

**Nemko Test Report:** 146343-1R1TRFWL

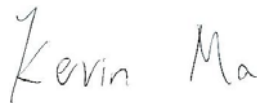
**Applicant:** BelAir Networks Inc.  
603 March Road,  
Ottawa, ON  
K2K 2M5 Canada

**Apparatus:** ERM5

**FCC ID:** RAR20051001

**In Accordance With:** FCC Part 15 Subpart E, 15.407  
Unlicensed National Information Infrastructure  
Devices

**Authorized By:**

A handwritten signature in black ink that reads "Kevin Ma".

Kevin Ma, Wireless/EMC Specialist

**Date:** April 28, 2010

**Total Number of Pages:** 30

## TABLE OF CONTENTS

<b>Section 1 : Report Summary .....</b>	<b>3</b>
<b>Section 2 : Equipment Under Test.....</b>	<b>4</b>
2.1 Identification of Equipment Under Test (EUT).....	4
2.2 Accessories .....	4
2.3 EUT Description.....	4
2.4 Technical Specifications of the EUT .....	5
2.5 EUT Setup diagram .....	6
2.6 Operation of the EUT during testing .....	6
2.7 Modifications incorporated in the EUT .....	6
<b>Section 3 : Test Conditions.....</b>	<b>7</b>
3.1 Specifications .....	7
3.2 Deviations From Laboratory Test Procedures .....	7
3.3 Test Environment .....	7
3.4 Measurement Uncertainty.....	7
3.5 Test Equipment.....	8
<b>Section 4 : Results Summary .....</b>	<b>9</b>
4.1 FCC Part 15 Subpart E : Test Results.....	9
<b>Appendix A : Test Results.....</b>	<b>10</b>
Clause 15.207(a) Powerline Conducted Emissions .....	10
Clause 15.209(a) Radiated Emissions within Restricted Bands .....	12
Clause 15.403(i) Emission Bandwidth .....	14
Clause 15.407(a)(2) Power Limits for the 5.25–5.35 GHz and 5.470–5.725 GHz bands.....	15
Clause 15.407(a)(6) Peak Excursion .....	20
Clause 15.407(b)(2) Undesirable emission limits for transmitters in the 5.25–5.35 GHz band .....	23
Clause 15.407(g) Frequency stability .....	28
<b>Appendix B : Setup Photographs .....</b>	<b>29</b>
<b>Appendix C : Block Diagram of Test Setups.....</b>	<b>30</b>

## Section 1 : Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart E. Radiated tests were conducted in accordance with ANSI C63.4-2003.

The assessment summary is as follows:

<b>Apparatus Assessed:</b>	ERM5
<b>Specification:</b>	FCC Part 15 Subpart E, 15.407
<b>Compliance Status:</b>	Complies
<b>Exclusions:</b>	None
<b>Non-compliances:</b>	None
<b>Report Release History:</b>	R1 – UNII 2B band has been removed from the original report.
<b>Test Location:</b>	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
<b>Registration Number:</b>	176392 (3 m Semi-Anechoic Chamber)
<b>Tests Performed By:</b>	Andrey Adelberg, Senior Wireless/EMC Specialist
<b>Test Dates:</b>	June–August 2009

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.

Nemko Canada Inc. authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

## Section 2 : Equipment Under Test

### 2.1 Identification of Equipment Under Test (EUT)

The following information identifies the EUT under test:

Type of Equipment:	Enhanced Radio Module
Brand Name:	BelAir
Model Name or Number:	ERM5
Serial Number:	K002360442
Nemko Sample Number:	1
FCC ID:	RAR20051001
Date of Receipt:	June 10, 2009

### 2.2 Accessories

The following information identifies accessories used to exercise the EUT during testing:

Description:	Host Unit
Brand Name:	BelAir
Model Name or Number:	BelAir100T
Serial Number:	BELAF2398
Nemko Sample Number:	1
Connection Port:	PCI connection

Description:	Ethernet Hub
Brand Name:	Airlink
Model Name or Number:	ASW105/A4
Serial Number:	0526A4A20149
Nemko Sample Number:	2
Connection Port:	Ethernet

Description:	Laptop
Brand Name:	Toshiba
Model Name or Number:	Satellite A10 PSA10C-00REH
Serial Number:	63042093J
Nemko Sample Number:	3
Connection Port:	Ethernet connection through Ethernet Hub

### 2.3 EUT Description

The EUT is a module designed to operate in the 5.25–5.35 GHz UNII band.

## 2.4 Technical Specifications of the EUT

**Operating Bands:** 5250–5350 MHz

**Operating Frequency:** 5280–5320 MHz (20 MHz channel)  
5280–5300 MHz (40 MHz channel)

**Modulation:** OFDM

**Occupied Bandwidth:** 20 and 40 MHz

**Emission Designator:** W7D

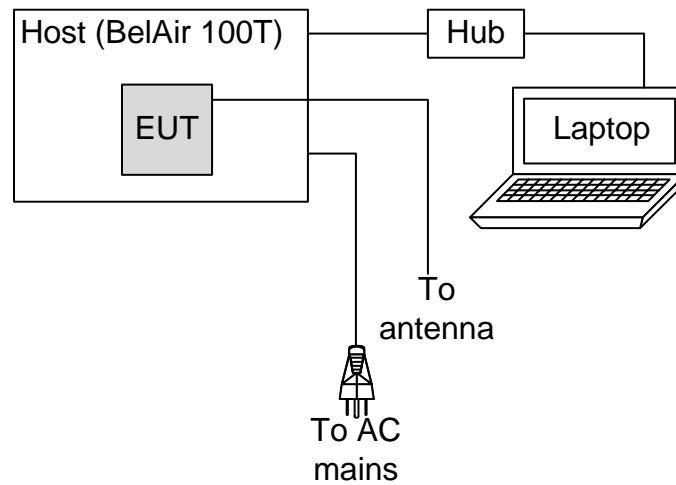
**Antenna Data:**

1. 10 dBi, Maxrad, MHO515010NM, N-Male
2. 10 dBi, MTI, MT-462008/N/A, SN 00004
3. 15 dBi, Maxrad Panel Antenna, WISP4959018MBV
4. 19 dBi, MTI, MT-485001
5. 23 dBi, Huber&Suhner, SPA 5600/9/23/0/V, SN 04375
6. 15 dBi, BelAir BAM Antenna BEL10008-A01
7. 10.5 dBi, BelAir B1BB025AA-A01
8. 22.5 dBi, MTI, MT-485028/N

**Antennas 1–3 are point-to-multipoint, the rest are point-to-point.**

**Power Supply Requirements:** 120 VAC, 60 Hz

## 2.5 EUT Setup diagram



## 2.6 Operation of the EUT during testing

The EUT was controlled to transmit at desired frequency from laptop.

