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<b>Report Reference ID:</b>	148744-1TRFWL
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<b>Test specification:</b>	Title 47 - Telecommunication Chapter I - Federal Communications Commission Subchapter A - General Part 15 - Radio Frequency Devices Subpart C - Intentional Radiators  <b>§15.247 - Operation within the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz</b>
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<b>Applicant:</b>	4126254 Canada Inc. 5631 St-Francois St-Laurent, QC H4S 1W6 Canada
<b>Apparatus:</b>	Base station
<b>FCC ID:</b>	T9RHAWKEYE
<b>Model:</b>	BS-SB-1

<b>Testing laboratory:</b>	<b>Nemko Canada Inc.</b> 303 River Road Ottawa, ON, Canada K1V 1H2  Telephone: (613) 737-9680 Facsimile: (613) 737-9691
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	<b>Name and title</b>	<b>Date</b>
<b>Tested by:</b>	Andrey Adelberg, Senior Wireless/EMC Specialist	April 30, 2010
<b>Reviewed by:</b>	 Richard Brazeau, Laboratory Manager	October 22, 2010



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.

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## Section 1: Report summary

### 1.1 Test specification

#### **FCC Part 15 Subpart C, 15.247**

Operation within the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz.

### 1.2 Statement of compliance

In the configuration tested, the EUT was found compliant.

This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Canada Inc. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C.

Radiated tests were conducted in accordance with ANSI C63.4-2003.

See “Summary of test results” for full details.

### 1.3 Exclusions

None

### 1.4 Registration number

176392 (3 m Semi anechoic chamber)

### 1.5 Test report revision history

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

### 1.6 Test location

303 River Road, R.R. 5, Ottawa, Ontario, Canada, K1V 1H2

### 1.7 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 contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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## Section 2: Summary of test results

### 2.1 General requirements for FCC Part 15 tests result summary

Part	Test description	Verdict
§15.31(e)	Variation of power source	Pass
§15.31(m)	Number of operating frequencies	Pass
§15.203	Antenna requirement	Pass
§15.207(a)	Conducted limits	Pass

### 2.2 FCC Part 15 Subpart C, 15.247 tests result summary

Part	Test description	Verdict
§15.247(a)(1)(i)	Frequency hopping systems operating in the 902–928 MHz band	Pass
§15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725–5850 MHz band	N/A
§15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400–2483.5 MHz band	N/A
§15.247(a)(2)	Minimum 6 dB bandwidth for systems using digital modulation techniques	N/A
§15.247(b)(1)	Maximum peak output power of frequency hopping systems operating in the 2400–2483.5 MHz band and 5725–5850 MHz band	N/A
§15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902–928 MHz band	Pass
§15.247(b)(3)	Maximum peak output power of systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands	N/A
§15.247(b)(4)	Maximum peak output power	Pass
§15.247(c)(1)	Fixed point-to-point operation with directional antenna gains greater than 6 dBi	N/A
§15.247(c)(2)	Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams	N/A
§15.247(d)	Spurious emissions	Pass
§15.247(e)	Power spectral density for digitally modulated devices	N/A
§15.247(f)	Time of occupancy for hybrid systems	N/A

Notes: None

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

### 3.1 Sample information

Receipt date: April 29, 2010

Nemko sample number: 1

### 3.2 EUT information

Type of Equipment: DSS Base station transceiver

Product: Base station

FCC ID: T9RHAWKEYE

Model: BS-SB-1

Serial number: BS-1-001

#### Manufacturer

4126254 Canada Inc.  
5631 St-Francois  
St-Laurent, QC  
Canada  
H4S 1W6

#### EUT description and theory of operation

The EUT is a base station transceiver used primarily for the identification, control and management of assets using RF (radio frequencies) operated within 902–928 MHz ISM band.

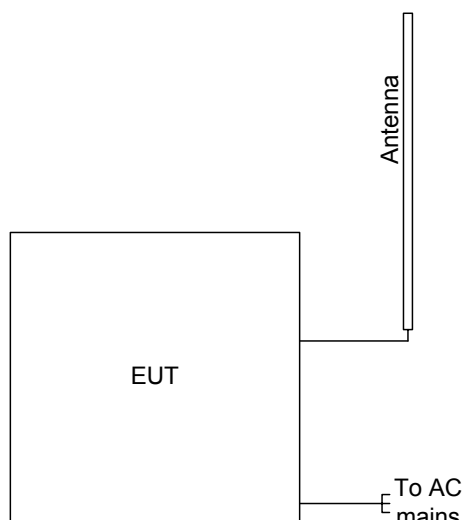
### 3.3 EUT technical specifications

Operating band:	902–928 MHz
Operating frequency:	902.24–927.76 MHz
Modulation type:	FSK
Occupied bandwidth:	33.65 kHz
Channel spacing:	40.4 kHz
Emission designator:	33K7F1D
Antenna data:	Omnidirectional, L-com HG908U-PRO, 8 dBi Omnidirectional, L-com HGV-906U, 6 dBi
Power source:	120 VAC, 60 Hz

### 3.4 Operation of the EUT during testing

The EUT was set to transmit continuously on the low, mid and high channels.

### 3.5 EUT setup diagram



## Section 4: Engineering considerations

### 4.1 Modifications incorporated in the EUT

In order to comply with conducted emissions on AC mains requirement, the following modifications were installed by client: Power supply "Circuit-Test", MN# PSF60-12.

### 4.2 Technical judgment

None

### 4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

## Section 5: Test conditions

### 5.1 Power source and ambient temperatures

Normal temperature, humidity and air pressure test conditions	<p>Temperature: 15–30 °C          Relative humidity: 20–75 %          Air pressure: 86–106 kPa</p> <p>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.</p>
Power supply range:	<p>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 <math>\pm 5\%</math>, for which the equipment was designed.</p>



## Section 6: Measurement uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95 % and can be found in Nemko Canada document MU-003.

