Lab Code: 200167-0

FCC PART 15.247

INDUSTRY CANADA RSS-210, ISSUE 7, JUNE 2007

MEASUREMENT AND TEST REPORT

For

Renaissance Learning, Inc.

2911 Peach Street
Wisconsin Rapids, Wisconsin 54494, USA

FCC ID: TJA-NEO2
IC ID: 6077A-NEO2
Model: NEO 2

Report Type: ☒ Original Report	**Product Type:** Portable Computing Device
Test Engineer(s):	James Ma
Report Number:	R0707231
Report Date:	2007-08-03
Reviewed By:	Hans Mellberg, VP of Engineering
Prepared By: (24)	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Ave. Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732-9164

TABLE OF CONTENTS

1 GENERAL INFORMATION 4
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 4
1.2 MECHANICAL DESCRIPTION OF EUT 4
1.3 ANTENNA DESCRIPTION 4
1.4 EUT PHOTO 5
1.5 OBJECTIVE 5
1.6 RELATED SUBMITTAL(S)/GRANT(S) 5
1.7 TEST METHODOLOGY 6
1.8 MEASUREMENT UNCERTAINTY 6
1.9 TEST FACILITY 6
2 SYSTEM TEST CONFIGURATION 7
2.1 JUSTIFICATION 7
2.2 EUT EXERCISE SOFTWARE 7
2.3 SPECIAL ACCESSORIES 7
2.4 EQUIPMENT MODIFICATIONS 7
2.5 LOCAL SUPPORT EQUIPMENT LIST AND DETAILS 7
2.6 TEST SETUP BLOCK DIAGRAMS 8
3 SUMMARY OF TEST RESULTS 10
4 FCC §15.247 (i) and §2.1091, IC RSS-Gen 5.5 & RSS-102 - RF EXPOSURE 11
4.1 APPLICABLE STANDARD 11
4.2 MPE PREDICTION 11
4.3 TEST RESULT 11
4.4 RESULT 12
5 FCC §15.203, IC RSS-Gen §7.1.4 – ANTENNA REQUIREMENT 13
5.1 APPLICABLE STANDARD 13
5.2 RESULT 13
6 FCC §15.207, IC RSS-Gen §7.2.2 - CONDUCTED EMISSIONS 14
6.1 SECTION 15.207 & RSS-GEN 7.2.2 CONDUCTED LIMITS: 14
6.2 TEST SETUP 14
6.3 TEST EQUIPMENT LIST AND DETAILS 14
6.4 TEST PROCEDURE 15
6.5 ENVIRONMENTAL CONDITIONS 15
6.6 SUMMARY OF TEST RESULTS 15
7 FCC §2.1051 & §15.247(d), RSS-210 § A8.5 & RSS-Gen 7.2 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS 18
7.1 APPLICABLE STANDARD 18
7.2 MEASUREMENT PROCEDURE 18
7.3 EQUIPMENT LIST 18
7.4 ENVIRONMENTAL CONDITIONS 18
7.5 MEASUREMENT RESULT: 18
8 FCC §15.109, §15.205, §15.209 & §15.247(c), IC RSS-Gen §4.9 - SPURIOUS RADIATED EMISSIONS 25
8.1 APPLICABLE STANDARD 25
8.2 TEST SETUP 26
8.3 EUT SETUP 26
8.4 TEST EQUIPMENT LIST AND DETAILS 26
8.5 TEST PROCEDURE 27
8.6 CORRECTED AMPLITUDE & MARGIN CALCULATION 27
8.7 ENVIRONMENTAL CONDITIONS 28
8.8 SUMMARY OF TEST RESULTS 28
8.9 RADIATED EMISSIONS TEST PLOT & DATA: 29
8.10 RADIATED SPURIOUS EMISSIONS TEST DATA 30
9 FCC §15.247(a) (2), RSS-210 § A8.2 (a) – 6 dB BANDWIDTH & OCCUPIED BANDWIDTH 36

9.1 APPLICABLE STANDARD 36
9.2 MEASUREMENT PROCEDURE 36
9.3 EQUIPMENT LIST 36
9.4 ENVIRONMENTAL CONDITIONS 37
9.5 SUMMARY OF TEST RESULTS 37
10 FCC §15.247(b), RSS210 § A8.4 - PEAK OUTPUT POWER MEASUREMENT 39
10.1 APPLICABLE STANDARD 39
10.2 MEASUREMENT PROCEDURE 39
10.3 EQUIPMENT LIST 39
10.4 ENVIRONMENTAL CONDITIONS 39
10.5 SUMMARY OF TEST RESULTS 39
11 FCC §15.247(d), RSS-210 § A8.5 - 100 kHz BANDWIDTH OF BAND EDGES 42
11.1 APPLICABLE STANDARD 42
11.2 MEASUREMENT PROCEDURE 42
11.3 EQUIPMENT LIST 42
11.4 ENVIRONMENTAL CONDITIONS 42
12 FCC §15.247(e), RSS-210 § A8.2 (b) - POWER SPECTRAL DENSITY 44
12.1 APPLICABLE STANDARD 44
12.2 MEASUREMENT PROCEDURE 44
12.3 EQUIPMENT LIST 44
12.4 ENVIRONMENTAL CONDITIONS 44
12.5 SUMMARY OF TEST RESULTS 44
13 EXHIBIT A – FCC & IC EQUIPMENT LABELING REQUIREMENTS 47
13.1 FCC § 2.925 IDENTIFICATION OF EQUIPMENT 47
13.2 FCC ID LABELING REQUIREMENTS AS PER FCC § 15.19 47
13.3 SPECIFICATIONS: AS PER RSS GEN 5.2 EQUIPMENT LABELING: 48
13.4 SUGGESTED FCC ID & IC LABEL 48
13.5 SUGGESTED LABEL LOCATION 48
14 EXHIBIT B - TEST SETUP PHOTOGRAPHS 49
14.1 CONDUCTED EMISSIONS –FRONT VIEW 49
14.2 CONDUCTED EMISSIONS – SIDE VIEW 49
14.3 RECEIVER RADIATED EMISSIONS – FRONT VIEW 50
14.4 RECEIVER RADIATED EMISSIONS – REAR VIEW 50
14.5 TRANSMITTER RADIATED SPURIOUS EMISSIONS – FRONT VIEW 51
14.6 TRANSMITTER RADIATED SPURIOUS EMISSIONS – REAR VIEW 51
15 EXHIBIT C - EUT PHOTOGRAPHS 52
15.1 EUT FRONT SIDE VIEW 52
15.2 EUT BACK SIDE VIEW 52
15.3 EUT PORT SIDE VIEW 53
15.4 EUT COVER OFF VIEW 53
15.5 EUT COVER OFF CLOSE UP VIEW 54
15.6 EUT PCB FRONT VIEW 54
15.7 EUT PCB BACK VIEW 55
15.8 RF & CONTROL PCB FRONT VIEW 55
15.9 RF & CONTROL PCB BACK VIEW 56
15.10 LCD PCB FRONT VIEW 56
15.11 LCD PCB BACK VIEW 57
15.12 AC/DC ADAPTOR FRONT VIEW 57

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Renaissance Learning, Inc.* product, *FCC ID:TJA-NEO2, IC: 6077A-NEO2, model: NEO 2* or the "EUT" as referred to this report is an 802.15.4 Handheld Computing Device, it is designed to be a simple data entry device for young students, the EUT can not connect to the internet, but can connect to a network printer. The EUT is compatible with Macintosh and Windows-based computers, and is capable of running learning software. The EUT operates in the 802.15.4 band, and has a frequency range of 2.405 GHz ~ 2.480 GHz. The EUT offers 4 MB of software storage, 512 KB of data storage, and is powered by both three "AA" size batteries and the included AC/DC adapter.

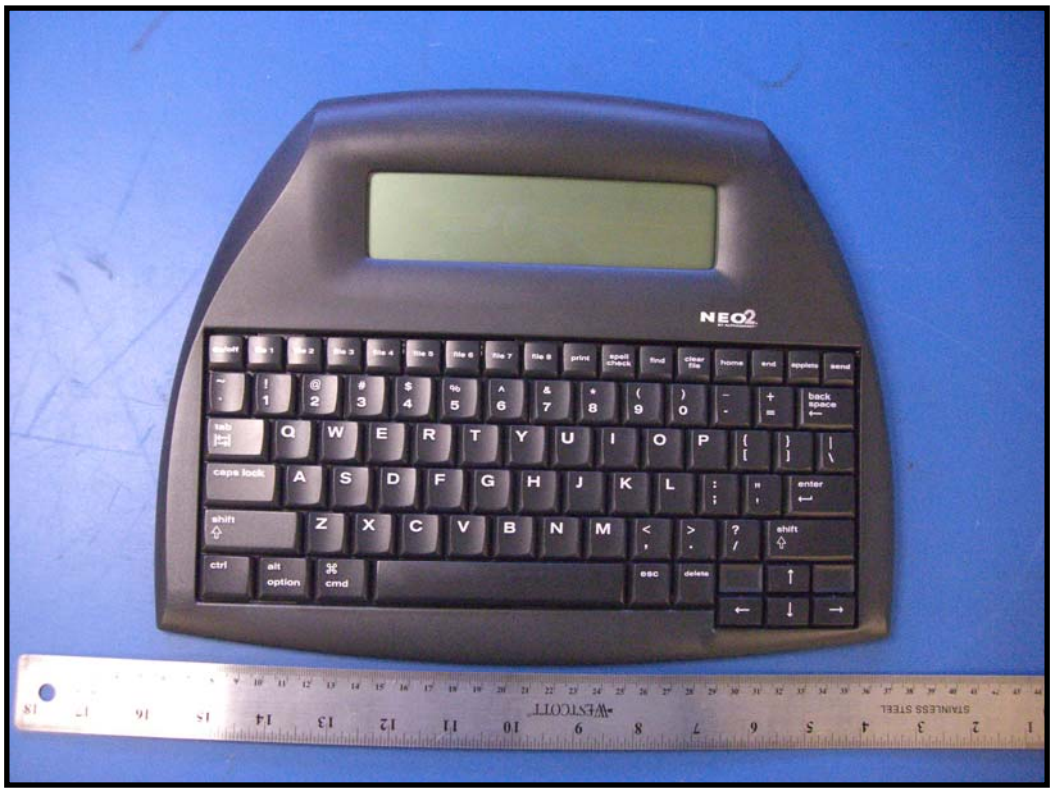
1.2 Mechanical Description of EUT

The *Renaissance Learning, Inc.* product, *FCC ID: TJA-NEO2, IC: 6077A-NEO2, model: NEO 2, is* of plastic construction and measure approximately 305 mm **(L)** x 229 mm **(W)** x 26 mm **(H)**, weighing approximately 817 *g*.

1.3 Antenna Description

Item Number	Model/Type	
Antenna	Model number:	CC2430DB
	Manufacturer:	Chipcon
	Frequency Range:	2.4 GHz (ISM Band)
	Connector Type/ Maximum Gain	Solder/ 3.3 dBi
	Antenna Type/ Pattern:	PCB, integral/omni-directional
	Measurement:	Length: 26 mm (D) x 8 mm (L); Weight: 20g

1.4 EUT Photo



Please refer to Exhibit C for addition EUT photographs.

1.5 Objective

This report is prepared on behalf of *Renaissance Learning, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules and Industry Canada RSS-210 Issue 7, June 2007.

The objective is to determine compliance with FCC and IC standards, rules and limits for this device including:

- RF Exposure
- Antenna Requirement
- Conducted Emissions
- Spurious Emissions at Antenna Port
- Radiated Spurious Emissions
- Restricted Band
- Receiver Spurious Emissions
- 6 dB Bandwidth & 99% Bandwidth
- Maximum Peak Output Power
- 100 kHz Bandwidth of Frequency Band Edge
- Power Spectral Density

1.6 Related Submittal(s)/Grant(s)

No related submittals.

1.7 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.8 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values range from ±2.0 for Conducted Emissions tests and ±4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.9 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The host system was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the testing mode to represent *worst*-case results during the final qualification test.

2.2 EUT Exercise Software

The EUT is programmed with the following data rate settings that were used during testing:

Channel	Low CH	Middle CH	High CH
Frequency (MHz)	2405	2440	2480

The Software to exercise the unit was provided by the client (SmartRF Studio software).

2.3 Special Accessories

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

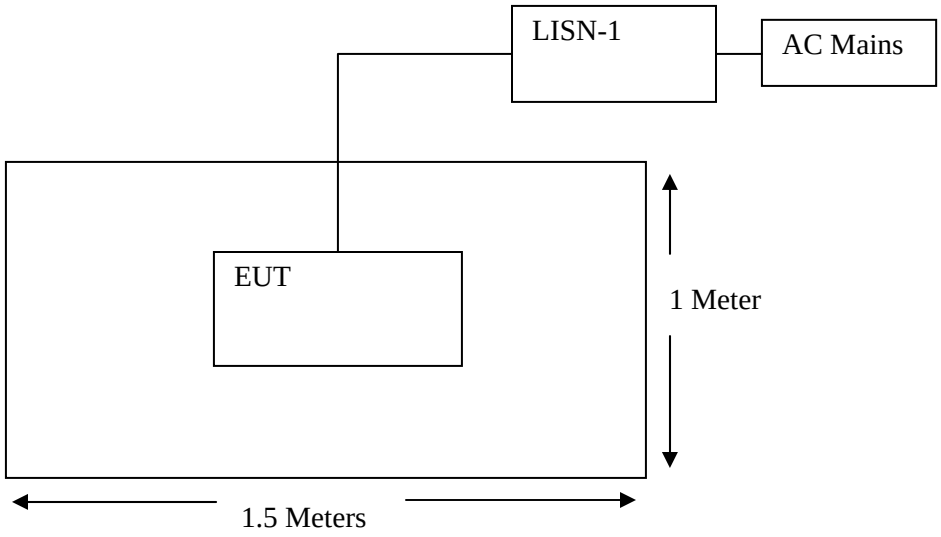
No modifications were made to the EUT.