## 2.7 Modifications incorporated in the EUT

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

## **Section 3 : Test Conditions**

### **3.1 Specifications**

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart E, 15.407

Unlicensed National Information Infrastructure Devices

### **3.2 Deviations From Laboratory Test Procedures**

No deviations were made from laboratory test procedures.

### **3.3 Test Environment**

All tests were performed under the following environmental conditions:

Temperature range	:	15–30 °C
Humidity range	:	20–75 %
Pressure range	:	86–106 kPa
Power supply range	:	±5 % of rated voltages

### **3.4 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.

### 3.5 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Cal. Date	Next Cal.
3 m EMI Test Chamber	TDK	SAC-3	FA002047	May 06/09	May 06/10
Bilog	Sunol	JB3	FA002108	Jan. 27/09	Jan. 27/10
Flush Mount Turntable	Sunol	FM2022	FA002082	NCR	NCR
Controller	Sunol	SC104V	FA002060	NCR	NCR
Mast	Sunol	TLT2	FA002061	NCR	NCR
International Power Supply	California Inst.	3001i	FA001021	Jan. 13/09	Jan. 13/10
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 26	FA002043	Dec. 16/08	Dec. 16/09
Horn Antenna #2	EMCO	3115	FA000825	Jan. 21/09	Jan. 21/10
1 – 18 GHz Amplifier	JCA	JCA118-503	FA002091	Oct 2/08	Oct 2/09
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 40	FA002071	Nov. 25/08	Nov. 25/09
Horn 18 – 26.5 GHz	Electro-Metrics	SH-50/60-1	FA000479	COU	COU
Horn 26.5 – 40 GHz	Electro-Metrics	SH-50/60-2	FA000485	COU	COU
18.0 – 26.0 GHz Amplifier	NARDA	BBS-1826N612	FA001550	COU	COU
26 – 40.0 GHz Amplifier	NARDA	DBL-2640N610	FA001556	COU	COU
Frequency Counter	HP	5352B	FA001915	Jan 08/09	Jan 08/10
Temperature Chamber	Thermotron	SM-16C	FA001030	NCR	NCR
Multimeter	Fluke	16	FA001831	Jan 13/09	Jan 13/10
Air probe	Fluke	None	FA001248	NCR	NCR
Attenuator	Narda	776B-20	FA001153	COU	COU

COU – Calibrate on Use

NCR – No Calibration Required



## Section 4 : Results Summary

This section contains the following:

### FCC Part 15 Subpart E : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No : not applicable / not relevant.

Y Yes : Mandatory i.e. the apparatus shall conform to these tests.

N/T Not Tested, mandatory but not assessed. (See Report Summary)

### 4.1 FCC Part 15 Subpart E : Test Results

Part 15	Test Description	Required	Result
15.207(a)	Powerline Conducted Emissions	Y	PASS
15.209(a)	Radiated Emissions within Restricted Bands	Y	PASS
15.403(i)	Emission Bandwidth	Y	PASS
15.407(a)(2)	Peak Conducted Transmit Output Power	Y	PASS
15.407(b)	Spurious Emissions	Y	PASS
15.407(a)(2)	Peak Power Spectral Density	Y	PASS
15.407(a)(6)	Peak Excursion Measurement	Y	PASS
15.407(g)	Frequency stability	Y	PASS

## Appendix A : Test Results

### Clause 15.207(a) Powerline Conducted Emissions

Frequency of Conducted limit (dB $\mu$ V)		
Emission (MHz)	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.

**Test Results:** Pass

### Additional Observations:

All plots were obtained using a sweeping receiver with an IF of 9 kHz using a Quasi-Peak and Average detector. The plots have been corrected with the cable loss and LISN loss to show compliance.

Frequency MHz	Average dB $\mu$ V	Meas. Time ms	Bandwidth kHz	Filter	Line	Corr. dB	Margin dB	Limit dB $\mu$ V
12.747250	45.6	100.0	9.000	On	Phase	10.5	4.4	50.0
12.808000	46.2	100.0	9.000	On	Phase	10.5	3.8	50.0
19.708750	45.9	100.0	9.000	On	Phase	10.7	4.1	50.0
25.693750	44.7	100.0	9.000	On	Phase	10.9	5.3	50.0
25.876000	44.8	100.0	9.000	On	Phase	10.9	5.2	50.0

Frequency MHz	Average dB $\mu$ V	Meas. Time ms	Bandwidth kHz	Filter	Line	Corr. dB	Margin dB	Limit dB $\mu$ V
12.747250	45.3	100.0	9.000	On	Neutral	10.5	4.7	50.0
12.808000	45.8	100.0	9.000	On	Neutral	10.5	4.2	50.0
19.708750	46.2	100.0	9.000	On	Neutral	10.8	3.8	50.0
25.693750	44.8	100.0	9.000	On	Neutral	11.1	5.2	50.0
25.876000	45.0	100.0	9.000	On	Neutral	11.1	5.0	50.0

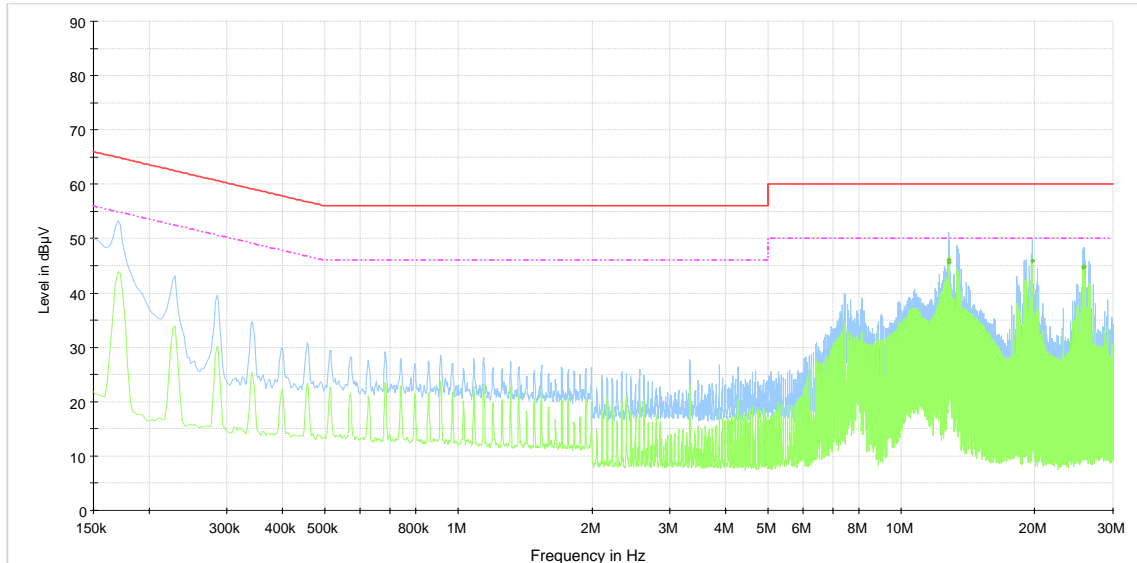


Nemko Canada Inc.