## Section 7: Test equipment

### 7.1 Test equipment list

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
3 m EMI Test Chamber	TDK	SAC-3	FA002047	Mar. 09/11
Flush Mount Turntable	Sunol	FM2022	FA002082	NCR
Controller	Sunol	SC104V	FA002060	NCR
Antenna Mast	Sunol	TLT2	FA002061	NCR
International Power Supply	California Inst.	3001i	FA001021	COU
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 26	FA002043	Jan. 14/11
Bilog Antenna	Sunol	JB3	FA002108	Jan. 18/11
Horn Antenna #2	EMCO	3115	FA000825	Jan. 18/11
1–18 GHz Amplifier	JCA	JCA118-503	FA002091	Oct 07/10
LISN	Rohde & Schwarz	ENV216	FA002023	Sept. 08/10

Note: N/A = Not applicable, NCR = No cal required, COU = Cal on use



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**Section 8:** Testing data

**Product:** Base station

**Test name:** Clause 15.31(e) Variation of power source

**Test date:** April 29, 2010

**Test engineer:** Andrey Adelberg

**Verdict:** Pass

**Specification:** FCC Part 15 Subpart A

## Section 8: Testing data

### 8.1 Clause 15.31(e) Variation of power source

#### § 15.31 Measurement standards.


- (e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. For battery-operated equipment, the equipment tests shall be performed using a new battery.

#### Special notes

None

#### Test data

- Transmit output power was measured while supply voltage was varied from 102 VAC to 138 VAC (85 % to 115 % of the nominal rated supply voltage). No change in transmit output power was observed.

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	<b>Test name:</b> Clause 15.31(m) Number of operating frequencies			
	<b>Test date:</b> April 29, 2010		<b>Test engineer:</b> Andrey Adelberg	
			<b>Verdict:</b> Pass	
	Specification: FCC Part 15 Subpart A			

## 8.2 Clause 15.31(m) Number of operating frequencies

### § 15.31 Measurement standards.

- (m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz and less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

### Special notes

None

### Test data

The frequency band is 26 MHz therefore number of operating frequencies is 3.

Low frequency / channel	902.24 MHz
Mid frequency / channel	915.00 MHz
High frequency / channel	927.76 MHz



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**Section 8:** Testing data

**Product:** Base station

**Test name:** Clause 15.203 Antenna requirement

**Test date:** April 29, 2010

**Test engineer:** Andrey Adelberg

**Verdict:** Pass

**Specification:** FCC Part 15 Subpart C

### 8.3 Clause 15.203 Antenna requirement

#### § 15.203 Antenna requirement.


An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

#### Special notes

None

#### Test data

The EUT is professionally installed.

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	<b>Test name:</b> Clause 15.207(a) Conducted limits			
	<b>Test date:</b> April 29, 2010		<b>Test engineer:</b> Andrey Adelberg	
	<b>Verdict:</b> Pass		<b>Supply input:</b> 120 VAC, 60 Hz	
	<b>Temperature:</b> 24 °C		<b>Air pressure:</b> 1002 mbar	
			<b>Relative humidity:</b> 31 %	
<b>Specification:</b> FCC Part 15 Subpart C				

## 8.4 Clause 15.207(a) Conducted limits

### § 15.207 Conducted limits.

- (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

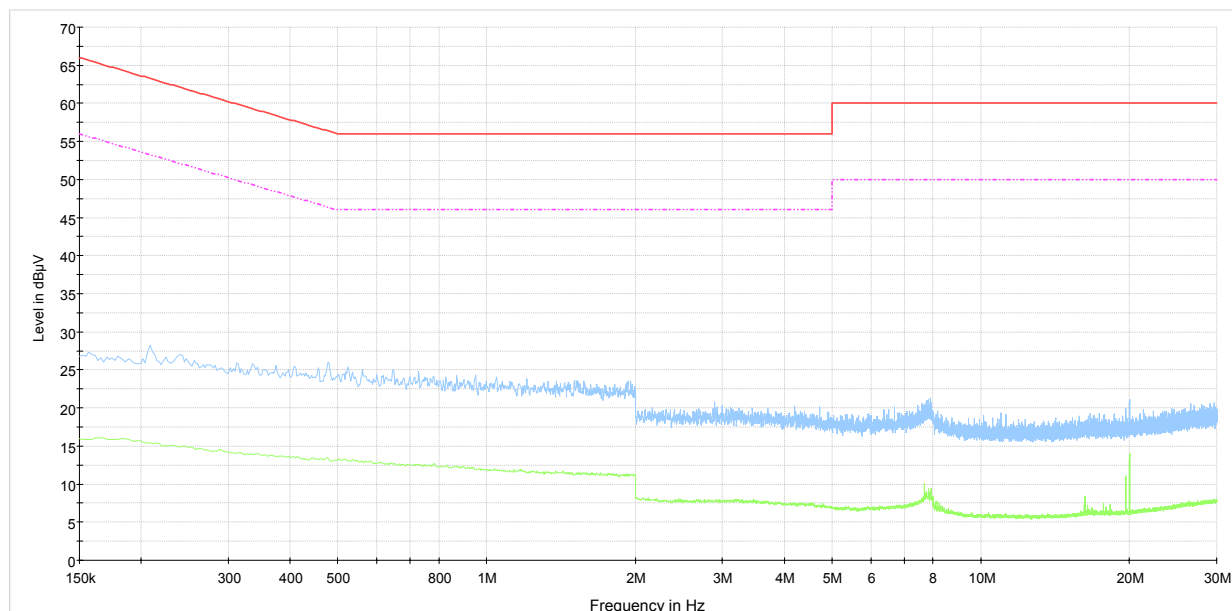
\*-Decreases with the logarithm of the frequency.