2.5 Local Support Equipment List and Details

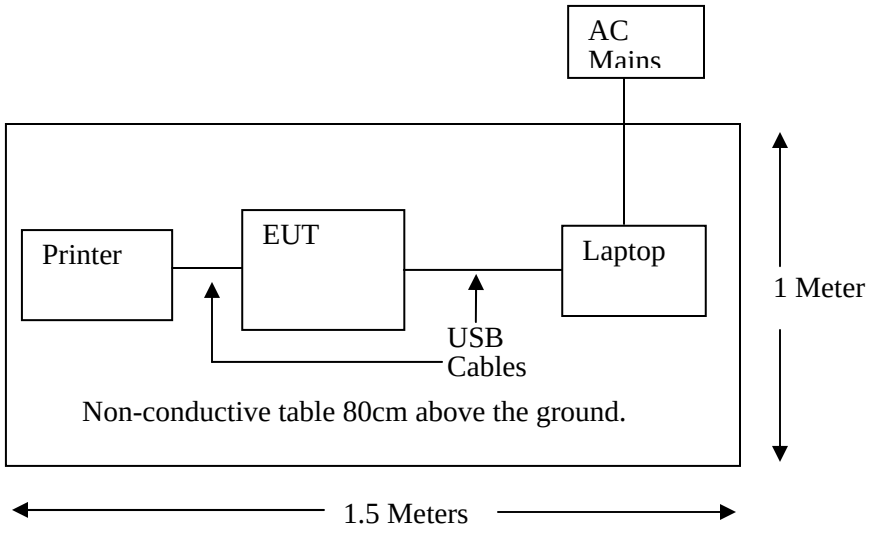
Manufacturer	Description	Model	Serial Number
Dell	Laptop	Inspiron 1300	CN0RJ272-70166-69A-03TC

2.6 Test Setup Block Diagrams

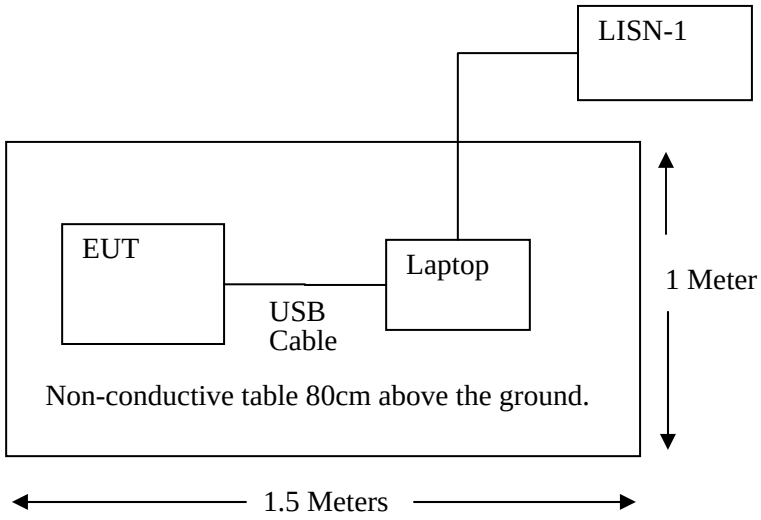
Conducted Emissions



Receiver Radiated Emissions



Transmitter Radiated Emission



3 SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

FCC & RSS-210 Rules	Description of Test	Result	Note
FCC §15.247 (i) and §2.1091, IC RSS-Gen 5.5 & RSS-102	RF Exposure	Compliant	-
FCC §15.203, IC RSS-Gen §7.1.4	Antenna Requirement	Compliant	-
FCC §15.207, IC RSS-Gen §7.2.2	Conducted Emissions	Compliant	-
FCC §2.1051 & §15.247(d), RSS210 § A8.5 § RSS-Gen §7.2	Spurious Emissions at Antenna Port	Compliant	-
FCC §15.109, §15.205, §15.209 & §15.247(c), IC RSS-Gen §4.9	Radiated Spurious Emissions	Compliant	-
FCC §15.205, RSS 2.6	Restricted Band	Compliant	-
§15.109, 15.209 (a) & §15.247(d), RSS-Gen §6(a)	Receiver Spurious Emissions	Compliant	-
§15.247 (a)(2), RSS-210 §A8.2 (a)	6 dB Bandwidth & 99% Bandwidth	Compliant	-
§15.247 (b)(3), RSS210 § A8.4	Maximum Peak Output Power	Compliant	-
§ 15.247 (d), RSS210 § A8.5	100 kHz Bandwidth of Frequency Band Edge	Compliant	-
§15.247 (e), RSS-210 §A8.2 (b)	Power Spectral Density	Compliant	-

4 FCC §15.247 (i) and §2.1091, IC RSS-Gen 5.5 & RSS-102 - RF EXPOSURE

4.1 Applicable Standard

According to §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

4.2 MPE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal (dBm):	0.16
Maximum peak output power at antenna input terminal (mW):	1.04
Prediction distance (cm):	20
Prediction frequency (MHz):	2440
Maximum Antenna Gain, typical (dBi):	3.3
Maximum Antenna Gain (numeric):	2.138
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.000442
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

4.3 Test Result

The power density level at 20 cm is 0.000442 mW/cm^2, which is below the uncontrolled exposure limit of 1.0mW/cm^2 at 2440 MHz.

According to RSS-102 Issue 2, November 2005 §2.5.2 exception from Routine Evaluation Limits- RF Exposure Evaluation:

RF exposure evaluation is required if the separation distance between the user and the device is greater than 20 cm, except when the device operates:

1) below 1.5 GHz and its e.i.r.p. is equal to or less than 2.5 W;
2) at or above 1.5 GHz and the e.i.r.p. of the device is equal to or less than 5 W.

RF limits for device used by the general public is provided hereinafter table:

Frequency Range (MHz)	Electric Field (V/M rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Time Averaging (min)
0.003 – 1	280	2.19	-	6
1 – 10	280 / f	2.19 / f	-	6
10 – 30	28	2.19 / f	-	6
30 – 300	28	0.073	2*	6
300 - 1500	$1.585\ f^{0.5}$	$0.0042\ f^{0.5}$	f / 150	6
1500 – 15 000	61.4	0.163	10	6
15 000 – 150 000	61.4	0.163	10	$616000 / f^{1.2}$
150 000 – 300 000	$f^{0.5}$	$4.21 \times 10^{-4}\ f^{0.5}$	$6.67 \times 10^{-5}\ f$	$616000 / f^{1.2}$

Note: f is the frequency in MHz
* Power density limit applicable at frequency greater than 100 MHz.

4.4 Result

The power of this device is 0.16 dBm (1.04 mW) and the antenna gain used for evaluation was 3.3 dBi (representing the worst case), according to RSS-102 section 2.5.2, this device exempt the RF exposure evaluation is.

5 FCC §15.203, IC RSS-Gen §7.1.4 – ANTENNA REQUIREMENT

5.1 Applicable Standard

According to FCC §15.203, 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.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

As per IC RSS-Gen §7.1.4: Transmitter Antenna, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

5.2 Result

The Antenna is an integral antenna with a gain of: 3.3 dBi.

☒ **Compliant** ☐ **N/A**

6 FCC §15.207, IC RSS-Gen §7.2.2 - CONDUCTED EMISSIONS

6.1 Section 15.207 & RSS-Gen 7.2.2 Conducted limits:

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 µH/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 frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	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.*

6.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4 – 2003 measurement procedure. The specification used was FCC Class B limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was powered via connection to AC/DC adapter which was plugged into the LISN.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Solar Electronics	LISN	9252-R-24-BNC	511205	2007-07-07
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.595 0K03	100338	2007-04-05

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

6.4 Test Procedure

During the conducted emissions test, the power cord of the system was connected to the main outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a "QP". Average readings are distinguished with an "Ave".

6.5 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

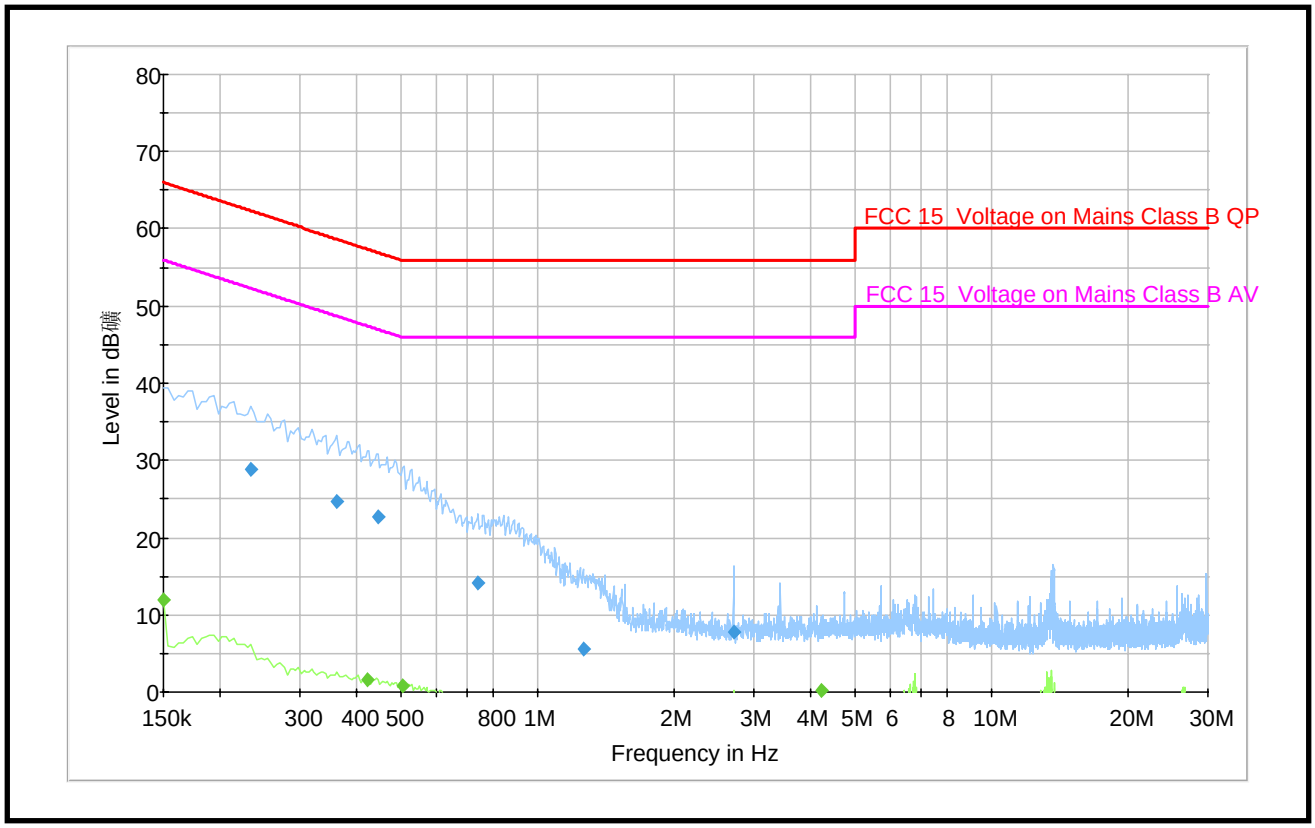
**The testing was performed by James Ma from 2007-07-26.*

6.6 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC & IC standard's conducted emissions limits for Class B devices, with the *worst* margin reading of:

Connection: AC/DC Adapter			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Hot/Neutral)**	**Range (MHz)**
-33.4	0.206000	Neutral	0.150 MHz to 30 MHz

120V/60 Hz Hot:



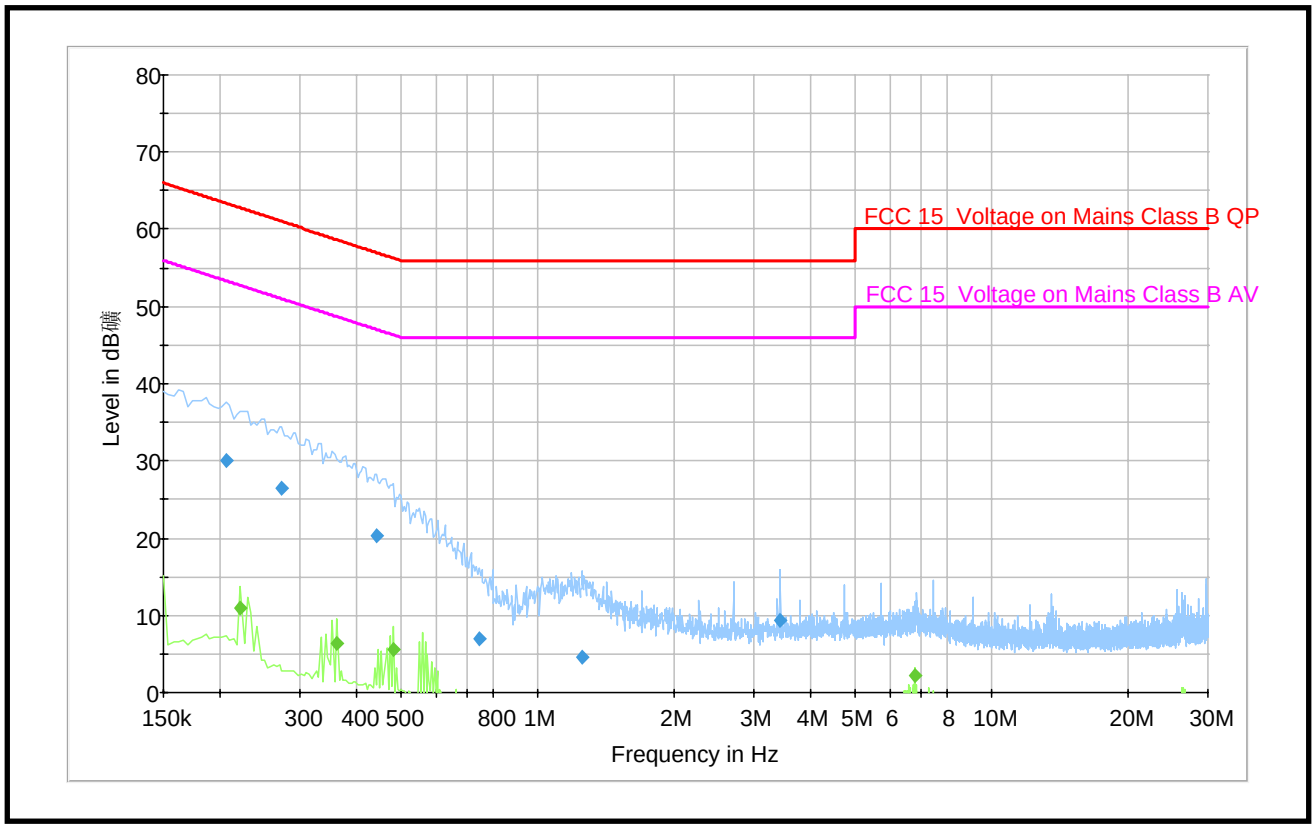
Final Measurement Quasi-Peak Detector

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
0.234000	28.8	H	62.3	-33.5
0.362000	24.7	H	58.7	-34.0
0.446000	22.7	H	56.9	-34.3
0.742000	14.2	H	56.0	-41.8
2.710000	7.8	H	56.0	-48.2
1.262000	5.6	H	56.0	-50.4

Final Measurement Average Detector

Frequency (MHz)	Average (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
0.150000	12.0	H	56.0	-44.0
0.506000	0.9	H	46.0	-45.1
0.422000	1.5	H	47.4	-45.9
4.218000	0.1	H	46.0	-45.9
2.706000	-0.3	H	46.0	-46.3
0.842000	-0.6	H	46.0	-46.6

120V/60 Hz Neutral:



Final Measurement Quasi-Peak Detector

Frequency (MHz)	Quasi-Peak (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
0.206000	30.0	N	63.4	-33.4
0.274000	26.5	N	61.0	-34.5
0.442000	20.3	N	57.0	-36.7
3.430000	9.4	N	56.0	-46.6
0.746000	6.9	N	56.0	-49.1
1.254000	4.7	N	56.0	-51.3

Final Measurement Average Detector

Frequency (MHz)	Average (dBµV)	Conductor (Hot/Neutral)	Limit (dBµV)	Margin (dB)
0.482000	5.6	N	46.3	-40.7
0.222000	10.9	N	52.7	-41.8
0.362000	6.3	N	48.7	-42.4
4.218000	-0.2	N	46.0	-46.2
2.702000	-0.9	N	46.0	-46.9
6.786000	2.1	N	50.0	-47.9

7 FCC §2.1051 & §15.247(d), RSS-210 § A8.5 & RSS-Gen 7.2 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

7.1 Applicable Standard

For §15.247(d) and RSS-210 § A8.5 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.

