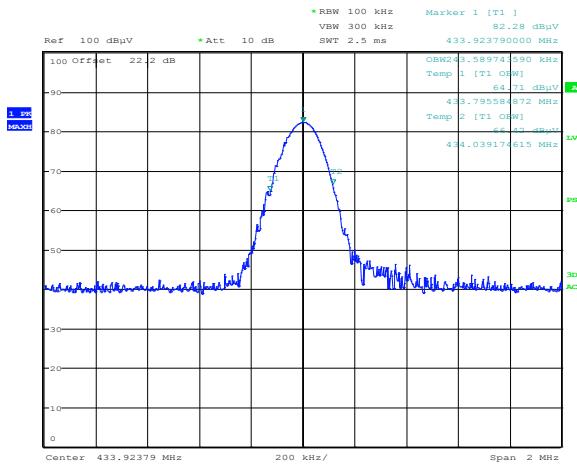
Resolution bandwidth	≥ 1 % of emission bandwidth
Video bandwidth	≥ 3 × RBW
Frequency span	Wider than emission bandwidth
Detector mode	Peak

### 8.3.4 Test data



Date: 5.JAN.2016 13:41:17

**Figure 8.3-1: 20 dB bandwidth**



Date: 5.JAN.2016 13:42:36

**Figure 8.3-2: 99 % bandwidth**

**Table 8.3-1: 20 dB bandwidth results**

20 dB bandwidth (kHz)	Limit (kHz)	Margin, kHz
282.37	1084.8	802.43

Notes: Limit: 0.25 % of 433.92 MHz is 1084.80 kHz

**Table 8.3-2: 99 % bandwidth results**

99 % bandwidth (kHz)	Limit (kHz)	Margin, kHz
243.38	1084.8	841.42

Notes: Limit: 0.25 % of 433.92 MHz is 1084.80 kHz

## Section 9. Block diagrams of test set-ups

### 9.1 Radiated emissions set-up