### Special notes

None



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**Section 8: Testing data****Product:** Base station**Test name:** Clause 15.207(a) Conducted limits**Test date:** April 29, 2010**Test engineer:** Andrey Adelberg**Verdict:** Pass**Supply input:** 120 VAC, 60 Hz**Temperature:** 24 °C**Air pressure:** 1002 mbar**Relative humidity:** 31 %**Specification:** FCC Part 15 Subpart C**Test data**

Conducted emissions on phase line  
— CISPR 22 Mains QP Class B LimitLine  
- - - CISPR 22 Mains AV Class B LimitLine  
— Preview Result 1  
— Preview Result 2

The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

**Receiver/Spectrum analyzer settings:**

0.15 MHz to 30 MHz

**Preview measurements****Final measurement**

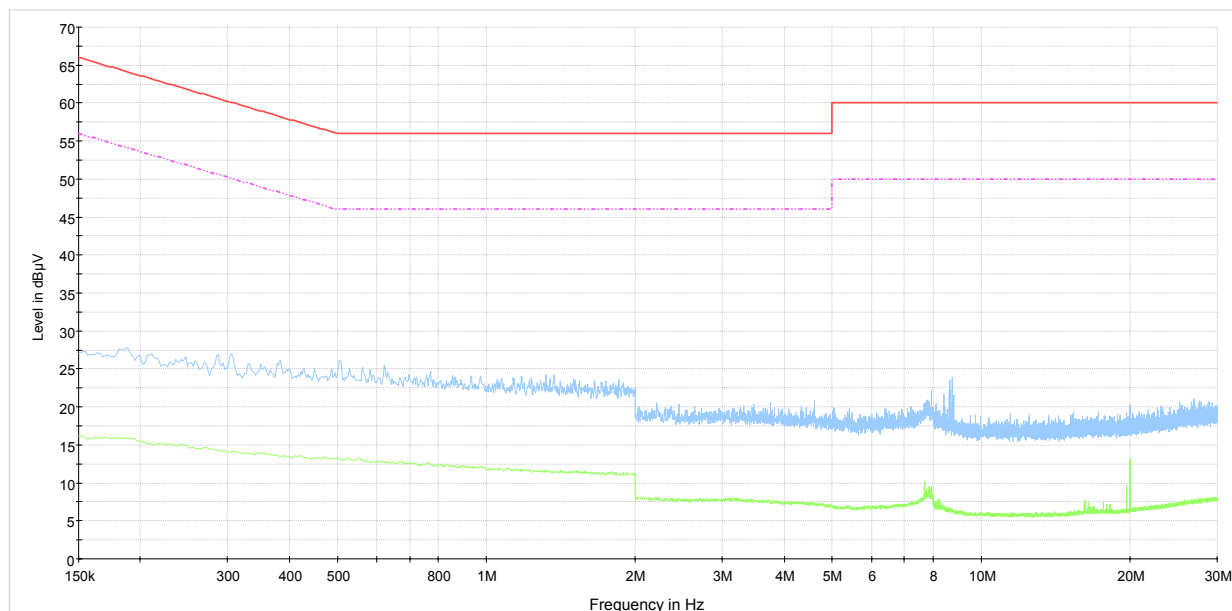
Receiver: 9 kHz RBW, Peak and Average detector, max hold

Receiver: 9 kHz RBW, Quasi-peak and Average detector

Measurement time 100 ms



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**Section 8: Testing data****Product:** Base station**Test name:** Clause 15.207(a) Conducted limits**Test date:** April 29, 2010**Test engineer:** Andrey Adelberg**Verdict:** Pass**Supply input:** 120 VAC, 60 Hz**Temperature:** 24 °C**Air pressure:** 1002 mbar**Relative humidity:** 31 %**Specification:** FCC Part 15 Subpart C**Test data, continued**

Conducted emissions on neutral line  
— CISPR 22 Mains QP Class B Limit Line  
- - - CISPR 22 Mains AV Class B Limit Line  
— Preview Result 1  
— Preview Result 2

The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

**Receiver/Spectrum analyzer settings:**

0.15 MHz to 30 MHz


**Preview measurements****Final measurement**

Receiver: 9 kHz RBW, Peak and Average detector, max hold


Receiver: 9 kHz RBW, Quasi-peak and Average detector

Measurement time 100 ms



 Nemko Canada Inc., 303 River Rd, Ottawa, ON, Canada, K1V 1H2	<b>Section 8: Testing data</b>		<b>Product:</b> Base station	
	<b>Test name:</b> Clause 15.207(a) Conducted limits			
	<b>Test date:</b> April 29, 2010		<b>Test engineer:</b> Andrey Adelberg	
	<b>Verdict:</b> Pass		<b>Supply input:</b> 120 VAC, 60 Hz	
	<b>Temperature:</b> 24 °C		<b>Air pressure:</b> 1002 mbar	
			<b>Relative humidity:</b> 31 %	
<b>Specification:</b> FCC Part 15 Subpart C				



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	<b>Test name:</b> Clause 15.247 (a) (1) Frequency hopping requirements			
	<b>Test date:</b> April 29, 2010		<b>Test engineer:</b> Andrey Adelberg	
	<b>Verdict:</b> Pass		<b>Supply input:</b> 120 VAC, 60 Hz	
	<b>Temperature:</b> 24 °C		<b>Air pressure:</b> 1002 mbar	
			<b>Temperature:</b> 24 °C	
<b>Specification:</b> FCC Part 15 Subpart C				

## 8.5 Clause 15.247(a)(1) Frequency hopping requirements

### § 15.207 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

- (a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:
- (1) 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 2400–2483.5 MHz band 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 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. 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.
    - (i) For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 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 frequencies and the average time of occupancy on any frequency 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.
    - (ii) Frequency hopping systems operating in the 5725–5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.
    - (iii) Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### Special notes