Requirements: CFR 47, §2.1051.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in §2.1057.

7.2 Measurement Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10^{th} harmonic.

7.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

7.4 Environmental Conditions

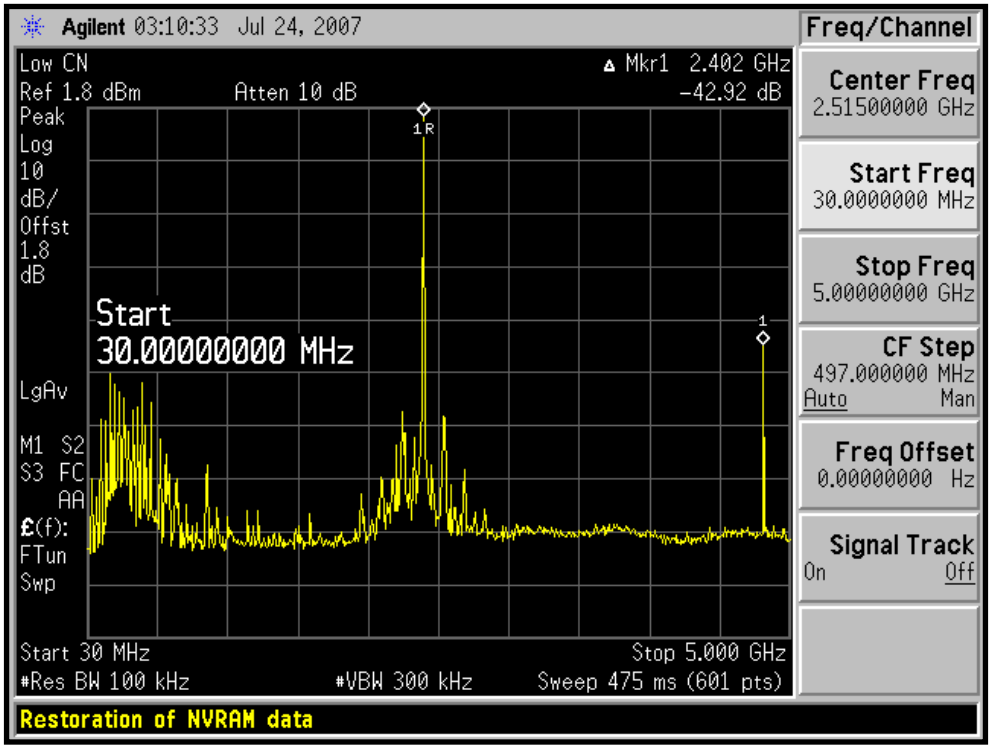
Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

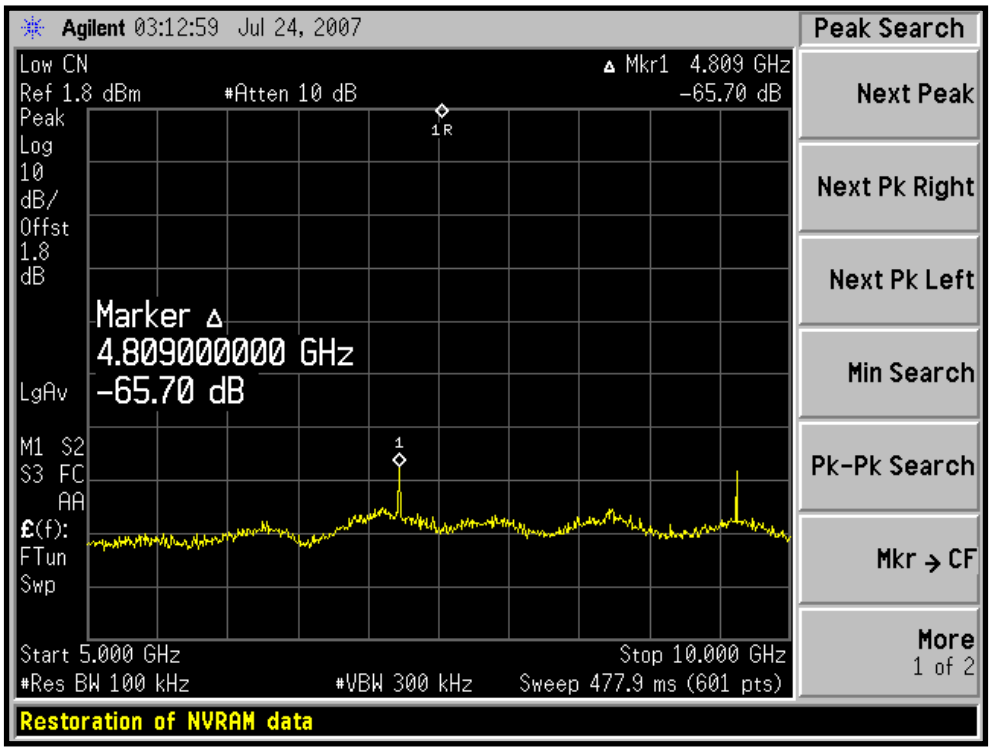
**The testing was performed by James Ma from 2007-07-26.*

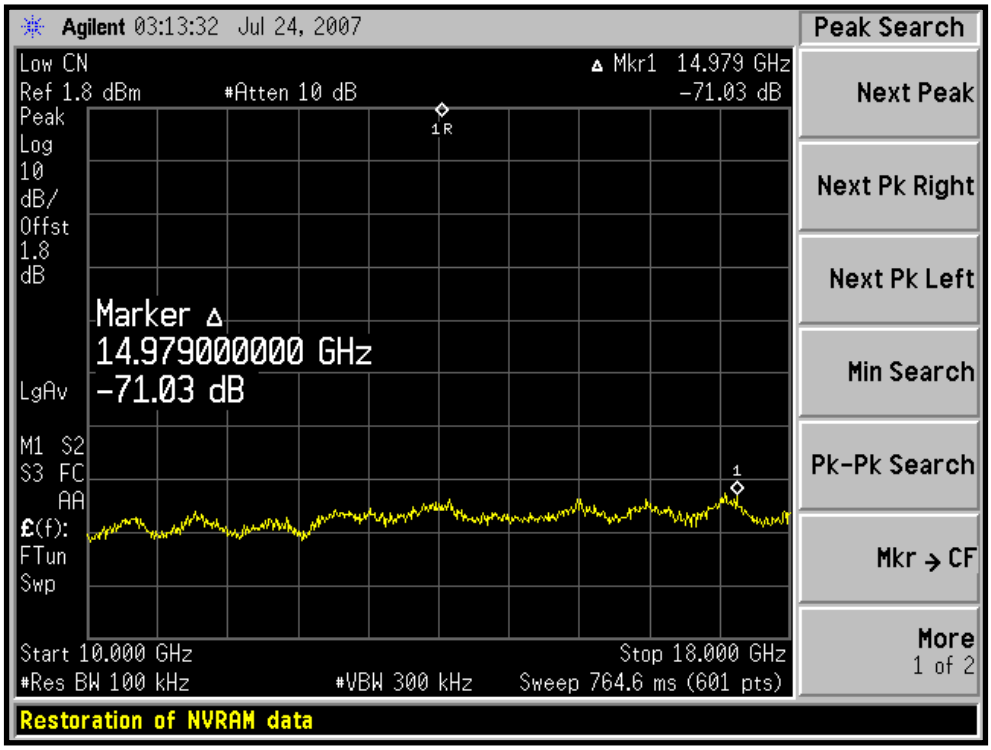
7.5 Measurement Result:

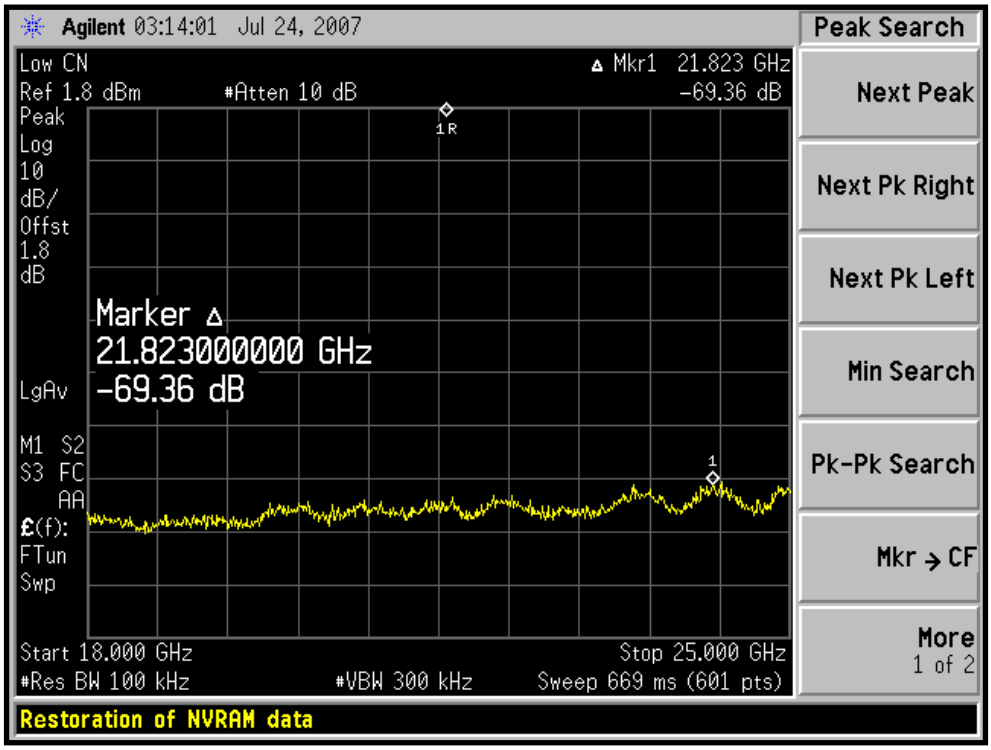
Please refer to following pages for plots of spurious emissions.

Low Channel

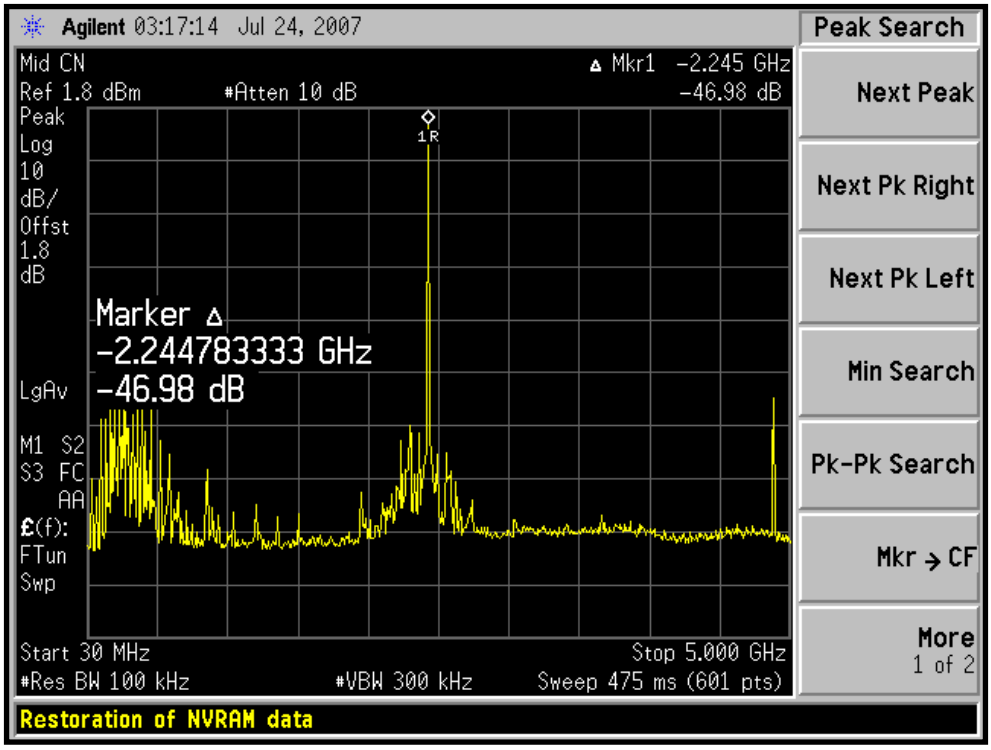

Agilent 03:10:33 Jul 24, 2007
Freq/Channel
Low CN
Ref 1.8 dBm
Atten 10 dB
Mkr1 2.402 GHz
-42.92 dB
Peak
Log
10
dB/
Offst
1.8
dB
Start
30.00000000 MHz
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 5.000 GHz
Sweep 475 ms (601 pts)
Center Freq
2.51500000 GHz
Start Freq
30.0000000 MHz
Stop Freq
5.00000000 GHz
CF Step
497.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Restoration of NVRAM data

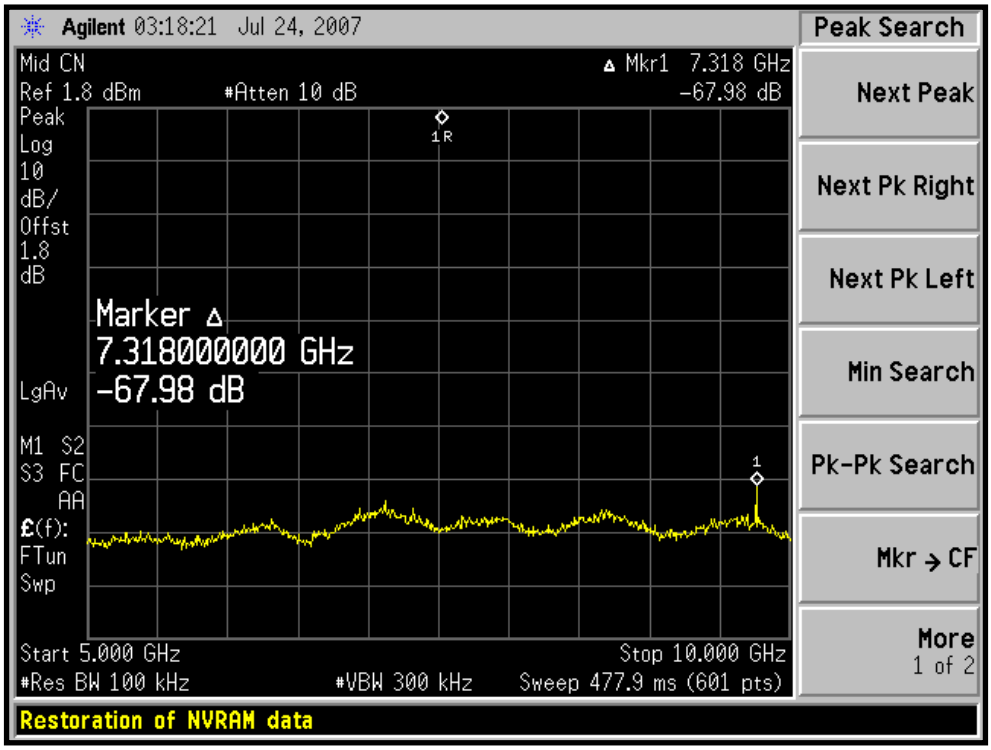

Agilent 03:12:59 Jul 24, 2007
Peak Search
Low CN
Ref 1.8 dBm
#Atten 10 dB
Mkr1 4.809 GHz
-65.70 dB
Peak
Log
10
dB/
Offst
1.8
dB
Marker Δ
4.809000000 GHz
-65.70 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 5.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 10.000 GHz
Sweep 477.9 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Restoration of NVRAM data