Report Number: 146343-1R1TRFWL

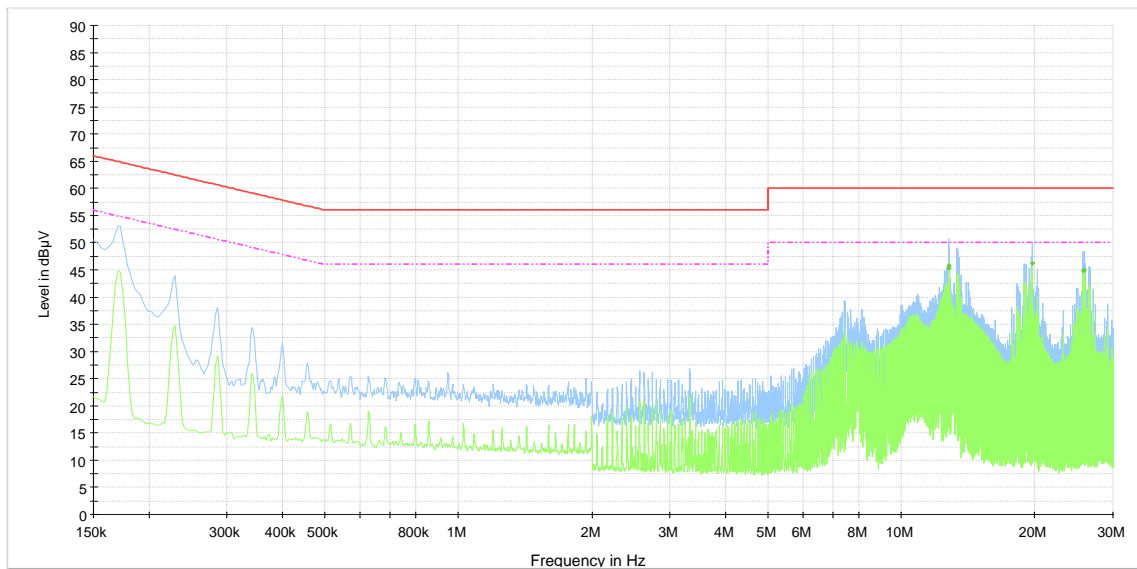
Specification: FCC Part 15 Subpart E

Phase:



Conducted Emissions on Phase Line  
— CISPR 22 Mains QP Class B.LimitLine  
- - - CISPR 22 Mains AV Class B.LimitLine  
— Preview Peak Result  
— Preview Average Result  
◆ Final Average Result

Neutral:



Conducted Emissions on Neutral  
— CISPR 22 Mains QP Class B.LimitLine  
- - - CISPR 22 Mains AV Class B.LimitLine  
— Preview Peak Result  
— Preview Average Result  
◆ Final Average Result

**Clause 15.209(a) Radiated Emissions within Restricted Bands**

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength		Measurement Distance (meters)
	( $\mu$ V/m)	(dB $\mu$ 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

Note: F = fundamental frequency in kHz

**Test Results:** Pass

**Additional Observations:**

The Spectrum was searched from 30MHz to the 40 GHz.

These results apply to emissions found in the Restricted bands defined in FCC Part 15 Subpart C, 15.205.

Peak Detector with 100 kHz/300 kHz RBW/VBW was used for measurements below 1 GHz and 1 MHz/3 MHz RBW/VBW for frequencies above 1 GHz. Since EUT has 100 % duty cycle average measurements were performed at the frequencies above 1 GHz with 1 MHz/10 Hz RBW/VBW spectrum analyzer settings.

The EUT was scanned with scanned with all modulation bandwidths. The highest gain antenna of each type was chosen for the test. Only the worst case of data is provided.

**Radiated emissions:**

Antenna	Emission Frequency, MHz	FS Peak, dB $\mu$ V/m	FS Peak Limit, dB $\mu$ V/m	Margin, dB	FS Avg, dB $\mu$ V/m	FS Avg Limit, dB $\mu$ V/m	Margin, dB
Flat 23 dBi (4)	10520	63.44	74.00	10.56	49.47	54.00	4.53
	10600	64.72	74.00	9.28	50.84	54.00	3.16
	10640	61.79	74.00	12.21	48.34	54.00	5.66
Omni 10 dBi (1)	10520	64.12	74.00	9.88	48.20	54.00	5.80
	10600	67.45	74.00	6.55	51.79	54.00	2.21
	10640	65.18	74.00	8.82	50.54	54.00	3.46
90 deg Sector 15 dBi (3)	10520	67.82	74.00	6.18	53.43	54.00	0.57
	10600	67.37	74.00	6.63	52.09	54.00	1.91
	10640	67.00	74.00	7.00	52.30	54.00	1.70
Patch 15 dBi (8)	10520	66.13	74.00	7.87	51.61	54.00	2.39
	10600	63.79	74.00	10.21	48.62	54.00	5.38
	10640	58.64	74.00	15.36	45.00	54.00	9.00

Note: Field Strength (FS) result includes antenna factor, cable losses and amplifier gain where applicable.

Number in parentheses indicates the antenna number from the table above.

The EUT can have one of the following antennae:

Antenna Type	Antenna Gain, dBi	Antenna #	Antenna Info
Omni directional Rod	10	1	Maxrad, MHO515010NM
		2	MTI, MT-462008/N/A
90 degrees Sectional	15	3	Maxrad, Panel Antenna, WISP4959018MBV
Flat	23	4	Huber&Suhner, SPA 5600/9/23/0/V
		5	MTI, MT-485028/N
		6	MTI, MT-485001
Patch	10.5	7	BelAir, B1BB025AA-A01
		8	BelAir, BAM Antenna BEL10008-A0

The highest gain antenna of each type was chosen for the test.



**Clause 15.403(i) Emission Bandwidth**

The emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement

**Test Results:** Pass  
The test was performed using 200 kHz RBW for 20 MHz channel and 500 kHz RBW for 40 MHz channel  
Refer to tables below:

**26 dB Bandwidth results:**

26 dB bandwidth:

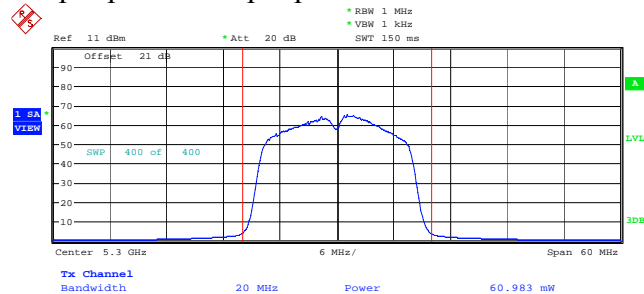
Frequency MHz	Channel Bandwidth MHz	Measured 26 dB BW MHz
5280	20	18.83
5300	20	18.59
5320	20	19.23
5280	40	43.75
5300	40	41.99