The peak detector was used with 2 kHz/5 kHz RBW/VBW



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## Section 8: Testing data

Product: Base station

Test name: Clause 15.247 (a) (1) Frequency hopping requirements

Test date: April 29, 2010

Test engineer: Andrey Adelberg

Verdict: Pass

Supply input: 120 VAC, 60 Hz

Temperature: 24 °C

Air pressure: 1002 mbar

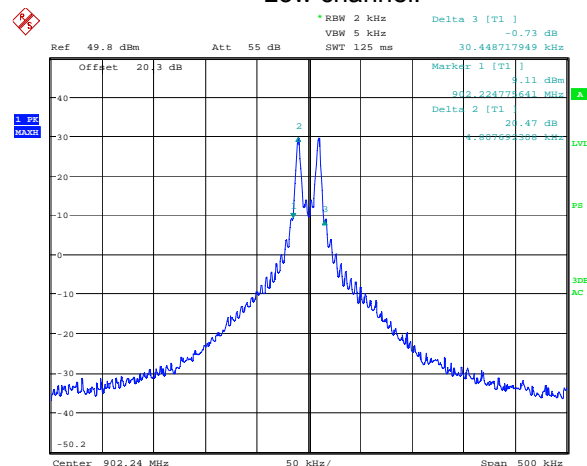
Temperature: 24 °C

Specification: FCC Part 15 Subpart C

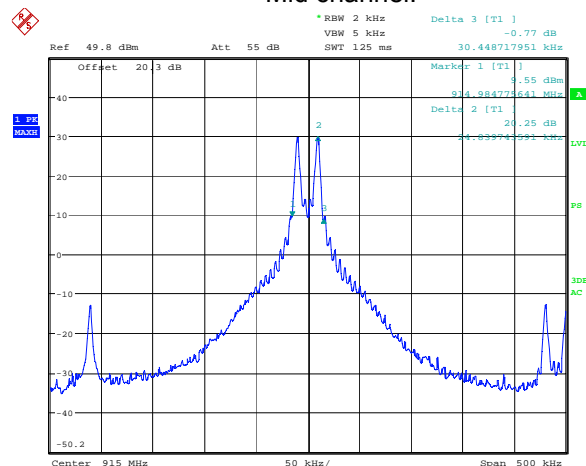
## Test data

### Section (1) Results

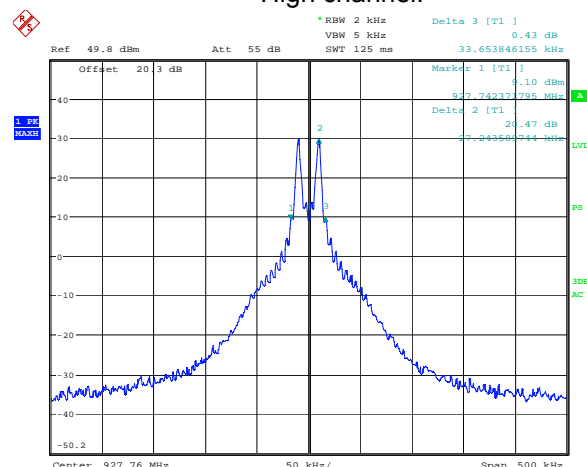
Low channel:



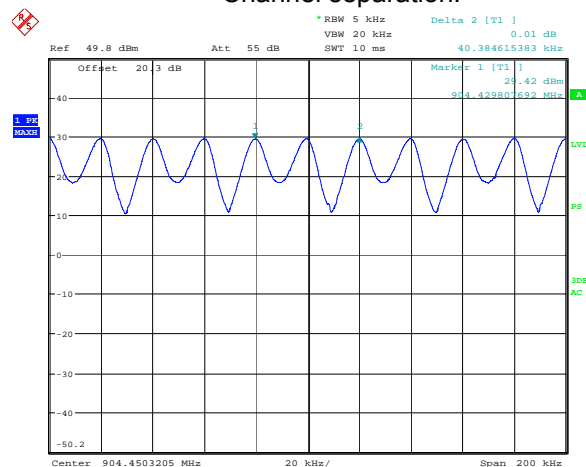
Mid channel:



High channel:




Channel separation:



Frequency (MHz)	20 dB bandwidth (kHz)
902.24	30.45
915.00	30.45
927.76	33.65

Minimum channel separation is  $\max(25 \text{ kHz}, 20 \text{ dB BW}) = \max(25 \text{ kHz}, 33.65 \text{ kHz}) = 33.65 \text{ kHz}$ .  
Measured channel separation is 40.4 kHz

The maximum 20 dB bandwidth is 33.65 kHz that is less than 250 kHz; therefore the minimum number of hopping frequencies is 50.

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	<b>Test name:</b> Clause 15.247 (a) (1) Frequency hopping requirements			
	<b>Test date:</b> April 29, 2010		<b>Test engineer:</b> Andrey Adelberg	
	<b>Verdict:</b> Pass		<b>Supply input:</b> 120 VAC, 60 Hz	
	<b>Temperature:</b> 24 °C		<b>Air pressure:</b> 1002 mbar	<b>Temperature:</b> 24 °C
	<b>Specification:</b> FCC Part 15 Subpart C			