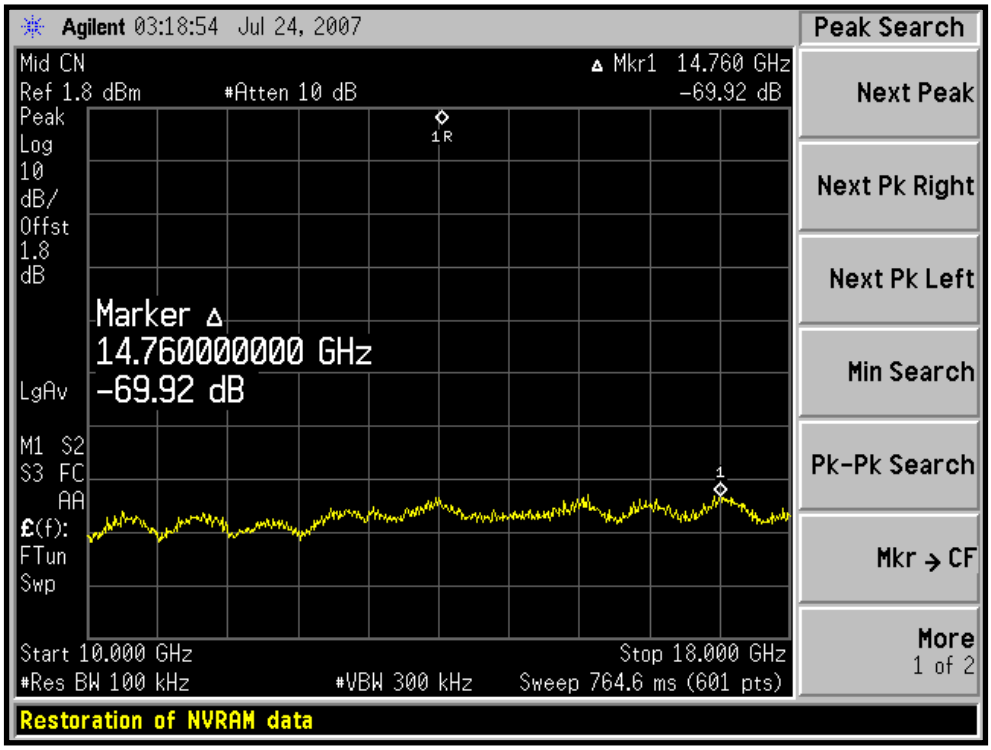

Agilent 03:13:32 Jul 24, 2007
Peak Search
Low CN
Ref 1.8 dBm
#Atten 10 dB
Mkr1 14.979 GHz
-71.03 dB
Peak
Log
10
dB/
Offst
1.8
dB
1R
Marker Δ
14.979000000 GHz
-71.03 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
1
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 10.000 GHz
Stop 18.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 764.6 ms (601 pts)
Restoration of NVRAM data

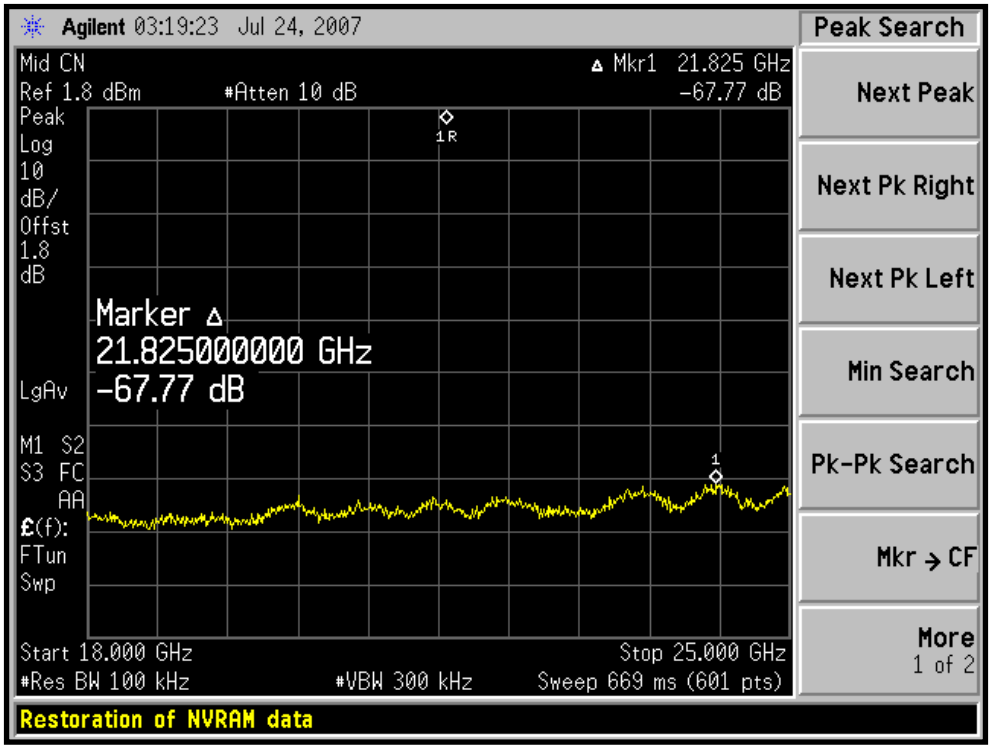

Agilent 03:14:01 Jul 24, 2007
Peak Search
Low CN
Ref 1.8 dBm
#Atten 10 dB
Mkr1 21.823 GHz
-69.36 dB
Peak
Log
10
dB/
Offst
1.8
dB
1R
Marker Δ
21.823000000 GHz
-69.36 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
1
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 18.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 669 ms (601 pts)
Restoration of NVRAM data

Middle Channel

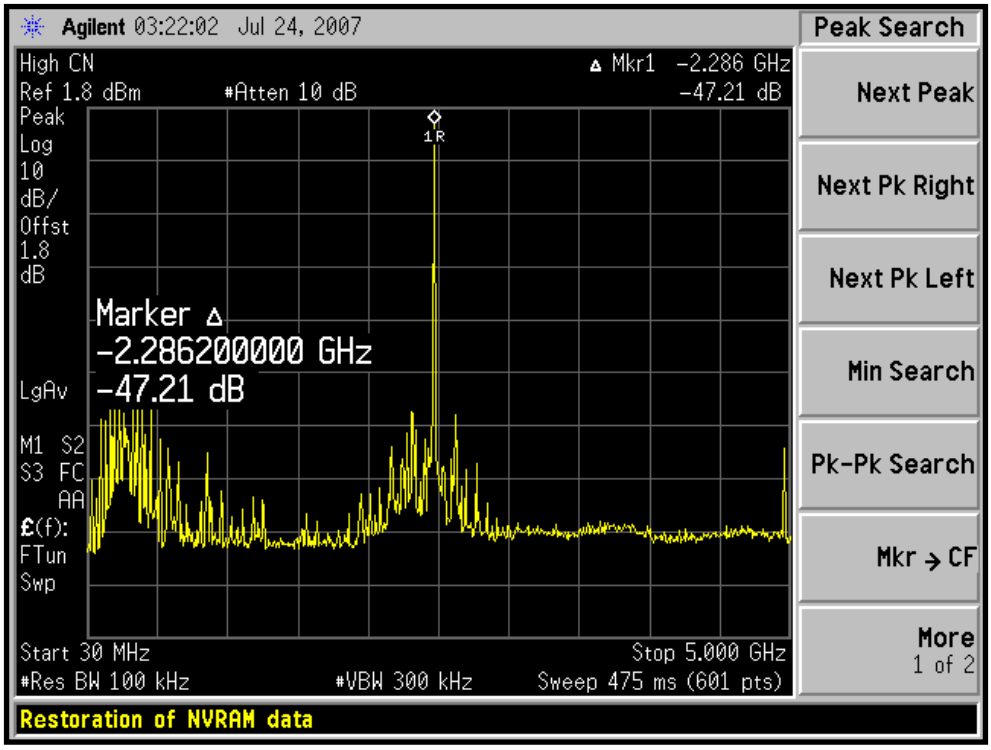


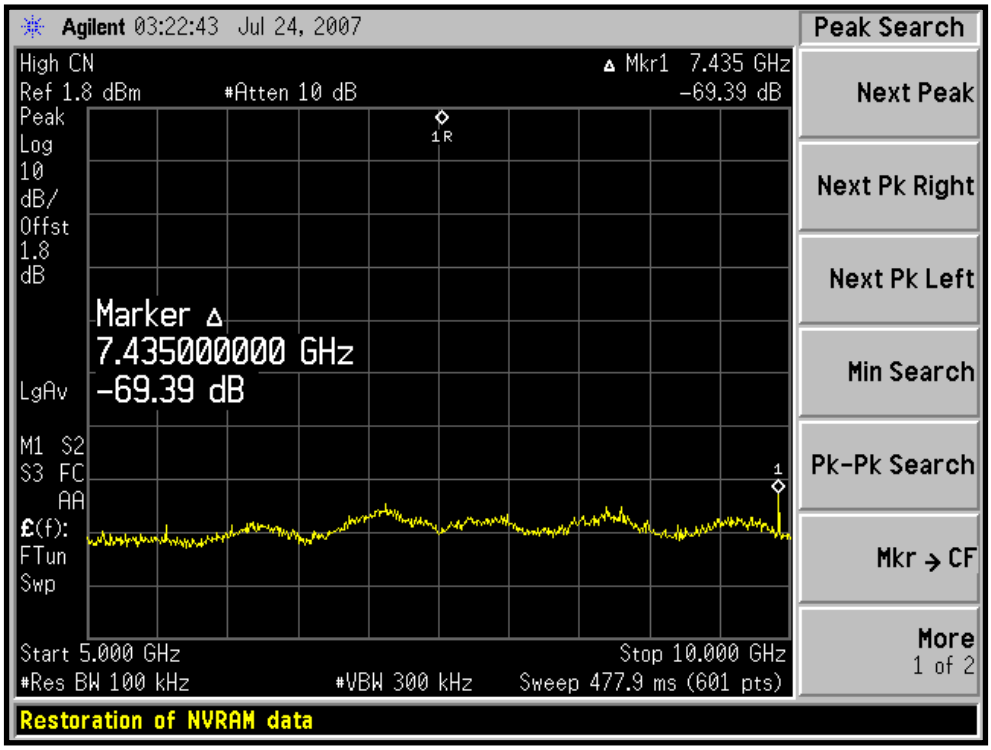


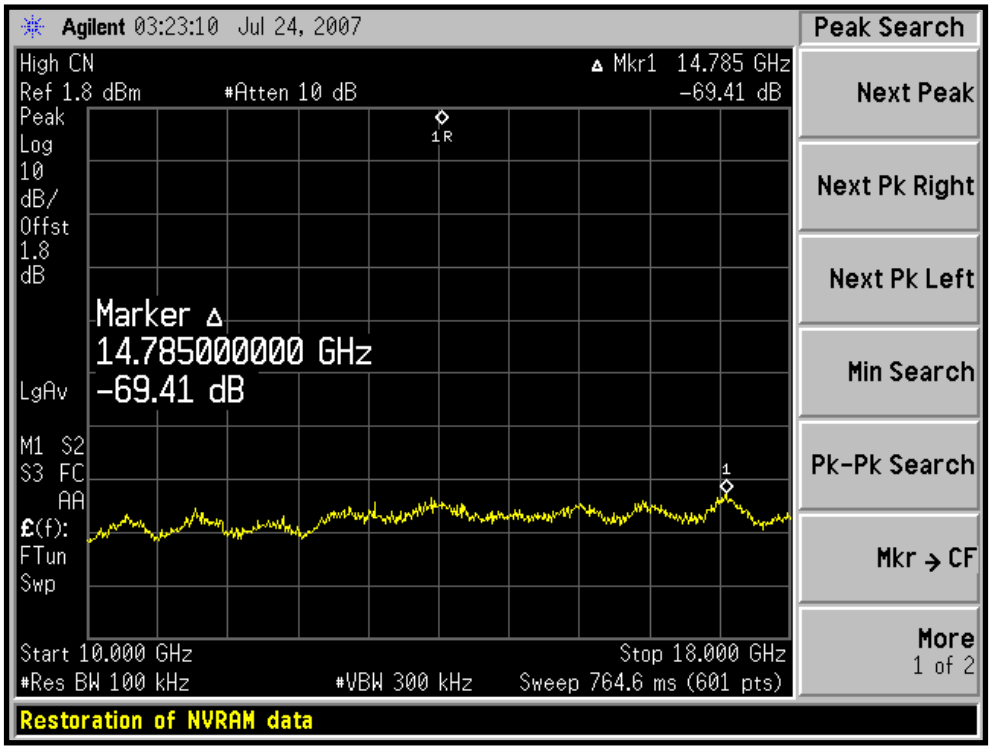

Agilent 03:18:54 Jul 24, 2007
Peak Search
Mid CN
Ref 1.8 dBm
#Atten 10 dB
Mkr1 14.760 GHz
-69.92 dB
Peak
Log
10
dB/
Offst
1.8
dB
1R
Marker Δ
14.760000000 GHz
-69.92 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 18.000 GHz
Sweep 764.6 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Restoration of NVRAM data