**Clause 15.407(a)(2) Power Limits for the 5.25–5.35 GHz and 5.470–5.725 GHz bands**

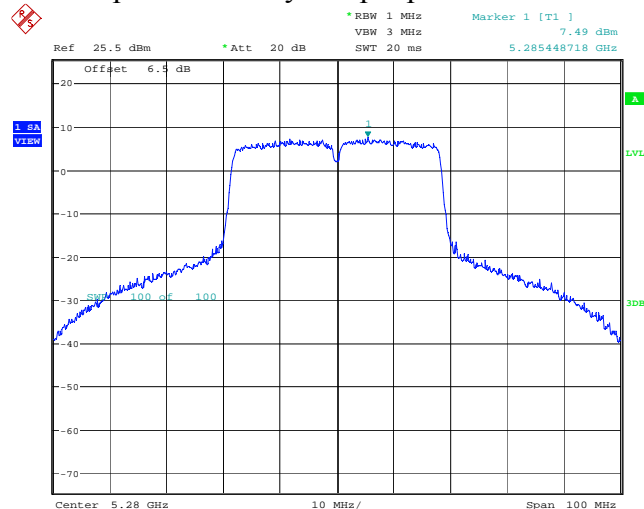
For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24 dBm) or  $11\text{dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**Test Method:** FCC Public Notice Ref: DA: 02-2138  
 Measurement Procedure for Peak Transmit Power in UNII Band  
 The output RF power was measured on the antenna port by means of a spectrum analyzer and following the 'Method 3' procedure (since the maximum resolution bandwidth of a spectrum analyser is less that 40 MHz channel).

**Test Results:** Pass  
 Output power sample plot:



Power spectral density sample plot:



Date: 31.JUL.2009 09:45:44

Note: The plots are provided to show measurement settings and technique only; the plots do not necessary reflect actual measurement.

Output Power for 20 MHz channel:

Freq. (MHz)	G <sub>ANT</sub> (dBi)	Antenna number	Cable loss (dB)	G <sub>ANT+CABLE</sub> (dBi)	SW power setting	PTX Cond. (mW)	PTX Cond. (dBm)	Limit (dBm)	Margin (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
5280	10	1,2	1	9	25	61.816	17.91	21.00	3.09	26.91	30.00	3.09
5300	10	1,2	1	9	25	60.983	17.85	21.00	3.15	26.85	30.00	3.15
5320	10	1,2	1	9	26	66.113	18.20	21.00	2.80	27.20	30.00	2.80
5280	15	3	1	14	10	22.751	13.57	16.00	2.43	27.57	30.00	2.43
5300	15	3	1	14	9	18.157	12.59	16.00	3.41	26.59	30.00	3.41
5320	15	3	1	14	9	18.083	12.57	16.00	3.43	26.57	30.00	3.43
5280	19	6	1	18	0	5.276	7.22	12.00	4.78	25.22	30.00	4.78
5300	19	6	1	18	0	7.656	8.84	12.00	3.16	26.84	30.00	3.16
5320	19	6	1	18	0	4.151	6.18	12.00	5.82	24.18	30.00	5.82
5280	22.5	5	1	21.5	L5	3.900	5.91	8.50	2.59	27.41	30.00	2.59
5300	22.5	5	1	21.5	L5	3.971	5.99	8.50	2.51	27.49	30.00	2.51
5320	22.5	5	1	21.5	L5	3.663	5.64	8.50	2.86	27.14	30.00	2.86
5280	23	4	1	22	L3	3.013	4.79	8.00	3.21	26.79	30.00	3.21
5300	23	4	1	22	L3	3.192	5.04	8.00	2.96	27.04	30.00	2.96
5320	23	4	1	22	L3	2.939	4.68	8.00	3.32	26.68	30.00	3.32
5280	10.5	7	1	9.5	25	61.816	17.91	20.50	2.59	27.41	30.00	2.59
5300	10.5	7	1	9.5	23	54.597	17.37	20.50	3.13	26.87	30.00	3.13
5320	10.5	7	1	9.5	25	58.195	17.65	20.50	2.85	27.15	30.00	2.85
5280	15	8	1	14	10	22.751	13.57	16.00	2.43	27.57	30.00	2.43
5300	15	8	1	14	9	18.157	12.59	16.00	3.41	26.59	30.00	3.41
5320	15	8	1	14	9	18.083	12.57	16.00	3.43	26.57	30.00	3.43

Peak Output power limit = (24 dBm or 11 dBm + 10 log B) – (antenna gain – 6 dBi)

Note: antenna gain considered as a combination of the actual antenna gain with the cable.

Antenna Type	Antenna Gain, dBi	Antenna #	Antenna Info
Omni directional Rod	10	1	Maxrad, MHO515010NM
		2	MTI, MT-462008/N/A
90 degrees Sectional	15	3	Maxrad, Panel Antenna, WISP4959018MBV
Flat	23	4	Huber&Suhner, SPA 5600/9/23/0/V
	22.5	5	MTI, MT-485028/N
	19	6	MTI, MT-485001
Patch	10.5	7	BelAir, B1BB025AA-A01
	15	8	BelAir, BAM Antenna BEL10008-A0



Output Power for 40 MHz channel:

Freq. (MHz)	G <sub>ANT</sub> (dBi)	Antenna number	Cable loss (dB)	G <sub>ANT+CABLE</sub> (dBi)	SW power setting	PTX Cond. (mW)	PTX Cond. (dBm)	Limit (dBm)	Margin (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
5280	10	1,2	1	9	36	121.542	20.85	21.00	0.15	29.85	30.00	0.15
5320	10	1,2	1	9	36	122.436	20.88	21.00	0.12	29.88	30.00	0.12
5280	15	3	1	14	24	39.750	15.99	16.00	0.01	29.99	30.00	0.01
5320	15	3	1	14	22	37.213	15.71	16.00	0.29	29.71	30.00	0.29
5280	19	6	1	18	5	15.614	11.94	12.00	0.06	29.94	30.00	0.06
5320	19	6	1	18	8	13.504	11.30	12.00	0.70	29.30	30.00	0.70
5280	22.5	5	1	21.5	0	6.192	7.92	8.50	0.58	29.42	30.00	0.58
5320	22.5	5	1	21.5	0	5.402	7.33	8.50	1.17	28.83	30.00	1.17
5280	23	4	1	22	0	6.192	7.92	8.00	0.08	29.92	30.00	0.08
5320	23	4	1	22	L10	6.132	7.88	8.00	0.12	29.88	30.00	0.12
5280	10.5	7	1	9.5	35	110.926	20.45	20.50	0.05	29.95	30.00	0.05
5320	10.5	7	1	9.5	35	104.026	20.17	20.50	0.33	29.67	30.00	0.33
5280	15	8	1	14	24	37.213	15.71	16.00	0.29	29.71	30.00	0.29
5320	15	8	1	14	22	37.213	15.71	16.00	0.29	29.71	30.00	0.29

**Peak Output power limit** = (24 dBm or 11 dBm + 10 log B) – (antenna gain – 6 dBi)

Note: antenna gain considered as a combination of the actual antenna gain with the cable.