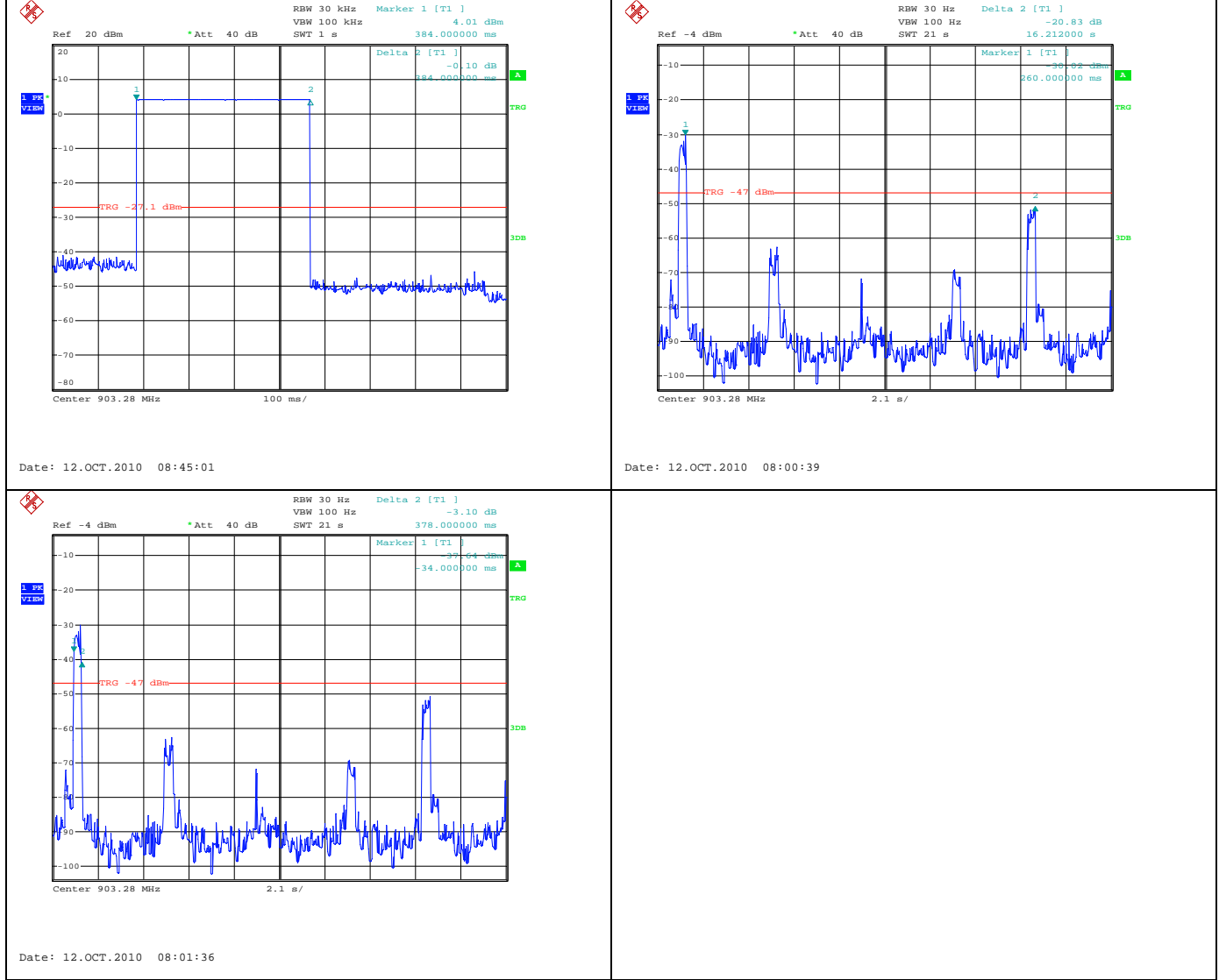
Test data, continued


Section (i) Results

Customer declaration:  
The EUT uses 53 channels out of 625.

Average time of occupancy = 384 ms per channel

Time of occupancy



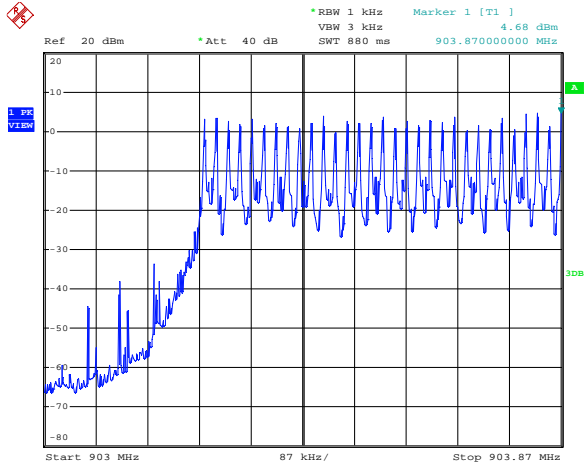
 Nemko Canada Inc., 303 River Rd, Ottawa, ON, Canada, K1V 1H2	<b>Section 8: Testing data</b>		<b>Product:</b> Base station	
	<b>Test name:</b> Clause 15.247 (a) (1) Frequency hopping requirements			
	<b>Test date:</b> April 29, 2010		<b>Test engineer:</b> Andrey Adelberg	
	<b>Verdict:</b> Pass		<b>Supply input:</b> 120 VAC, 60 Hz	
	<b>Temperature:</b> 24 °C		<b>Air pressure:</b> 1002 mbar	<b>Temperature:</b> 24 °C
	<b>Specification:</b> FCC Part 15 Subpart C			

Test data, continued

Section (i) Results

Number of operating frequencies

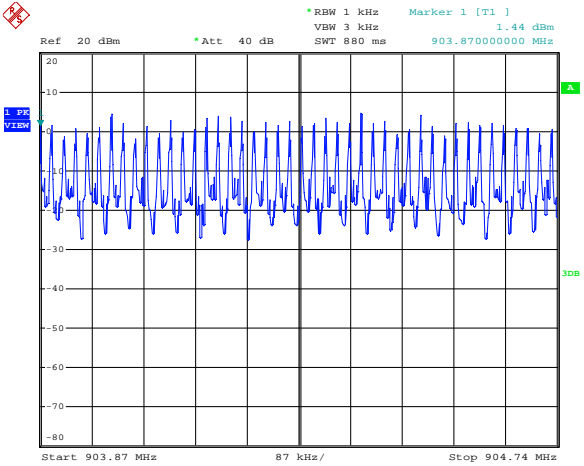
903 to 903.87 MHz



Date: 12.OCT.2010 08:26:49

15 Channels

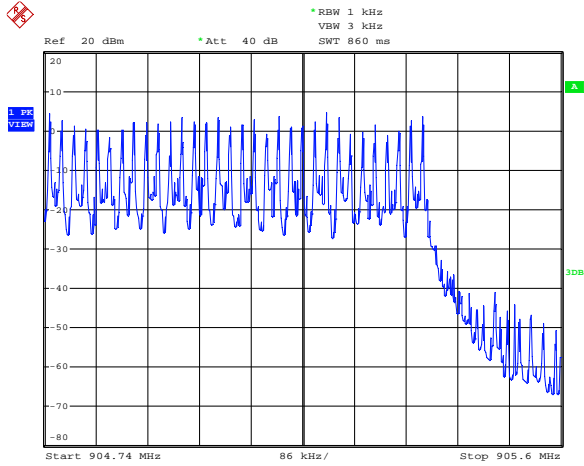
903.87 to 904.74 MHz



Date: 12.OCT.2010 08:31:18

22 Channels

904.74 to 905.6 MHz




Date: 12.OCT.2010 08:35:49

16 Channels

EUT utilizes 53 operating channels.