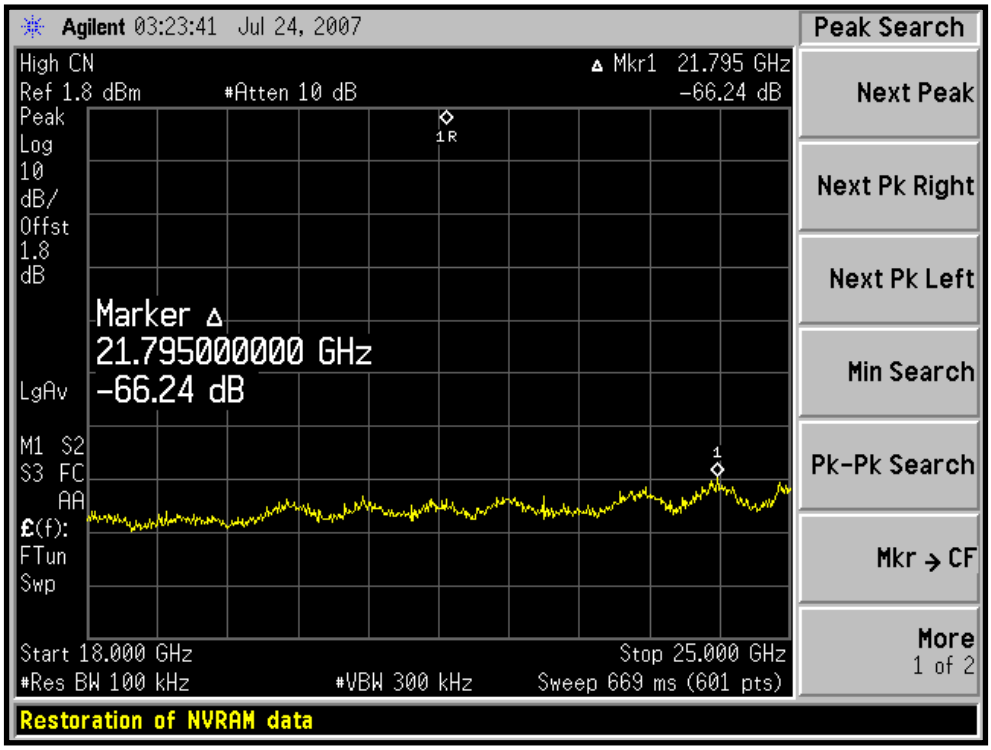

Agilent 03:19:23 Jul 24, 2007
Peak Search
Mid CN
Ref 1.8 dBm
#Atten 10 dB
Mkr1 21.825 GHz
-67.77 dB
Peak
Log
10
dB/
Offst
1.8
dB
1R
Marker Δ
21.825000000 GHz
-67.77 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 18.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 669 ms (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Restoration of NVRAM data

High Channel






Agilent 03:23:10 Jul 24, 2007
Peak Search
High CN
Ref 1.8 dBm
#Atten 10 dB
Mkr1 14.785 GHz
-69.41 dB
Peak
Log
10
dB/
Offst
1.8
dB
Marker Δ
14.785000000 GHz
-69.41 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 10.000 GHz
Stop 18.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 764.6 ms (601 pts)
Restoration of NVRAM data


Agilent 03:23:41 Jul 24, 2007
Peak Search
High CN
Ref 1.8 dBm
#Atten 10 dB
Mkr1 21.795 GHz
-66.24 dB
Peak
Log
10
dB/
Offst
1.8
dB
Marker Δ
21.795000000 GHz
-66.24 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 18.000 GHz
Stop 25.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 669 ms (601 pts)
Restoration of NVRAM data

8 FCC §15.109, §15.205, §15.209 & §15.247(c), IC RSS-Gen §4.9 - SPURIOUS RADIATED EMISSIONS

8.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §15.209(a): 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 (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.247(c)(1)(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 conducted 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.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.247 (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)).

IC RSS-GEN §4.9 the measurement method shall be described in the test report. The same parameter, peak power or average power, used for the transmitter output power measurement shall be used for unwanted emission measurements. The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or from 30 MHz, whichever is the lower, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.

8.2 Test Setup

The radiated emissions tests were performed in the 3-meter open area test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

8.3 EUT Setup

The radiated emissions tests were performed using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

8.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Sonoma Instruments	Pre amplifier	317	260407	2007-04-26
HP	Pre amplifier	8449B	3147A00400	2006-08-21
Sunol Science Corp	Combination Antenna	JB3 Antenna	A020106-3	2007-03-05
A.R.A	Antenna Horn	DRG-118/A	1132	2007-06-18
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

8.5 Test Procedure

For the radiated emissions test, the EUT, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meters away from the testing antenna, which is varied from 1-4 meters, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

8.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit.
The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

8.7 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma on 2007-07-26.*

8.8 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC and IC requirements, and had the worst margin readings of:

Unintentional Emissions, (30-1000 MHz):

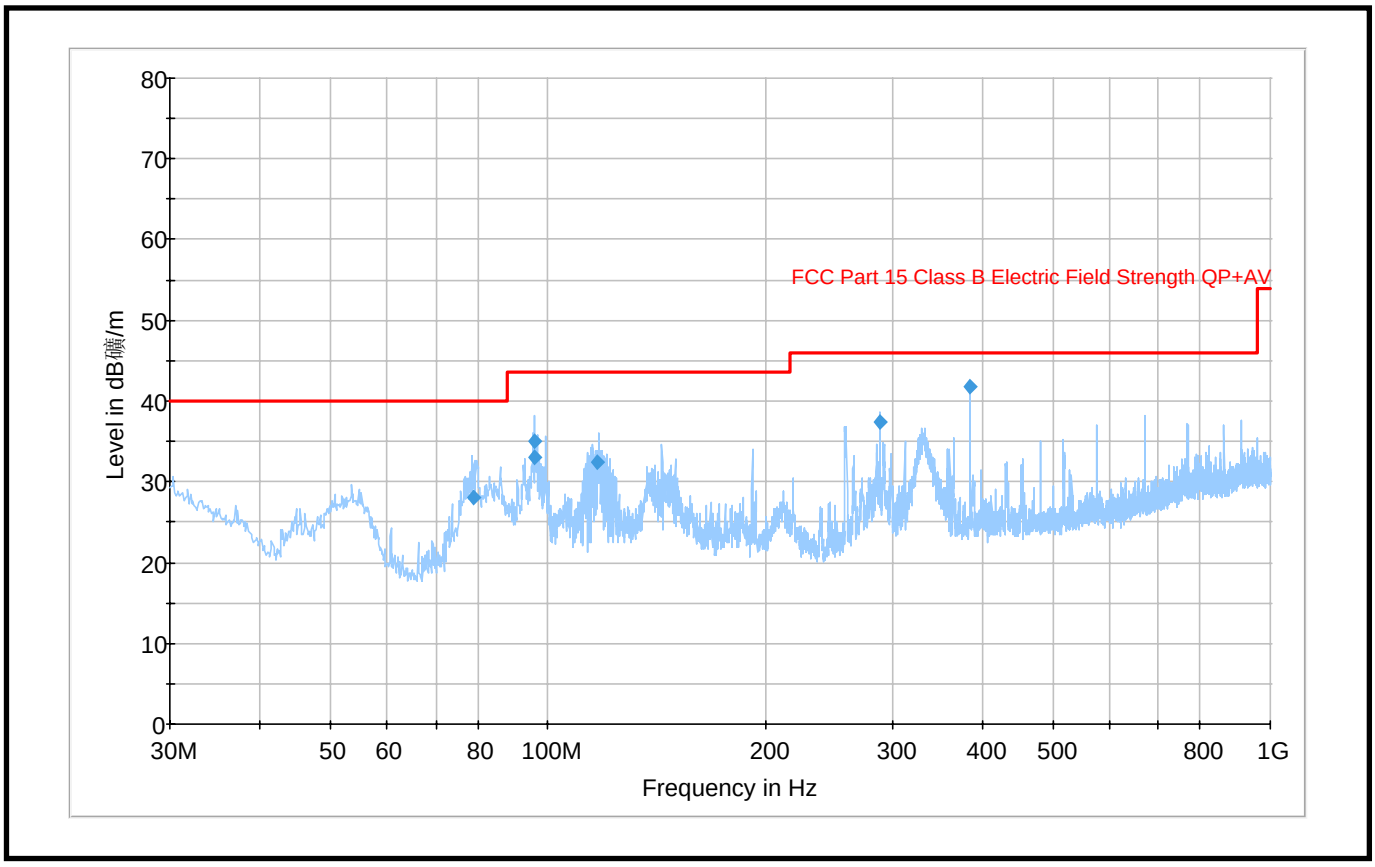
Mode: Receiver			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-4.2	384.010000	Horizontal	30 MHz to 1000 MHz

Out of Band Emissions:

Mode: Transmission			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range (GHz)**
-13.2	7215.0000	Vertical	Low, 1 GHz – 25GHz
-19.5	7320.0000	Vertical	Middle, 1 GHz – 25GHz
-20.3	7440.0000	Vertical	High, 1 GHz – 25GHz

8.9 Radiated Emissions Test plot & data:

Primary scan 30MHz -1GHz



Frequency (MHz)	Quasi-Peak (dBµV/m)	Antenna Height (cm)	Polarity (H/V)	Turntable Position (degrees)	Limit (dBµV/m)	Margin (dB)
384.010000	41.8	99.0	H	354.0	46.0	-4.2
95.920000	35.0	200.0	H	309.0	43.5	-8.5
288.020000	37.3	99.0	H	102.0	46.0	-8.7
95.953750	33.1	329.0	H	8.0	43.5	-10.4
117.303750	32.5	252.0	H	283.0	43.5	-11.0
79.020000	28.0	398.0	H	321.0	40.0	-12.0

8.10 Radiated Spurious Emissions Test Data

Regular Antenna (3.3 dBi)

802.15.4, 2405 - 2480 MHz, Measured at 3 meters, 1 GHz – 25 GHz

Low channel 2405 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Height (m)	Polar. H / V	Antenna Factor (dB/m)	Cable loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2405.0000	94.8	220	1.8	V	28.7	1.5	35.8	89.2			Fund/Peak
2405.0000	91.6	180	1.2	H	28.7	1.5	35.8	86.0			Fund/Peak
2405.0000	91.3	220	1.2	V	28.7	1.5	35.8	85.7			Ave
2405.0000	90.6	180	1.2	H	28.7	1.5	35.8	85.0			Ave
7215.0000	34.8	180	2.0	V	36.7	4.2	34.9	40.8	54	-13.2	Ave
7215.0000	27.3	90	2.0	H	36.7	4.2	34.9	33.3	54	-20.7	Ave
4810.0000	29.3	270	2.4	V	32.5	1.9	34.8	28.9	54	-25.1	Ave
4810.0000	27.8	180	2.3	H	32.5	1.9	34.8	27.4	54	-26.6	Ave
7215.0000	35.1	90	2.0	V	36.7	4.2	34.9	41.1	74	-32.9	Peak
4810.0000	37.0	270	2.4	V	32.5	1.9	34.8	36.6	74	-37.4	Peak
7215.0000	27.8	180	2.0	H	36.7	4.2	34.9	33.8	74	-40.2	Peak
4810.0000	30.9	180	2.3	H	32.5	1.9	34.8	30.5	74	-43.5	Peak

Middle channel 2440 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Height (m)	Polar. H / V	Antenna Factor (dB/m)	Cable loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2440.0000	93.1	180	1.3	V	28.7	1.5	35.8	87.5			Fund/Peak
2440.0000	92.4	320	1.2	H	28.7	1.5	35.8	86.8			Fund/Peak
2440.0000	89.4	180	1.3	V	28.7	1.5	35.8	83.8			Ave
2440.0000	90.0	320	1.2	H	28.7	1.5	35.8	84.4			Ave
7320.0000	28.7	270	2.4	V	36.7	4.2	35.1	34.5	54	-19.5	Ave
7320.0000	28.3	180	2.1	H	36.7	4.2	35.1	34.1	54	-19.9	Ave
4880.0000	29.4	270	2.4	V	32.5	1.9	34.8	29.0	54	-25.0	Ave
4880.0000	28.8	180	2.2	H	32.5	1.9	34.8	28.4	54	-25.6	Ave
7320.0000	34.6	270	2.4	V	36.7	4.2	35.1	40.4	74	-33.6	Peak
7320.0000	34.1	180	2.3	H	36.7	4.2	35.1	39.9	74	-34.1	Peak
4880.0000	36.7	270	2.4	V	32.5	1.9	34.8	36.3	74	-37.7	Peak
4880.0000	25.9	180	2.2	H	32.5	1.9	34.8	25.5	74	-48.5	Peak

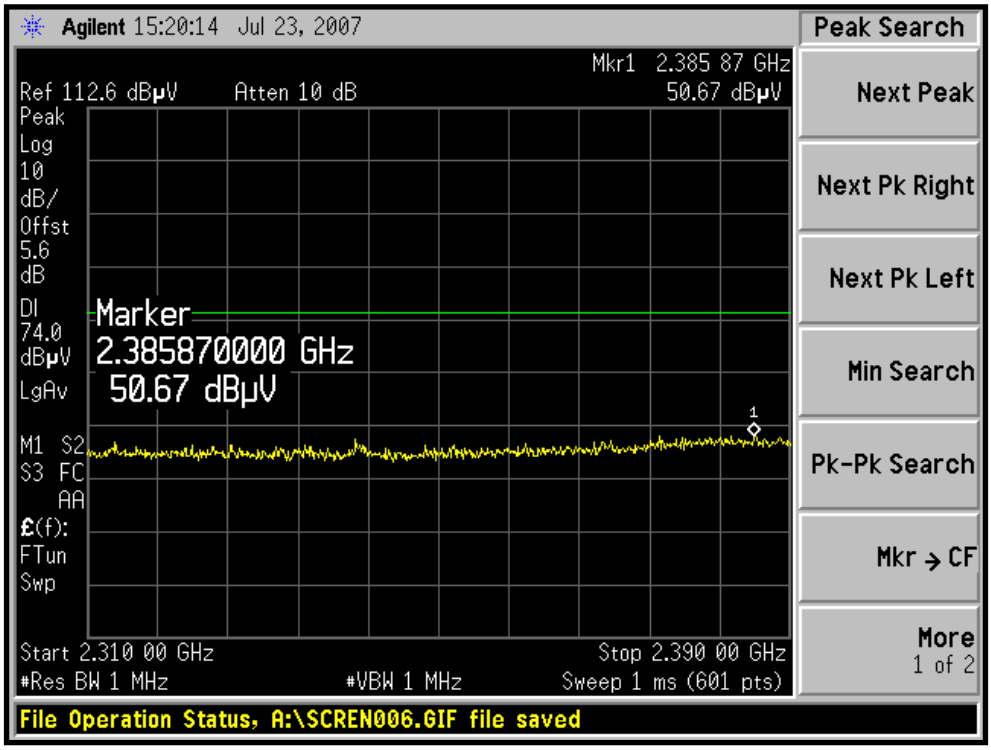
High channel 2480 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth Degrees	Height (m)	Polar. H / V	Antenna Factor (dB/m)	Cable loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
2480.0000	93.5	180	1.3	V	28.7	1.5	35.8	87.9			Fund/Peak
2480.0000	92.8	180	1.2	H	28.7	1.5	35.8	87.2			Fund/Peak
2480.0000	90.2	180	1.3	V	28.7	1.5	35.8	84.6			Ave
2480.0000	90.0	180	1.2	H	28.7	1.5	35.8	84.4			Ave
7440.0000	28.4	270	2.4	V	36.7	4.2	35.6	33.7	54	-20.3	Ave
7440.0000	28.0	90	2.1	H	36.7	4.2	35.6	33.3	54	-20.7	Ave
4960.0000	31.5	270	2.4	V	32.5	1.9	35.0	30.9	54	-23.1	Ave
4960.0000	30.2	90	2.1	H	32.5	1.9	35.0	29.6	54	-24.4	Ave
7440.0000	39.2	270	2.4	V	36.7	4.2	35.6	44.5	74	-29.5	Peak
7440.0000	36.5	90	2.1	H	36.7	4.2	35.6	41.8	74	-32.2	Peak
4960.0000	38.8	270	2.4	V	32.5	1.9	35.0	38.2	74	-35.8	Peak
4960.0000	37.4	90	2.1	H	32.5	1.9	35.0	36.8	74	-37.2	Peak