Antenna Type	Antenna Gain, dBi	Antenna #	Antenna Info
Omni directional Rod	10	1	Maxrad, MHO515010NM
		2	MTI, MT-462008/N/A
90 degrees Sectional	15	3	Maxrad, Panel Antenna, WISP4959018MBV
Flat	23	4	Huber&Suhner, SPA 5600/9/23/0/V
	22.5	5	MTI, MT-485028/N
	19	6	MTI, MT-485001
Patch	10.5	7	BelAir, B1BB025AA-A01
	15	8	BelAir, BAM Antenna BEL10008-A0

PSD for 20 MHz channel:

Frequency (MHz)	G <sub>ANT</sub> (dBi)	Antenna number	Cable loss (dB)	G <sub>ANT+CABLE</sub> (dBi)	SW power setting	PSD Conducted (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
5280	10	1,2	1	9	25	7.49	8.00	0.51
5300	10	1,2	1	9	25	7.98	8.00	0.02
5320	10	1,2	1	9	26	7.88	8.00	0.12
5280	15	3	1	14	10	2.98	3.00	0.02
5300	15	3	1	14	9	2.69	3.00	0.31
5320	15	3	1	14	9	2.93	3.00	0.07
5280	19	6	1	18	0	-2.40	-1.00	1.40
5300	19	6	1	18	0	-1.35	-1.00	0.35
5320	19	6	1	18	0	-2.41	-1.00	1.41
5280	22.5	5	1	21.5	L5	-4.74	-4.50	0.24
5300	22.5	5	1	21.5	L5	-4.53	-4.50	0.03
5320	22.5	5	1	21.5	L5	-4.90	-4.50	0.40
5280	23	4	1	22	L3	-5.39	-5.00	0.39
5300	23	4	1	22	L3	-5.07	-5.00	0.07
5320	23	4	1	22	L3	-5.98	-5.00	0.98
5280	10.5	7	1	9.5	25	7.49	7.50	0.01
5300	10.5	7	1	9.5	23	7.36	7.50	0.14
5320	10.5	7	1	9.5	25	7.50	7.50	0.00
5280	15	8	1	14	10	2.98	3.00	0.02
5300	15	8	1	14	9	2.69	3.00	0.31
5320	15	8	1	14	9	2.93	3.00	0.07

PSD Limit = 11 dBm – (antenna gain – 6 dBi)

Note: antenna gain considered as a combination of the actual antenna gain with the cable.

Antenna Type	Antenna Gain, dBi	Antenna #	Antenna Info
Omni directional Rod	10	1	Maxrad, MHO515010NM
		2	MTI, MT-462008/N/A
90 degrees Sectional	15	3	Maxrad, Panel Antenna, WISP4959018MBV
Flat	23	4	Huber&Suhner, SPA 5600/9/23/0/V
	22.5	5	MTI, MT-485028/N
	19	6	MTI, MT-485001
Patch	10.5	7	BelAir, B1BB025AA-A01
	15	8	BelAir, BAM Antenna BEL10008-A0

PSD for 40 MHz channel:

Frequency (MHz)	G <sub>ANT</sub> (dBi)	Antenna number	Cable loss (dB)	G <sub>ANT+CABLE</sub> (dBi)	SW power setting	PSD Conducted (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
5280	10	1,2	1	9	36	7.90	8.00	0.10
5320	10	1,2	1	9	36	7.75	8.00	0.25
5280	15	3	1	14	24	2.63	3.00	0.37
5320	15	3	1	14	22	2.17	3.00	0.83
5280	19	6	1	18	10	-1.28	-1.00	0.28
5320	19	6	1	18	8	-1.98	-1.00	0.98
5280	22.5	5	1	21.5	0	-5.49	-4.50	0.99
5320	22.5	5	1	21.5	0	-8.77	-4.50	4.27
5280	23	4	1	22	0	-5.49	-5.00	0.49
5320	23	4	1	22	L20	-5.12	-5.00	0.12
5280	10.5	7	1	9.5	35	7.49	7.50	0.01
5320	10.5	7	1	9.5	35	7.26	7.50	0.24
5280	15	8	1	14	24	2.63	3.00	0.37
5320	15	8	1	14	22	2.52	3.00	0.48

PSD Limit = 11 dBm – (antenna gain – 6 dBi)

Note: antenna gain considered as a combination of the actual antenna gain with the cable.

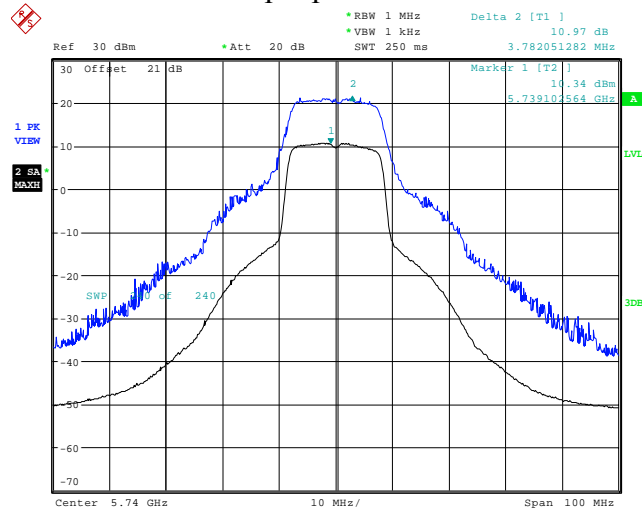
Antenna Type	Antenna Gain, dBi	Antenna #	Antenna Info
Omni directional Rod	10	1	Maxrad, MHO515010NM
		2	MTI, MT-462008/N/A
90 degrees Sectional	15	3	Maxrad, Panel Antenna, WISP4959018MBV
Flat	23	4	Huber&Suhner, SPA 5600/9/23/0/V
	22.5	5	MTI, MT-485028/N
	19	6	MTI, MT-485001
Patch	10.5	7	BelAir, B1BB025AA-A01
	15	8	BelAir, BAM Antenna BEL10008-A0

**Clause 15.407(a)(6) Peak Excursion**

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

**Test Method:** FCC Public Notice Ref: DA: 02-2138  
 Measurement Procedure for Peak Transmit Power in UNII Band

**Test Results:** Pass  
 Peak excursion sample plot:



Note: The plot is provided to show measurement settings and technique only; the plot does not necessary reflect actual measurement.