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 Nemko Canada Inc., 303 River Rd, Ottawa, ON, Canada, K1V 1H2	<b>Section 8: Testing data</b>		<b>Product:</b> Base station	
	<b>Test name:</b> Clause 15.247(b) Maximum peak output power			
	<b>Test date:</b> April 29, 2010		<b>Test engineer:</b> Andrey Adelberg	
	<b>Verdict:</b> Pass		<b>Supply input:</b> 120 VAC, 60 Hz	
	<b>Temperature:</b> 24 °C		<b>Air pressure:</b> 1002 mbar	
			<b>Temperature:</b> 24 °C	
<b>Specification:</b> FCC Part 15 Subpart C				

## 8.6 Clause 15.247(b) Maximum peak conducted output power

### § 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

- (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:
- (1) For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.
  - (2) For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.
  - (3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
  - (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
    - (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.
    - (ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.
    - (iii) Fixed, point-to-point operation, as used in paragraphs (b)(3)(i) and (b)(3)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

### Special notes

None





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**Section 8: Testing data****Product:** Base station**Test name:** Clause 15.247(b) Maximum peak output power**Test date:** April 29, 2010**Test engineer:** Andrey Adelberg**Verdict:** Pass**Supply input:** 120 VAC, 60 Hz**Temperature:** 24 °C**Air pressure:** 1002 mbar**Temperature:** 24 °C**Specification:** FCC Part 15 Subpart C**Test data****Section (2) Results****Conducted output power**

Frequency (MHz)	Conducted output power (dBm)	Limit (dBm)	Margin (dB)
902.24	29.83	30.00	0.17
915.00	30.00	30.00	0.00
927.76	29.73	30.00	0.27

**EIRP calculation**

Frequency (MHz)	Output power (dBm)	Path gain, dB	EIRP (dBm)	Limit (dBm)	Margin (dB)
902.24	29.83	4.00	33.83	36.00	2.17
915.00	30.00	4.00	34.00	36.00	2.00
927.76	29.73	4.00	33.73	36.00	2.27

EIRP [dBm] = Conducted output power [dBm] + path gain [dB]

Path gain [dB] = Antenna gain [dBi] - Cable loss [dB]

Maximum antenna gain is = 8 dBi

Cable loss is 4 dB


Maximum output power = 30 dBm

Limit = 30 dBm

Maximum EIRP = 34.00 dBm

Limit = 36 dBm

- The peak detector was used with RBW wider than 20 dB bandwidth.
- The span was wider than RBW.

 Nemko Canada Inc., 303 River Rd, Ottawa, ON, Canada, K1V 1H2	<b>Section 8:</b> Testing data		<b>Product:</b> Base station	
	<b>Test name:</b> Clause 15.247(d) Spurious emissions			
	<b>Test date:</b> April 29, 2010		<b>Test engineer:</b> Andrey Adelberg	
	<b>Verdict:</b> Pass		<b>Supply input:</b> 120 VAC, 60 Hz	
	<b>Temperature:</b> 24 °C		<b>Air pressure:</b> 1002 mbar	
	<b>Temperature:</b> 24 °C			
<b>Specification:</b> FCC Part 15 Subpart C				

## 8.7 Clause 15.247(d) Spurious emissions

### § 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

- (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).





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<b>Section 8: Testing data</b>		<b>Product:</b> Base station
<b>Test name:</b> Clause 15.247(d) Spurious emissions		
<b>Test date:</b> April 29, 2010		<b>Test engineer:</b> Andrey Adelberg
<b>Verdict:</b> Pass		<b>Supply input:</b> 120 VAC, 60 Hz
<b>Temperature:</b> 24 °C	<b>Air pressure:</b> 1002 mbar	<b>Temperature:</b> 24 °C
<b>Specification:</b> FCC Part 15 Subpart C		

## Special notes

### §15.209 – Radiated emission limits

Frequency (MHz)	Field strength		Measurement distance (m)
	( $\mu\text{V/m}$ )	(dB $\mu\text{V/m}$ )	
0.009–0.490	2400/F	67.6–20log(F)	300
0.490–1.705	24000/F	87.6–20log(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.

### §15.205 – Restricted bands of operation.

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			

- The spectrum was searched from 30 MHz to the 10<sup>th</sup> harmonic.
- All radiated measurements were performed at a distance of 3 m.
- All radiated measurements were performed:
  - within 30–1000 MHz range: using a quasi-peak detector with 120 kHz/300 kHz RBW/VBW,
  - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
    - and using peak detector with 1 MHz/10 Hz RBW/VBW for average results
- All conducted measurements were performed using a peak detector with 100 kHz/300 kHz RBW/VBW.
- Omnidirectional, L-com HG908U-PRO, 8 dBi antenna was used for radiated tests.