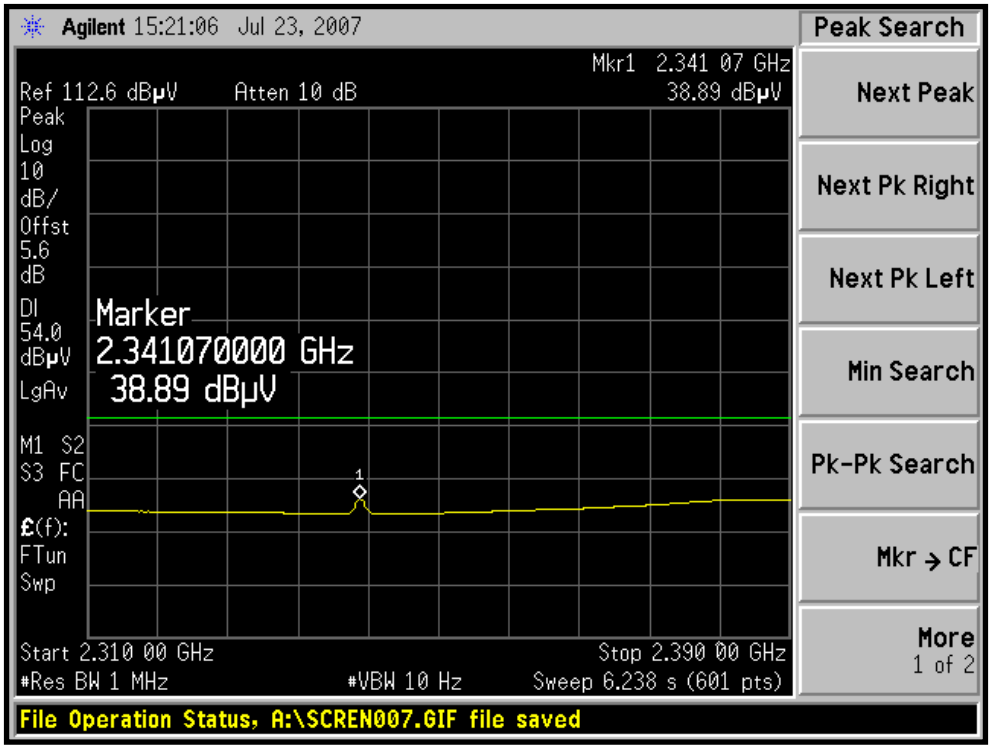
Restricted Band Edge

Low Channel

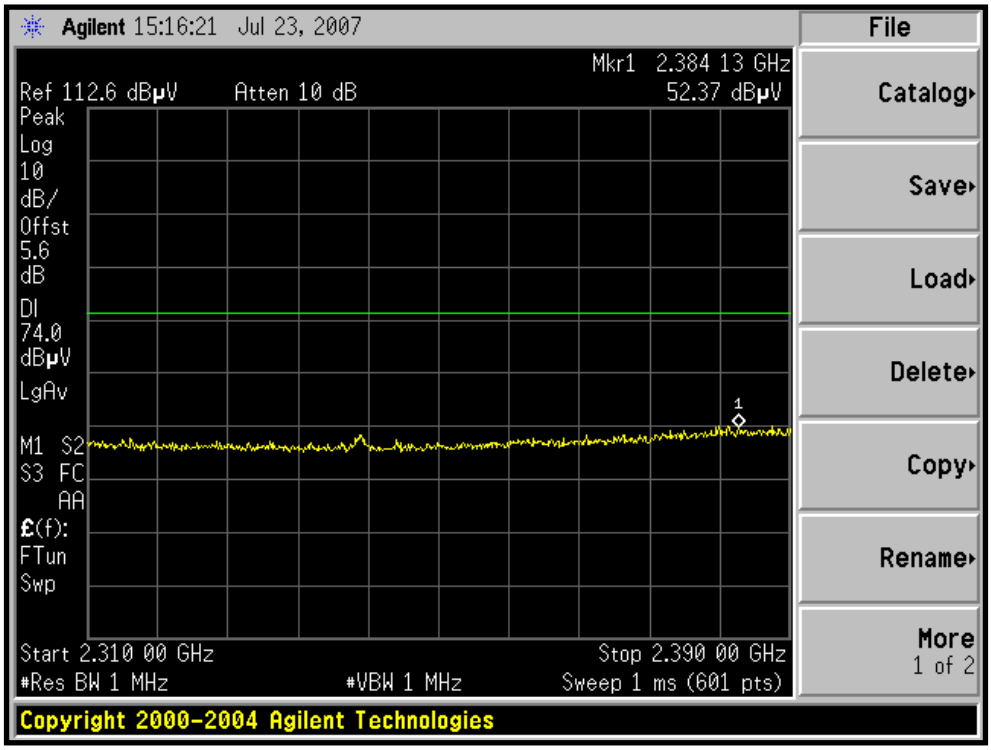
Peak, Horizontal



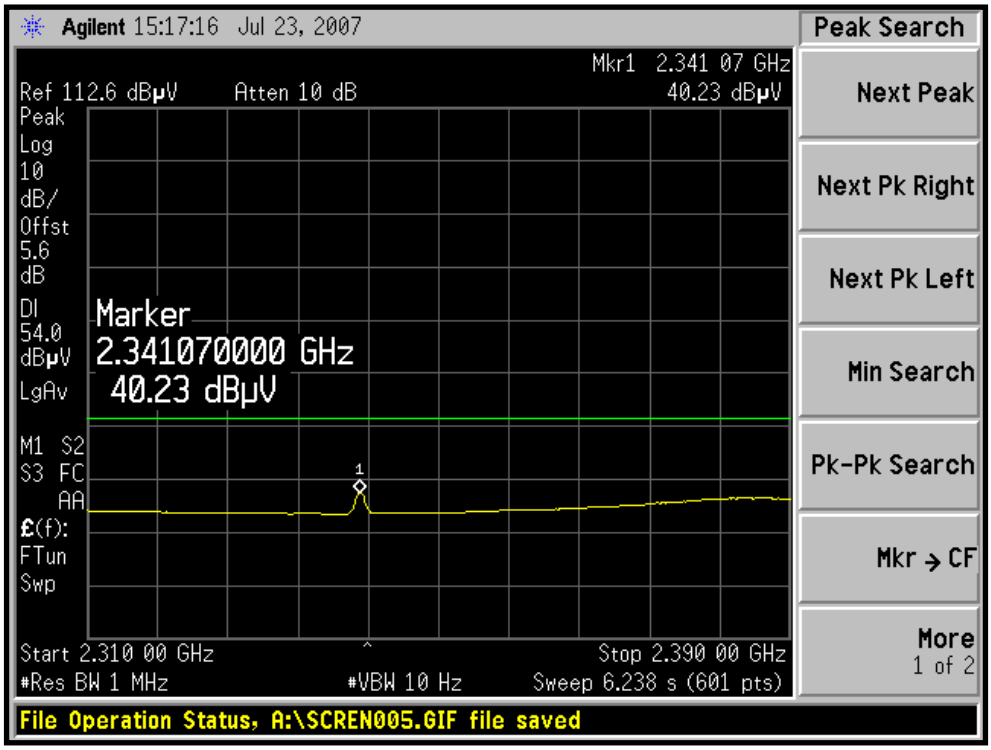
Average, Horizontal



Peak, Vertical

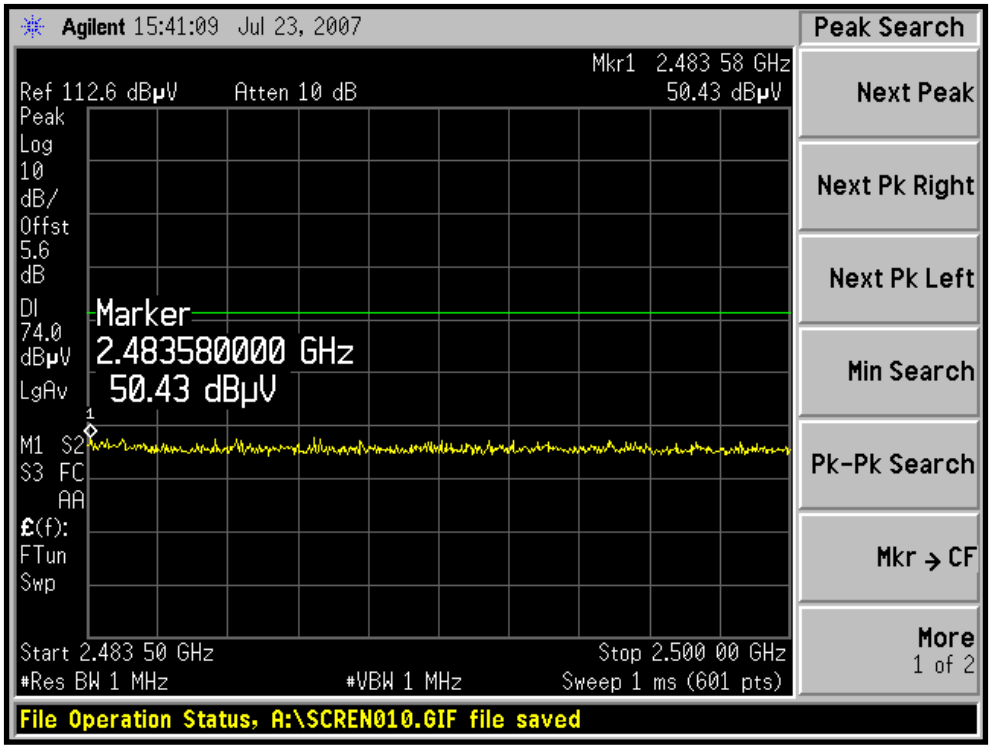


Average, Vertical

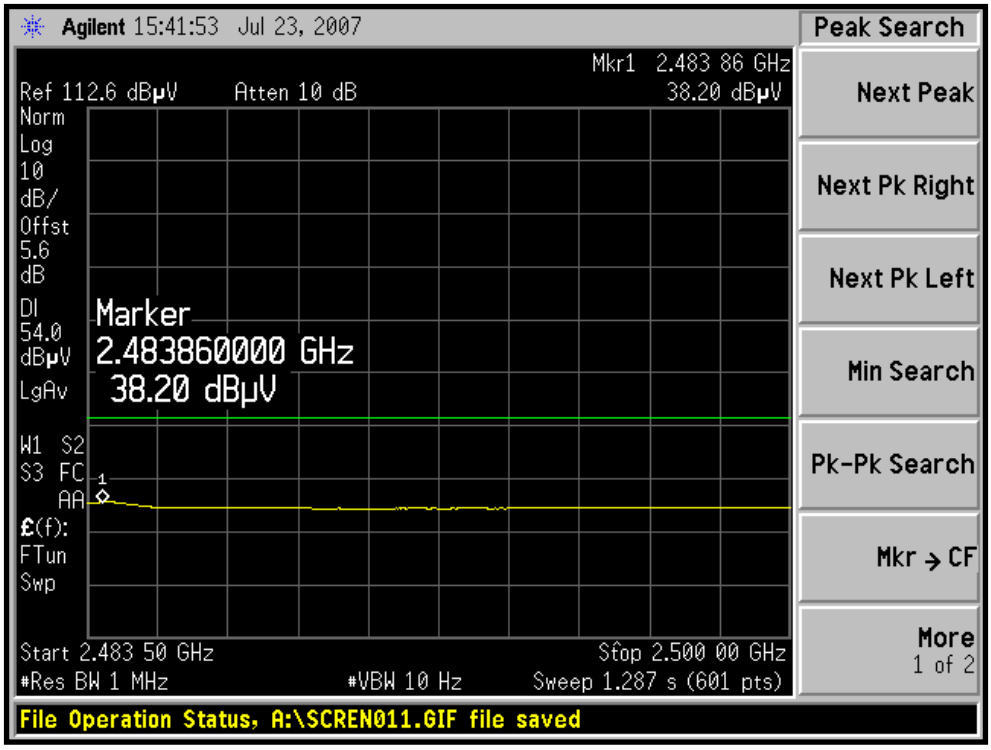


High Channel

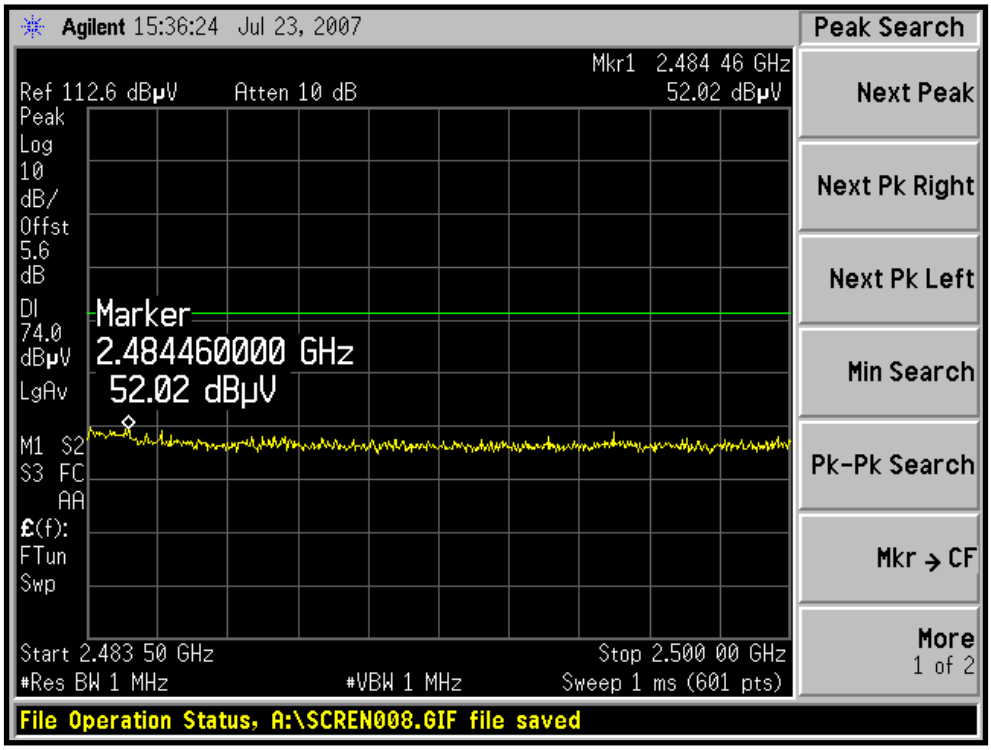
Peak, Horizontal



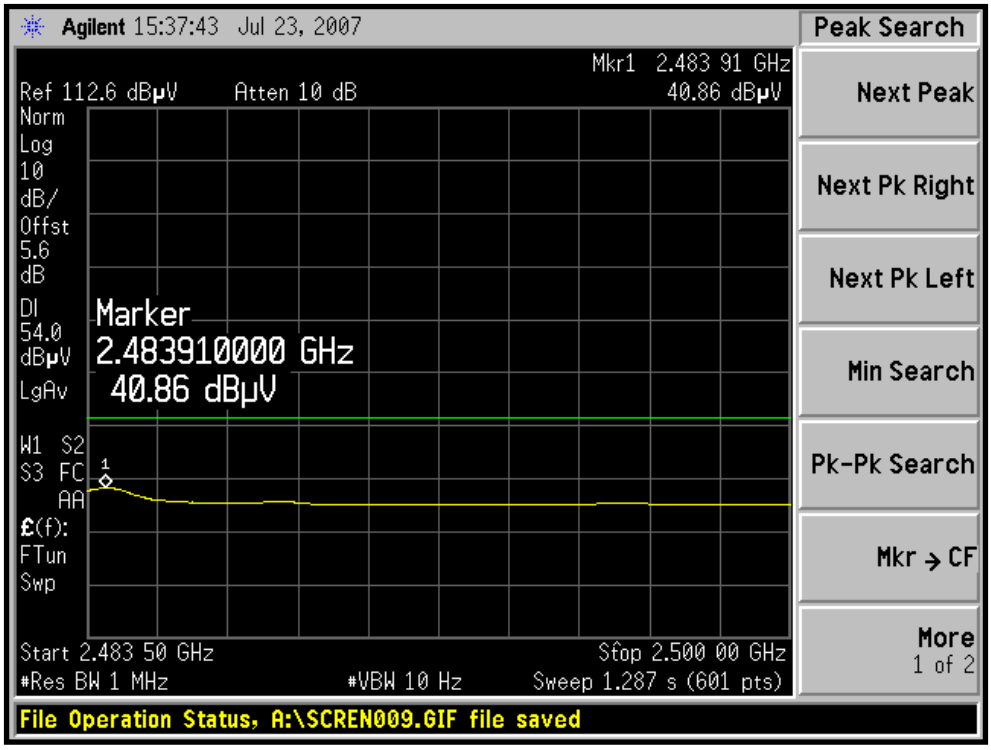
Average, Horizontal



Peak, Vertical



Average, Vertical



9 FCC §15.247(a) (2), RSS-210 § A8.2 (a) – 6 dB BANDWIDTH & OCCUPIED BANDWIDTH

9.1 Applicable Standard

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz

Channel	Frequency (MHz)	6 dB BW (kHz)	Limit (kHz)	Result
Low	2405	1623	>500	Compliant
Middle	2440	1633	>500	Compliant
High	2480	1613	>500	Compliant

Channel	Frequency (MHz)	Occupied BW (kHz)
Low	2405	2582
Middle	2440	2570
High	2480	2580

9.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emissions bandwidth. (6 dB bandwidth for DTS)
4. Repeat above procedures until all frequencies measured were complete.

9.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

9.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