Peak Excursion for 20 MHz channel:

Freq. (MHz)	G <sub>ANT</sub> (dBi)	Antenna number	Cable loss (dB)	G <sub>ANT+CABLE</sub> (dBi)	SW Power Setting	Excursion (dB)	Limit (dB)	Margin (dB)
5280	10	1,2	1	9	25	9.92	13.00	3.08
5300	10	1,2	1	9	25	10.54	13.00	2.46
5320	10	1,2	1	9	26	10.13	13.00	2.87
5280	15	3	1	14	10	10.52	13.00	2.48
5300	15	3	1	14	9	10.27	13.00	2.73
5320	15	3	1	14	9	10.83	13.00	2.17
5280	19	6	1	18	0	10.87	13.00	2.13
5300	19	6	1	18	0	10.47	13.00	2.53
5320	19	6	1	18	0	10.13	13.00	2.87
5280	22.5	5	1	21.5	L5	10.36	13.00	2.64
5300	22.5	5	1	21.5	L5	10.34	13.00	2.66
5320	22.5	5	1	21.5	L5	10.38	13.00	2.62
5280	23	4	1	22	L3	10.34	13.00	2.66
5300	23	4	1	22	L3	10.12	13.00	2.88
5320	23	4	1	22	L3	10.04	13.00	2.96
5280	10.5	7	1	9.5	25	10.46	13.00	2.54
5300	10.5	7	1	9.5	23	10.45	13.00	2.55
5320	10.5	7	1	9.5	25	10.57	13.00	2.43
5280	15	8	1	14	10	10.52	13.00	2.48
5300	15	8	1	14	9	10.27	13.00	2.73
5320	15	8	1	14	9	10.83	13.00	2.17

Note: antenna gain considered as a combination of the actual antenna gain with the cable.

Antenna Type	Antenna Gain, dBi	Antenna #	Antenna Info
Omni directional Rod	10	1	Maxrad, MHO515010NM
		2	MTI, MT-462008/N/A
90 degrees Sectional	15	3	Maxrad, Panel Antenna, WISP4959018MBV
Flat	23	4	Huber&Suhner, SPA 5600/9/23/0/V
	22.5	5	MTI, MT-485028/N
	19	6	MTI, MT-485001
Patch	10.5	7	BelAir, B1BB025AA-A01
	15	8	BelAir, BAM Antenna BEL10008-A0



**Nemko Canada Inc.**

Report Number: 146343-1R1TRFWL

Specification: FCC Part 15 Subpart E

**Peak Excursion for 40 MHz channel:**

Freq. (MHz)	G <sub>ANT</sub> (dBi)	Antenna number	Cable loss (dB)	G <sub>ANT+CABLE</sub> (dBi)	SW Power Setting	Excursion (dB)	Limit (dB)	Margin (dB)
5280	10	1,2	1	9	25	9.92	13.00	3.08
5320	10	1,2	1	9	26	10.13	13.00	2.87
5280	15	3	1	14	10	10.52	13.00	2.48
5320	15	3	1	14	9	10.83	13.00	2.17
5280	19	6	1	18	0	10.87	13.00	2.13
5320	19	6	1	18	0	10.13	13.00	2.87
5280	22.5	5	1	21.5	L5	10.36	13.00	2.64
5320	22.5	5	1	21.5	L5	10.38	13.00	2.62
5280	23	4	1	22	L3	10.34	13.00	2.66
5320	23	4	1	22	L3	10.04	13.00	2.96
5280	10.5	7	1	9.5	25	10.46	13.00	2.54
5320	10.5	7	1	9.5	25	10.57	13.00	2.43
5280	15	8	1	14	10	10.52	13.00	2.48
5320	15	8	1	14	9	10.83	13.00	2.17

Note: antenna gain considered as a combination of the actual antenna gain with the cable.

Antenna Type	Antenna Gain, dBi	Antenna #	Antenna Info
Omni directional Rod	10	1	Maxrad, MHO515010NM
		2	MTI, MT-462008/N/A
90 degrees Sectional	15	3	Maxrad, Panel Antenna, WISP4959018MBV
Flat	23	4	Huber&Suhner, SPA 5600/9/23/0/V
	22.5	5	MTI, MT-485028/N
	19	6	MTI, MT-485001
Patch	10.5	7	BelAir, B1BB025AA-A01
	15	8	BelAir, BAM Antenna BEL10008-A0

---

**Clause 15.407(b)(2) Undesirable emission limits for transmitters in the 5.25–5.35 GHz band**

For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of  $-27$  dBm/MHz. Devices operating in the 5.25–5.35 GHz band that generate emissions in the 5.15–5.25 GHz band must meet all applicable technical requirements for operation in the 5.15–5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of  $-27$  dBm/MHz in the 5.15–5.25 GHz band.

**Test Results:** Pass

**Test Data:**

The spectrum was searched from 30 MHz to the 40 GHz

The test was performed conducted at the antenna port and radiated with antenna, one from each type that has a highest gain.

Conducted emissions measurements were performed using sample detector with RBW/VBW of 1 MHz/3 MHz. All emissions were measured using power averaging over 100 sweeps.

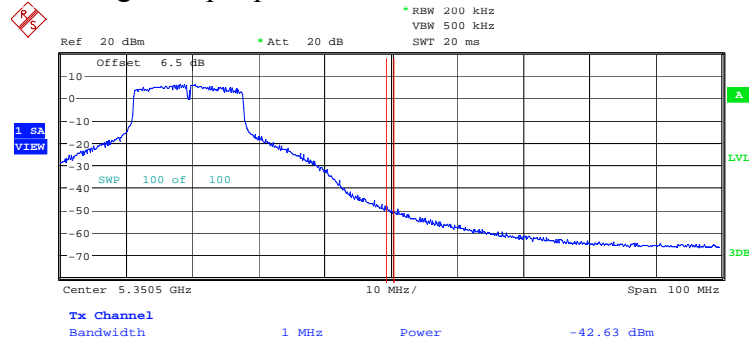
Radiated emissions measurements were performed using with RBW/VBW of 1 MHz/3 MHz at the distance of 3 m.

Only worst-case emissions (lowest margin) reported.

**Conducted emissions measurements:**

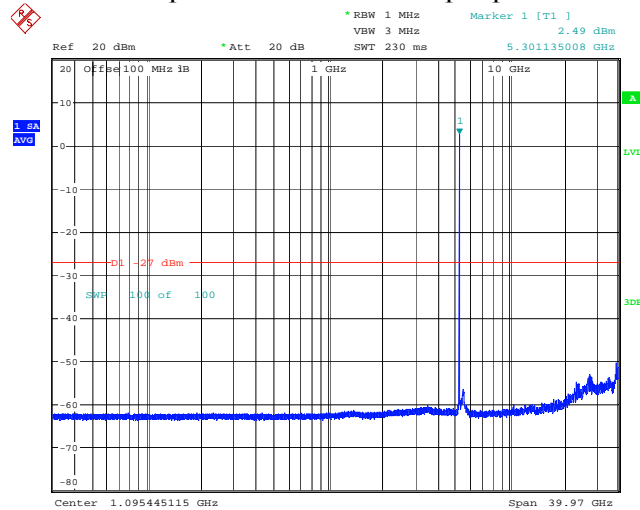
Except for band edges all other emissions were more than 20 dB below the limit.