Nemko Canada Inc.,  
303 River Rd, Ottawa, ON, Canada, K1V 1H2

## Section 8: Testing data

Product: Base station

Test name: Clause 15.247(d) Spurious emissions

Test date: April 29, 2010

Test engineer: Andrey Adelberg

Verdict: Pass

Supply input: 120 VAC, 60 Hz

Temperature: 24 °C

Air pressure: 1002 mbar

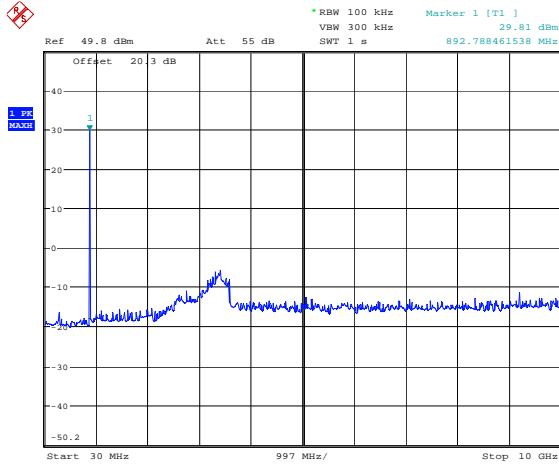
Temperature: 24 °C

Specification: FCC Part 15 Subpart C

## Test data, continued

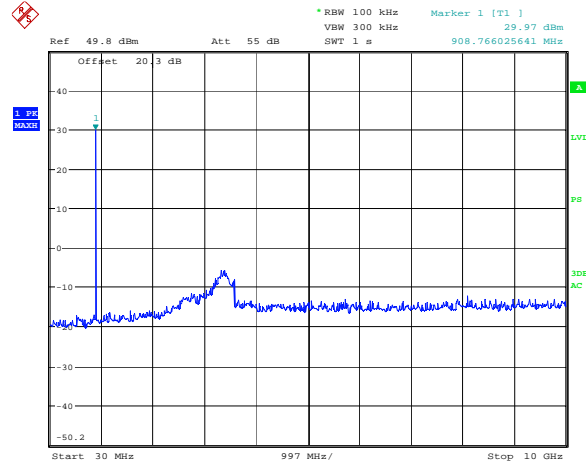
### Conducted measurements

#### Low channel:



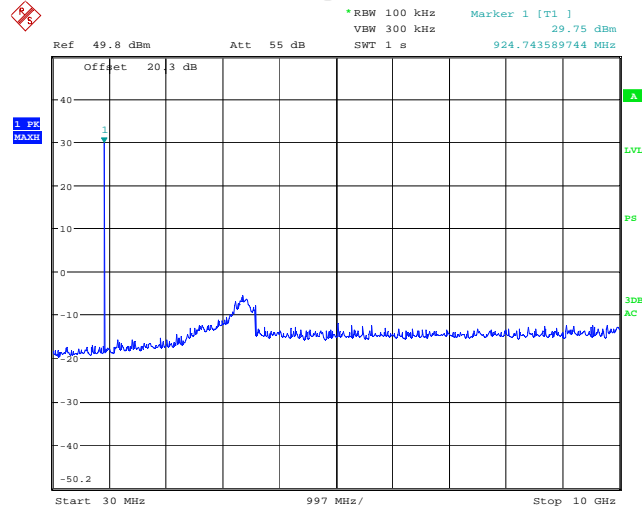
Date: 29.APR.2010 16:57:38

#### Mid channel:



Date: 29.APR.2010 16:52:05

#### High channel:



Date: 29.APR.2010 16:50:42



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## Section 8: Testing data

Product: Base station

Test name: Clause 15.247(d) Spurious emissions

Test date: April 29, 2010

Test engineer: Andrey Adelberg

Verdict: Pass

Supply input: 120 VAC, 60 Hz

Temperature: 24 °C

Air pressure: 1002 mbar

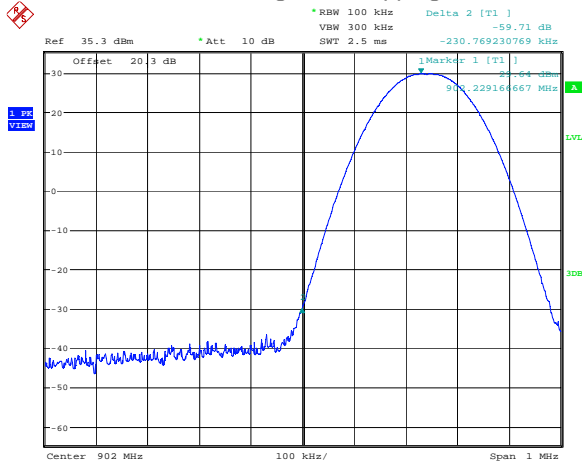
Temperature: 24 °C

Specification: FCC Part 15 Subpart C

## Test data, continued

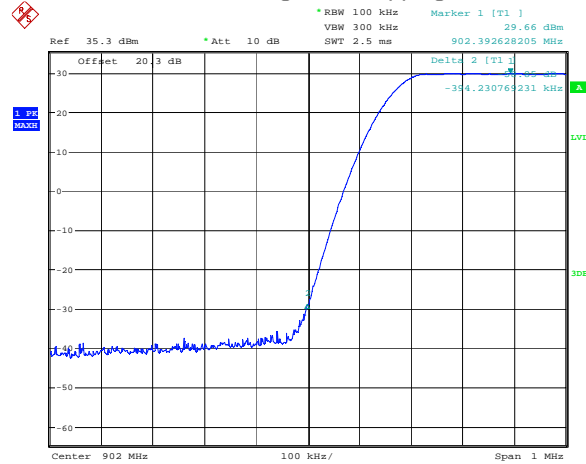
### Conducted measurements

#### Lower band edge with hopping turned off:



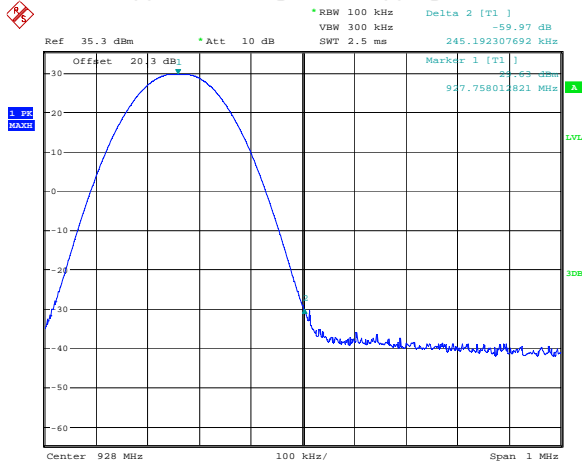
Date: 29.APR.2010 15:39:47

#### Lower band edge with hopping turned on:



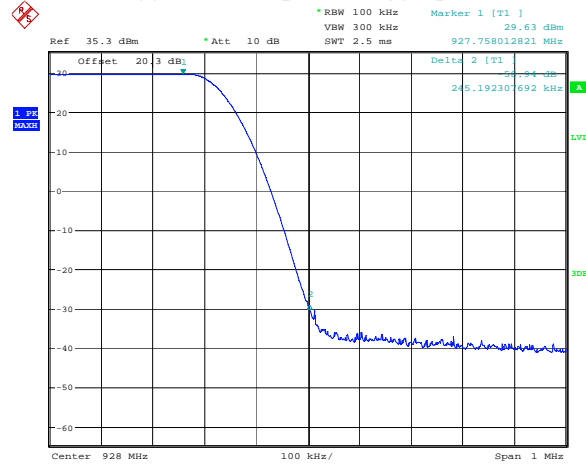