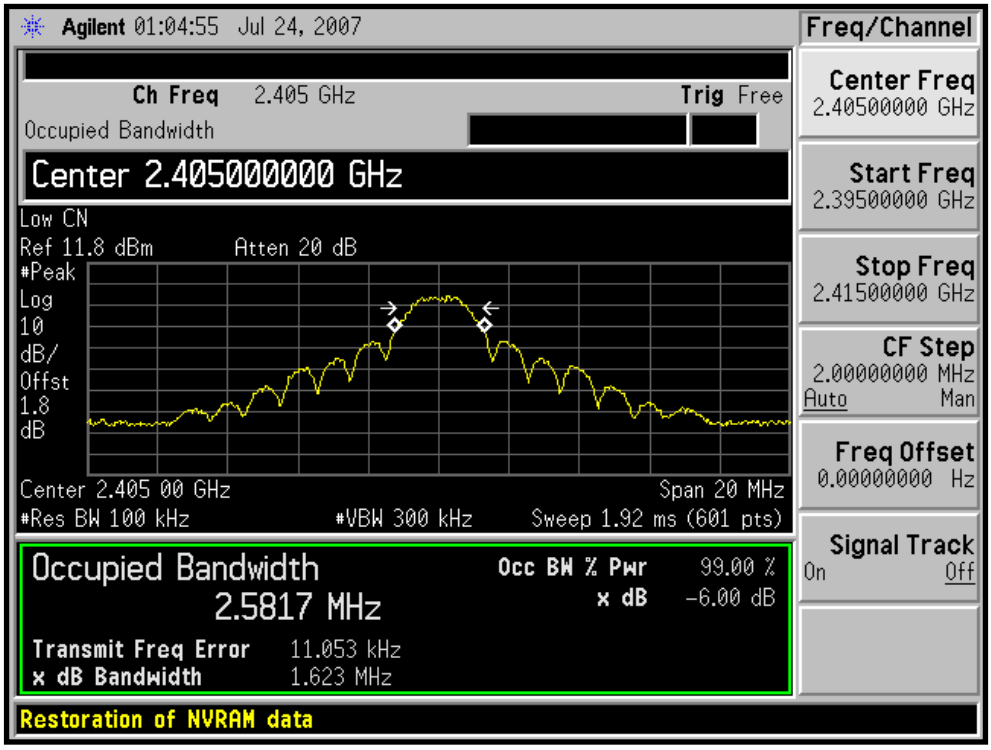
**The testing was performed by James Ma on 2007-07-26.*

9.5 Summary of Test Results

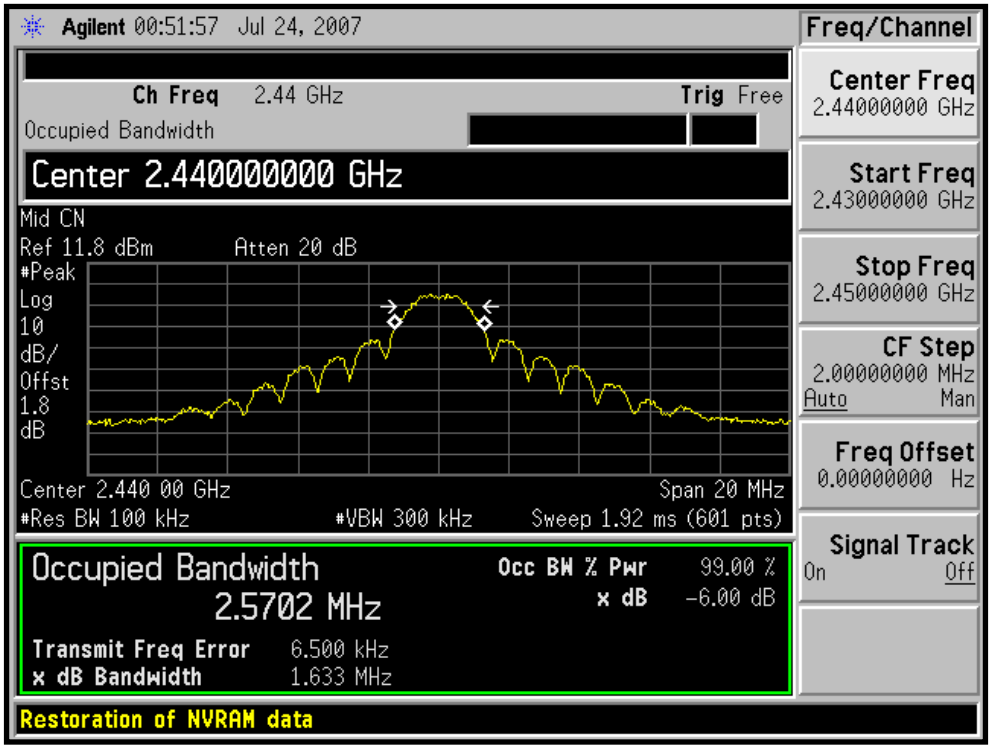
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2405	1.623	2.5817
Middle	2440	1.633	2.5702
High	2480	1.613	2.5804

Please refer to the following plots for detailed test results

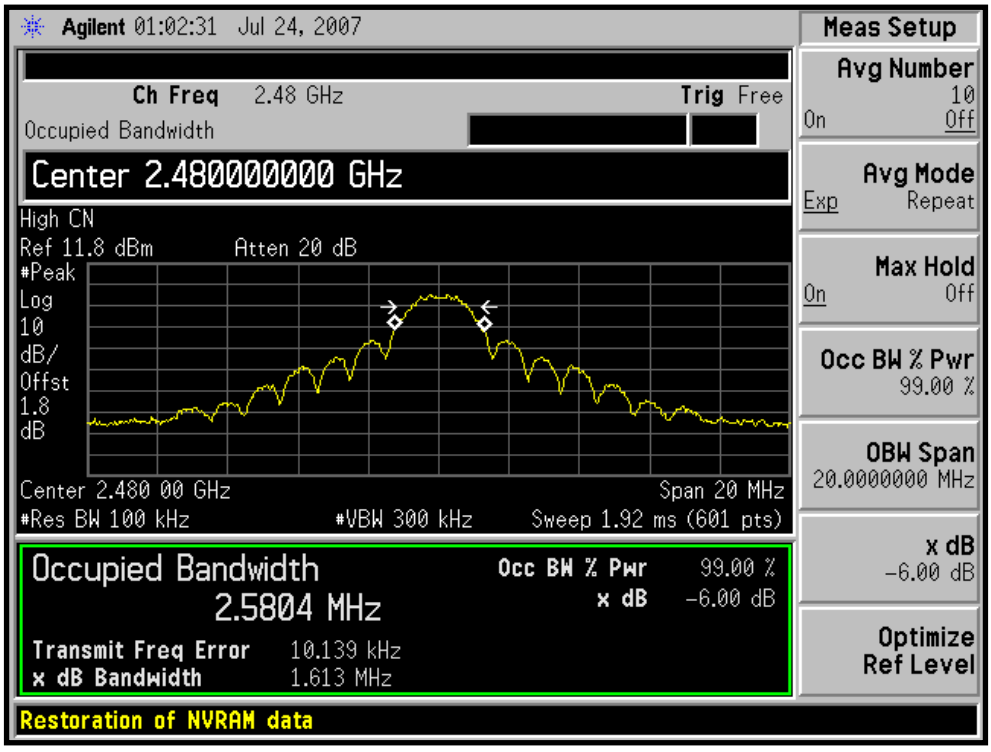
Low Channel



Middle Channel



High Channel



10 FCC §15.247(b), RSS210 § A8.4 - PEAK OUTPUT POWER MEASUREMENT

10.1 Applicable Standard

§15.247(b) the maximum peak output power of the intentional radiator shall not exceed the following:

§15.247(b) (3) and RSS210 § A8.4 (4) for systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

§15.247(b) (4) (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.

10.2 Measurement Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a spectrum analyzer.
3. Add a correction factor to the display.

10.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

10.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

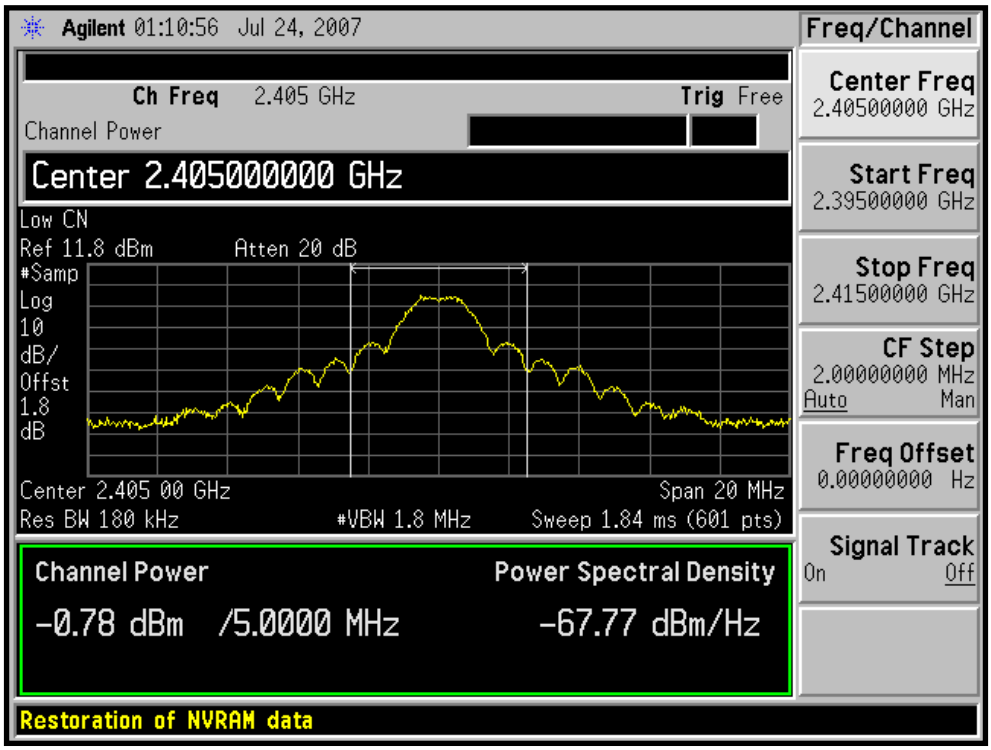
**The testing was performed by James Ma from 2007-07-26.*