**Band edge sample plot:**



Note: The plot is provided to show measurement settings and technique only; the plot does not necessary reflect actual measurement.

**Conducted spurious emission sample plot:**



Date: 14.AUG.2009 11:27:31

Note: The plot is provided to show measurement settings and technique only; the plot does not necessary reflect actual measurement.



Band edge test at the 5250 MHz  
20 MHz channel

Freq. (MHz)	G <sub>ANT</sub> (dBi)	Antenna number	Cable loss (dB)	G <sub>ANT+CABLE</sub> (dBi)	SW Power Setting	BE power (dBm/MHz)	BE EIRP (dBm/MHz)	BE limit (dBm/MHz)	Margin (dB)
5280	10	1, 2	1	9	39	-36.24	-27.24	-27.00	0.24
5280	10.5	7	1	9.5	38	-39.09	-29.59	-27.00	2.59
5280	15	3, 8	1	14	37	-41.99	-27.99	-27.00	0.99
5280	19	6	1	18	35	-45.67	-27.67	-27.00	0.67
5280	22.5	5	1	21.5	32	-48.99	-27.49	-27.00	0.49
5280	23	4	1	22	31	-49.87	-27.87	-27.00	0.87

Band edge test at the 5250 MHz  
40 MHz channel

Freq. (MHz)	G <sub>ANT</sub> (dBi)	Antenna number	Cable loss (dB)	G <sub>ANT+CABLE</sub> (dBi)	SW Power Setting	BE power (dBm/MHz)	BE EIRP (dBm/MHz)	BE limit (dBm/MHz)	Margin (dB)
5280	10	1, 2	1	9	26	-36.58	-27.58	-27.00	0.58
5280	10.5	7	1	9.5	26	-36.58	-27.08	-27.00	0.08
5280	15	3, 8	1	14	23	-41.25	-27.25	-27.00	0.25
5280	19	6	1	18	18	-45.02	-27.02	-27.00	0.02
5280	22.5	5	1	21.5	13	-48.55	-27.05	-27.00	0.05
5280	23	4	1	22	11	-49.38	-27.38	-27.00	0.38

Antenna Type	Antenna Gain, dBi	Antenna #	Antenna Info
Omni directional Rod	10	1	Maxrad, MHO515010NM
		2	MTI, MT-462008/N/A
90 degrees Sectional	15	3	Maxrad, Panel Antenna, WISP4959018MBV
Flat	23	4	Huber&Suhner, SPA 5600/9/23/0/V
		5	MTI, MT-485028/N
		6	MTI, MT-485001
Patch	10.5	7	BelAir, B1BB025AA-A01
		8	BelAir, BAM Antenna BEL10008-A0

Band edge test at the 5350 MHz  
 20 MHz channel

Freq. (MHz)	G <sub>ANT</sub> (dBi)	Antenna number	Cable loss (dB)	G <sub>ANT+CABLE</sub> (dBi)	SW Power Setting	BE power (dBm/MHz)	BE EIRP (dBm/MHz)	BE limit (dBm/MHz)	Margin (dB)
5320	10	1, 2	1	9	40	-37.78	-28.78	-27.00	1.78
5320	10.5	7	1	9.5	40	-37.78	-28.28	-27.00	1.28
5320	15	3, 8	1	14	37	-42.63	-28.63	-27.00	1.63
5320	19	6	1	18	35	-46.20	-28.20	-27.00	1.20
5320	22.5	5	1	21.5	32	-49.34	-27.84	-27.00	0.84
5320	23	4	1	22	32	-49.34	-27.34	-27.00	0.34

Band edge test at the 5350 MHz  
 40 MHz channel

Freq. (MHz)	G <sub>ANT</sub> (dBi)	Antenna number	Cable loss (dB)	G <sub>ANT+CABLE</sub> (dBi)	SW Power Setting	BE power (dBm/MHz)	BE EIRP (dBm/MHz)	BE limit (dBm/MHz)	Margin (dB)
5300	10	1, 2	1	9	37	-37.39	-28.39	-27.00	1.39
5300	10.5	7	1	9.5	37	-37.39	-27.89	-27.00	0.89
5300	15	3, 8	1	14	34	-41.90	-27.90	-27.00	0.90
5300	19	6	1	18	31	-46.03	-28.03	-27.00	1.03
5300	22.5	5	1	21.5	28	-49.43	-27.93	-27.00	0.93
5300	23	4	1	22	28	-49.43	-27.43	-27.00	0.43

Antenna Type	Antenna Gain, dBi	Antenna #	Antenna Info
Omni directional Rod	10	1	Maxrad, MHO515010NM
		2	MTI, MT-462008/N/A
90 degrees Sectional	15	3	Maxrad, Panel Antenna, WISP4959018MBV
Flat	23	4	Huber&Suhner, SPA 5600/9/23/0/V
		5	MTI, MT-485028/N
		6	MTI, MT-485001
Patch	10.5	7	BelAir, B1BB025AA-A01
		8	BelAir, BAM Antenna BEL10008-A0

**Radiated emissions measurements:**

Channel	Antenna gain (dBi)	Antenna number	Frequency (MHz)	Peak field strength (dB $\mu$ V/m)	Peak limit (dB $\mu$ V/m)	Peak margin (dB)	Average field strength (dB $\mu$ V/m)	Average limit (dB $\mu$ V/m)	Average margin (dB)
Low	23	4	10560	63.44	74.00	10.56	49.47	54.00	4.53
Mid	23	4	10600	64.72	74.00	9.28	50.84	54.00	3.16
High	23	4	10640	61.79	74.00	12.21	48.34	54.00	5.66
Low	10	1	10560	64.12	74.00	9.88	48.20	54.00	5.80
Mid	10	1	10600	67.45	74.00	6.55	51.79	54.00	2.21
High	10	1	10640	65.18	74.00	8.82	50.54	54.00	3.46
Low	15	3	10560	67.82	74.00	6.18	53.43	54.00	0.57
Mid	15	3	10600	67.37	74.00	6.63	52.09	54.00	1.91
High	15	3	10640	67.00	74.00	7.00	52.30	54.00	1.70
Low	15	8	10560	66.13	74.00	7.87	51.61	54.00	2.39
Mid	15	8	10600	63.79	74.00	10.21	48.62	54.00	5.38
High	15	8	10640	58.64	74.00	15.36	45.00	54.00	9.00