Date: 29.APR.2010 15:41:03

#### Upper band edge with hopping turned off:




Date: 29.APR.2010 15:42:14

#### Upper band edge with hopping turned on:



Date: 29.APR.2010 15:43:59

 Nemko Canada Inc., 303 River Rd, Ottawa, ON, Canada, K1V 1H2	<b>Section 8: Testing data</b>		<b>Product:</b> Base station	
	<b>Test name:</b> Clause 15.247(d) Spurious emissions			
	<b>Test date:</b> April 29, 2010		<b>Test engineer:</b> Andrey Adelberg	
	<b>Verdict:</b> Pass		<b>Supply input:</b> 120 VAC, 60 Hz	
	<b>Temperature:</b> 24 °C		<b>Air pressure:</b> 1002 mbar	
	<b>Temperature:</b> 24 °C			
<b>Specification:</b> FCC Part 15 Subpart C				

#### Test data, continued

##### Radiated measurements

Channel	Frequency MHz	Peak FS dBμV/m	Peak limit dBμV/m	Margin dB	Average FS dBμV/m	Average limit dBμV/m	Margin dB
Low	2706.7	57.09	74.00	16.91	50.63	54.00	3.37
	3608.9	56.77	74.00	17.23	50.46	54.00	3.54
Mid	2745.0	57.59	74.00	16.41	51.08	54.00	2.92
	3660.0	56.49	74.00	17.51	49.65	54.00	4.35
High	2783.3	57.19	74.00	16.81	48.58	54.00	5.42
	3608.9	55.04	74.00	18.96	44.27	54.00	9.73

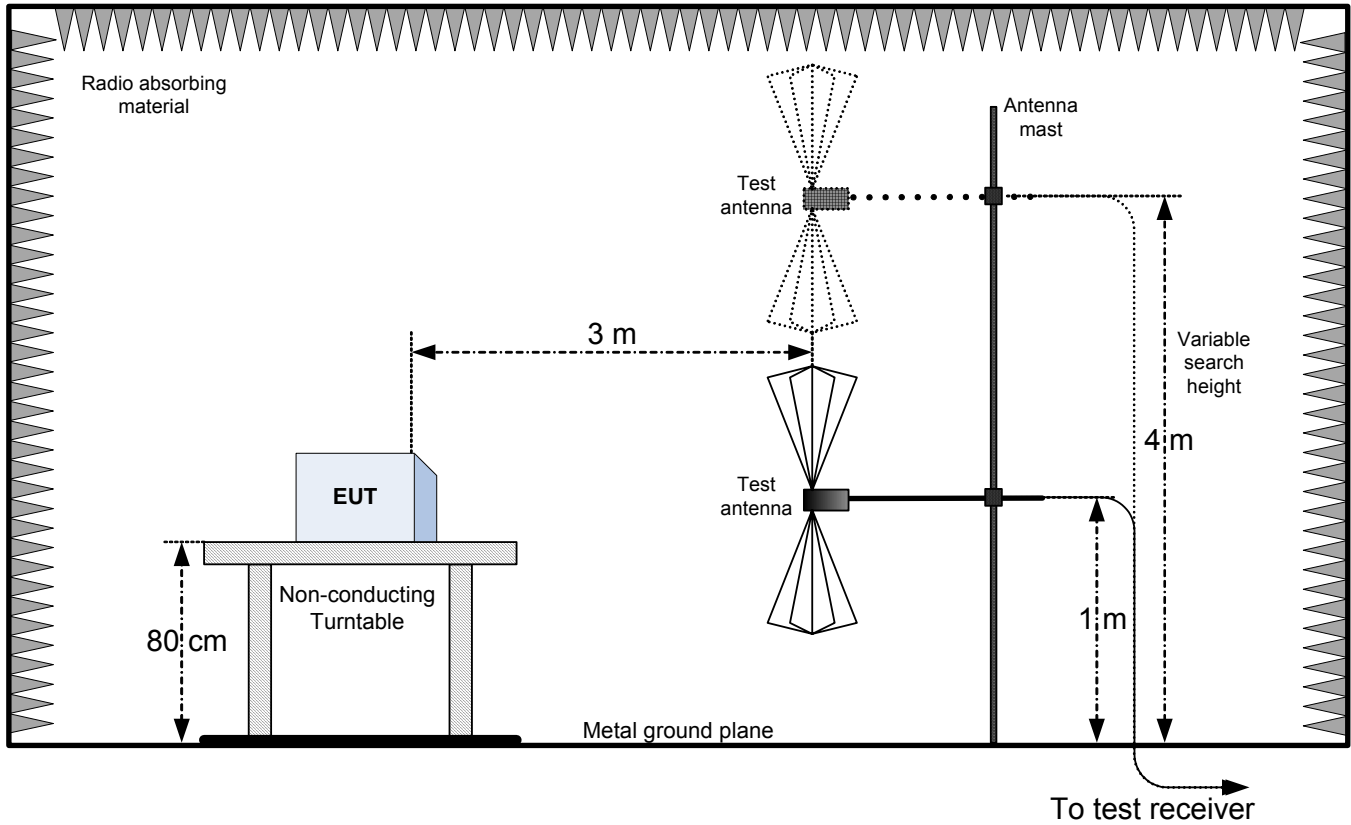
Note: FS (field strength) includes antenna factor, cable loss and amplifier gain were possible.

#### Setup photo



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

### Radiated emissions set-up



### Conducted emissions set-up