10.5 Summary of Test Results

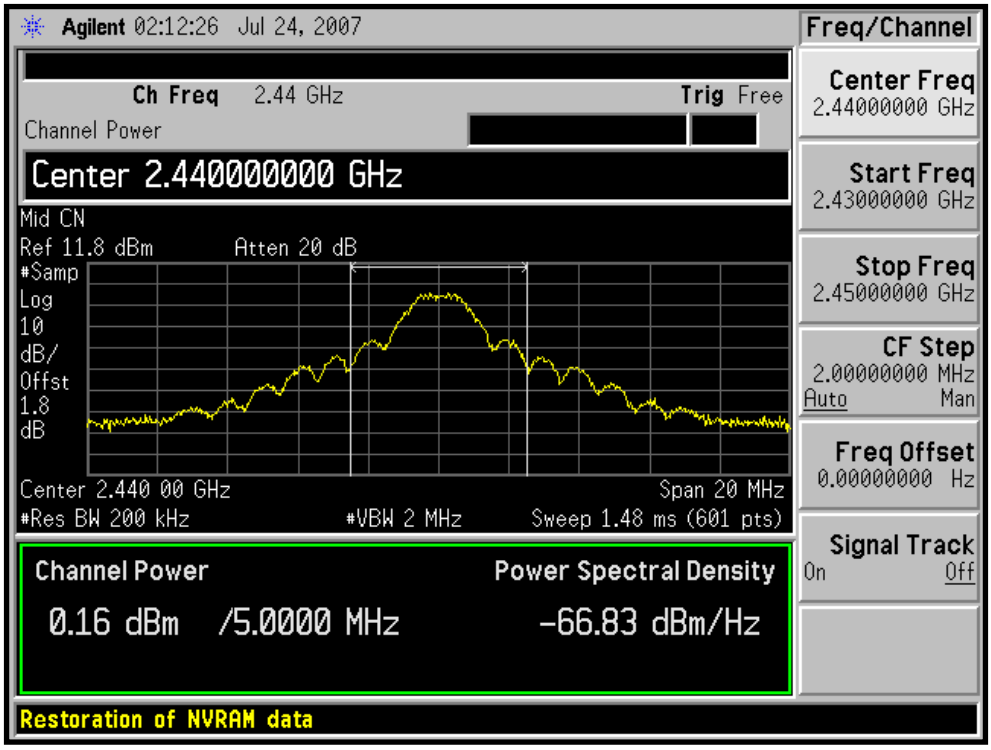
Channel	Frequency (MHz)	Max Power (dBm)	Max Power (mW)	Limit (mW)	Result
Low	2405	-0.78	0.84	1000	Compliant
Mid	2440	0.16	1.04	1000	Compliant
High	2480	-0.04	0.99	1000	Compliant

Please refer to the following Plots

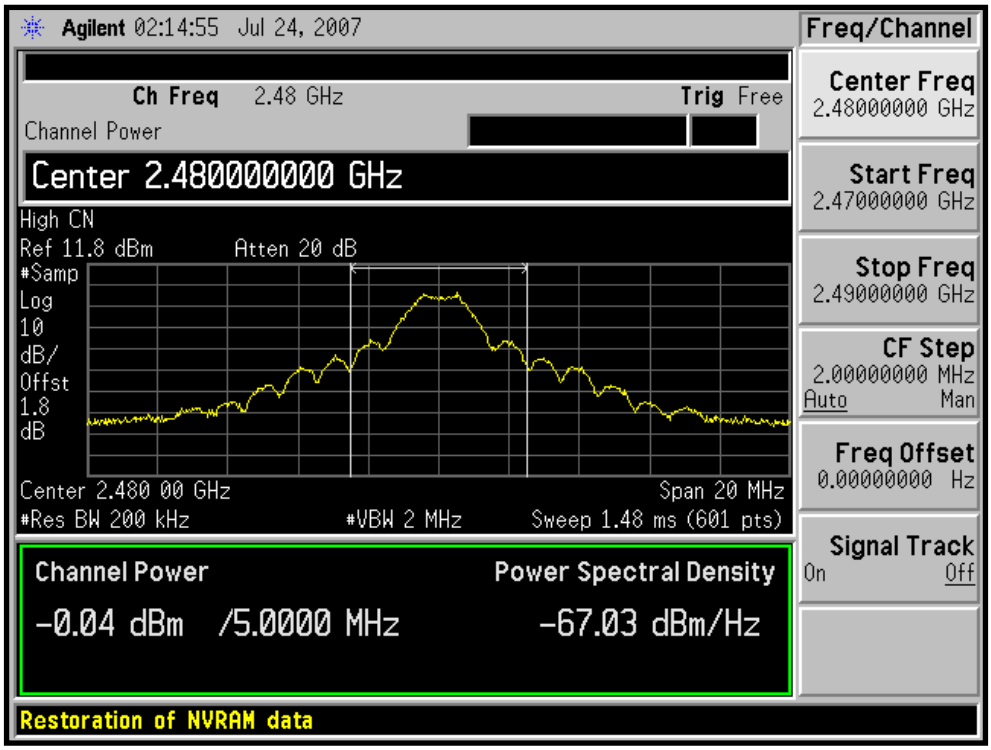
Low Channel



Middle Channel



High Channel



11 FCC §15.247(d), RSS-210 § A8.5 - 100 kHz BANDWIDTH OF BAND EDGES

11.1 Applicable Standard

According to §15.247(d), in *any* 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c)).

RSS210§ A8.5: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emissions limits specified in Tables 2 and 3.

11.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

11.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

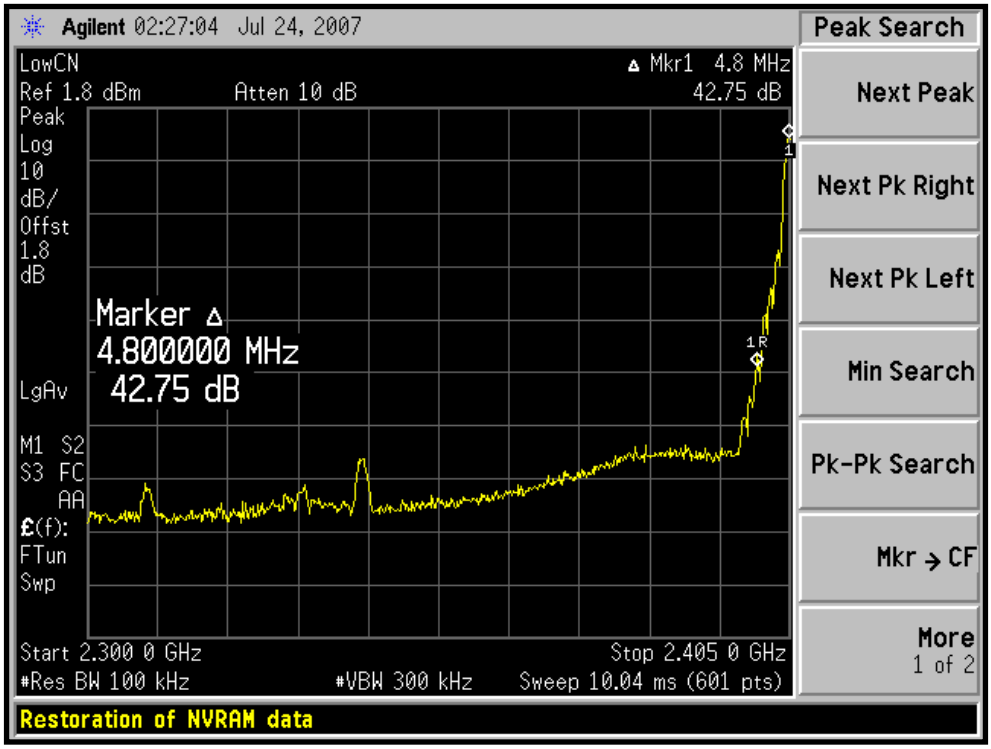
11.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

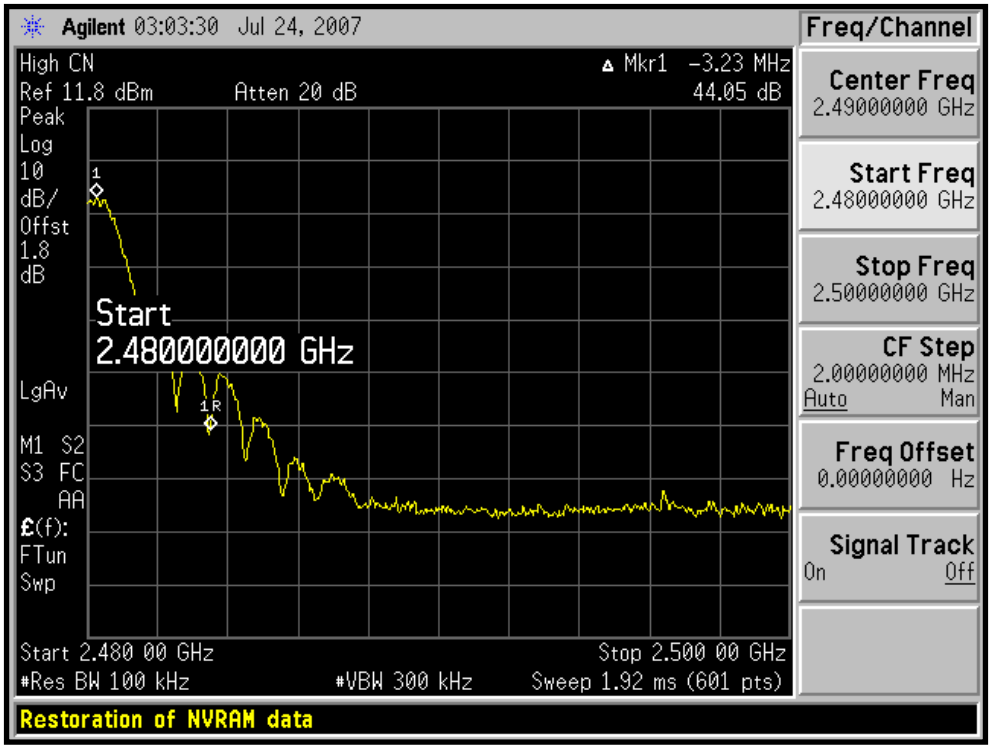
**The testing was performed by James Ma from 2007-07-26.*

Please Refer to the Following Plots

Lowest Channel



Highest Channel



12 FCC §15.247(e), RSS-210 § A8.2 (b) - POWER SPECTRAL DENSITY

12.1 Applicable Standard

According to §15.247 (e) and RSS-210 § A8.2 (b) , for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

12.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 1.5MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DTS)
4. Repeat above procedures until all frequencies measured were complete.

12.3 Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

12.4 Environmental Conditions

Temperature:	27 °C
Relative Humidity:	40 %
ATM Pressure:	102.0 kPa

**The testing was performed by James Ma from 2007-07-26.*

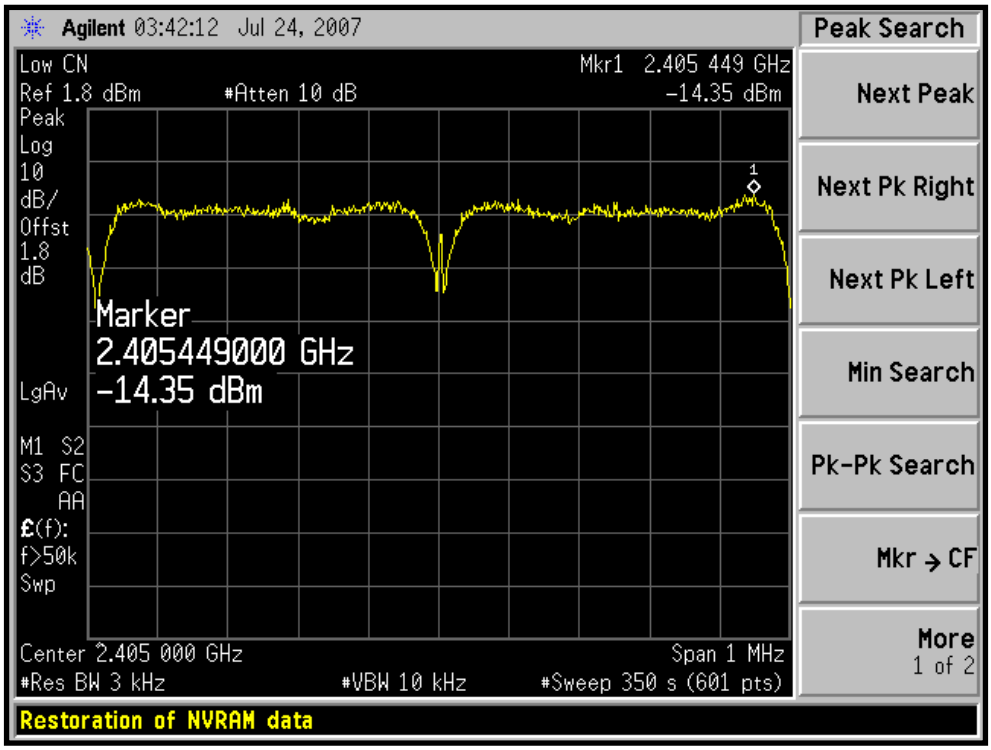
12.5 Summary of Test Results

2405 MHz - 2480 MHz, 802.15.4 Band

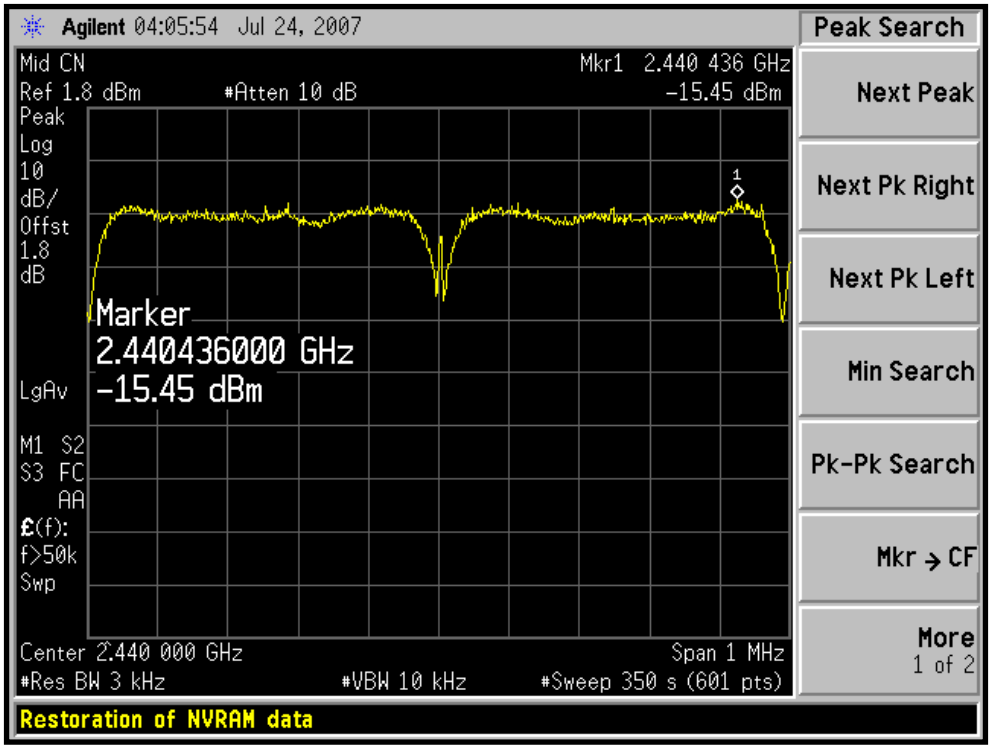
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
2405	-14.35	8	Compliant
2440	-15.45	8	Compliant
2480	-16.24	8	Compliant

Please refer to the following plots for detailed test results

Low Channel



Middle Channel



High Channel