Channel	Antenna gain (dBi)	Antenna number	Frequency (MHz)	Field strength (dB $\mu$ V/m)	Substitution factor (dB)	EIRP (dBm/MHz)	EIRP limit (dBm/MHz)	Margin (dB)
Low	23	4	10560	63.44	95.62	-32.18	-27.00	5.18
Mid	23	4	10600	64.72	95.49	-30.77	-27.00	3.77
High	23	4	10640	61.79	95.23	-33.44	-27.00	6.44
Low	10	1	10560	64.12	95.62	-31.50	-27.00	4.50
Mid	10	1	10600	67.45	95.49	-28.04	-27.00	1.04
High	10	1	10640	65.18	95.23	-30.05	-27.00	3.05
Low	15	3	10560	67.82	95.62	-27.80	-27.00	0.80
Mid	15	3	10600	67.37	95.49	-28.12	-27.00	1.12
High	15	3	10640	67.00	95.23	-28.23	-27.00	1.23
Low	15	8	10560	66.13	95.62	-29.49	-27.00	2.49
Mid	15	8	10600	63.79	95.49	-31.70	-27.00	4.70
High	15	8	10640	58.64	95.23	-36.59	-27.00	9.59

Antenna Type	Antenna Gain, dBi	Antenna #	Antenna Info
Omni directional Rod	10	1	Maxrad, MHO515010NM
		2	MTI, MT-462008/N/A
90 degrees Sectional	15	3	Maxrad, Panel Antenna, WISP4959018MBV
Flat	23	4	Huber&Suhner, SPA 5600/9/23/0/V
	22.5	5	MTI, MT-485028/N
	19	6	MTI, MT-485001
Patch	10.5	7	BelAir, B1BB025AA-A01
	15	8	BelAir, BAM Antenna BEL10008-A0



**Nemko Canada Inc.**

Report Number: 146343-1R1TRFWL

Specification: FCC Part 15 Subpart E

---

**Clause 15.407(g) Frequency stability**

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

**Test Results:** Pass

**Test Data:**

The frequency stability test was performed in the  $-30$  to  $+50$  °C temperature range at 5.25–5.35 GHz frequency range. The input voltage was varied  $\pm 15$  % at the room temperature.

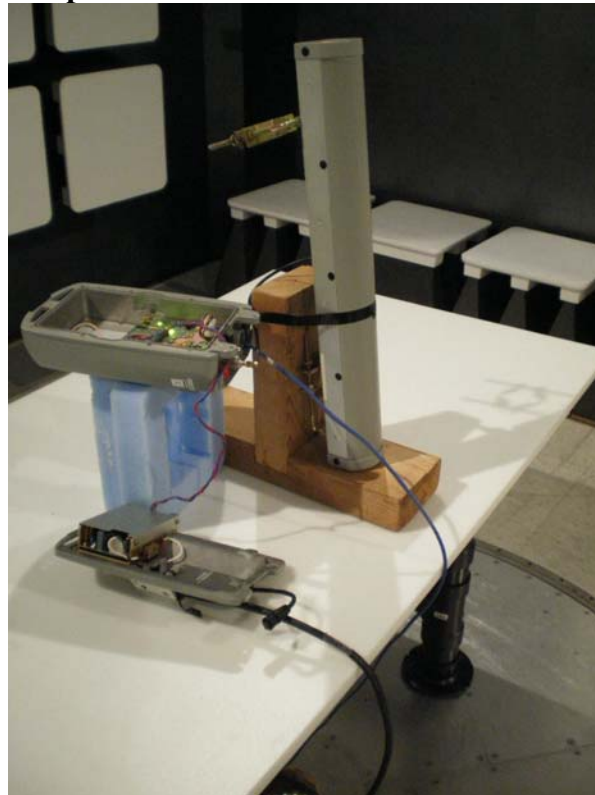
Maximum frequency drift was 117 kHz

## Appendix B : Setup Photographs

### Conducted Emissions Setup:

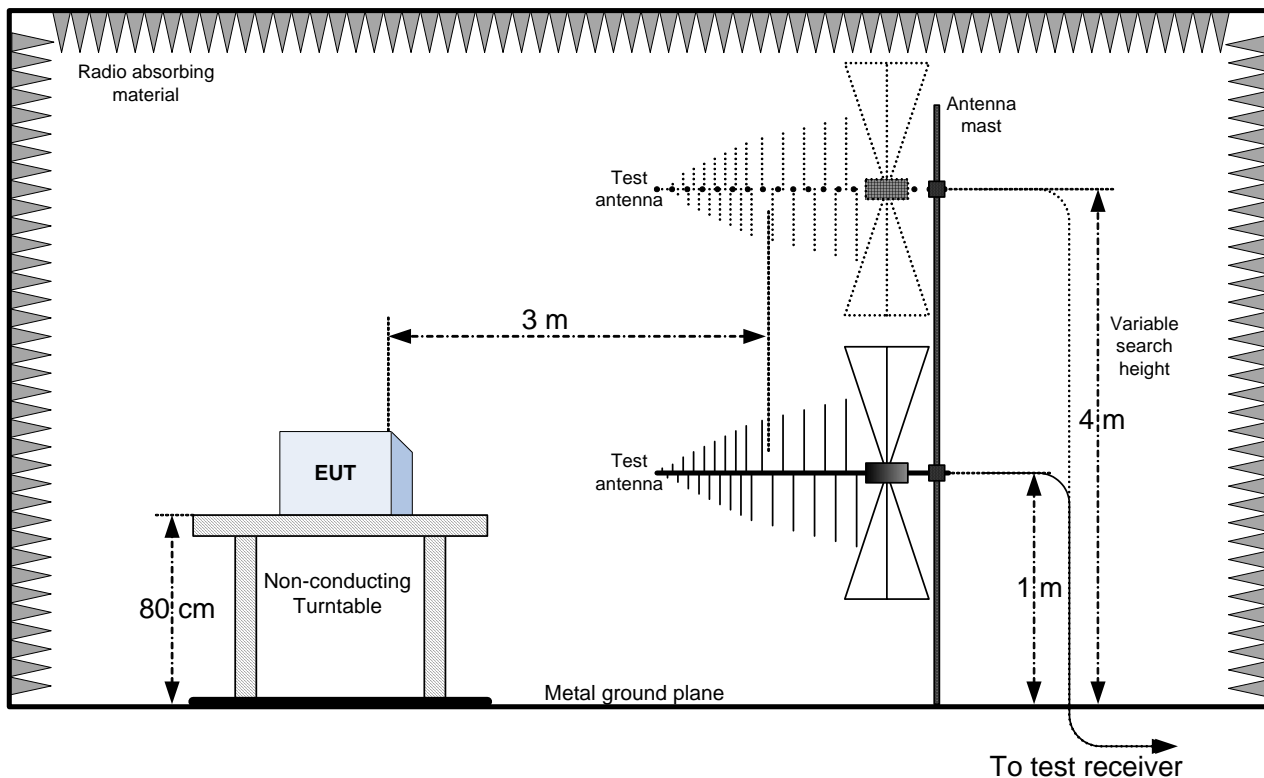


### Spurious Emissions Setup:



## Appendix C : Block Diagram of Test Setups

### Radiated Emissions above 30 MHz Test Site



### AC Power Line Conducted Emissions

