Engineering and Testing for EMC and Safety Compliance

Accredited under A2LA Testing Certificate # 2653.01

Certification Application Report
FCC Part 15.247

Test Lab:	Applicant:
Rhein Tech Laboratories, Inc. Phone: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 Web: www.rheintech.com Herndon, VA 20170 E-Mail: ATCBINFO@rheintech.com	McQ, Inc. Phone: 540-373-2374 x115 1551 Forbes St. Fax: 540-371-1358 Fredericksburg, VA 22405 Contact: Brian McQuiddy

FCC ID:	NVQ-OMNI2431	**Test Report Date:**	May 28, 2008
Platform:	N/A	**RTL Work Order Number:**	2008065
Model Name:	WMR	**RTL Quote Number:**	QRTL08-119A
American National Standard Institute:	ANSI C63.4-2003 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		
FCC Classification:	DSS – Part 15 Spread Spectrum Transmitter		
FCC Rule Part(s):	FCC Rules Part 15.247: Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System 10-01-07		
FCC Guidance:	DA 00-705: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems		
Digital Interface Information:	N/A		

Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
902.9 – 927.1	0.859	N/A	266KFXD
2402 - 2480	0.003	N/A	975KFXD

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from, the applicable parts of FCC Part 2, FCC Part 15, and ANSI C63.4.

Signature: _____ Date: May 28, 2008

Typed/Printed Name: Desmond A. Fraser Position: President

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1 General Information

1.1 Scope

Applicable Standards:

- FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

1.2 Description of EUT

Equipment Under Test	Wireless Mobile Relay	
Model	WMR	
Power Supply	Battery operated or 5V AC power adapter	
Modulation Type	FHSS – FSK	FHSS - Bluetooth
Transfer Rate	120 kbps	
Frequency Range	902.9 – 927.1 MHz	2402 – 2480 MHz
Antenna Connector Type	Reverse polarity SMA	Internal
Antenna Types	MobileMark CVT-925 (2.3 dBi) MobileMark MAG3-925 (5 dBi)	Internal Chip

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.4 Related Submittal(s)/Grant(s)

This is an original application for certification for McQ, Inc. Model WMR, FCC ID: NVQ-OMNI2431.

1.5 Modifications

No modifications were required for compliance.

2 Test Information

2.1 Description of Test Modes

In accordance with FCC 15.31(m), and because the EUT utilizes an operating band greater than 10 MHz, the following frequencies were tested:

Table 2-1: Channels Tested for 900 MHz FHSS - MaxStream

Channel	Frequency
Low	902.9
Middle	915.2
High	927.1

Table 2-2: Channels Tested for 2.4 GHz FHSS - Bluetooth

Channel	Frequency
0	2402
38	2440
78	2480

2.2 Exercising the EUT

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The EUT was provided with software to continuously transmit during testing. The carrier was also checked to verify that information was being transmitted. There were no deviations from the test standard(s) and/or methods. The test results reported relate only to the item tested.

2.3 Test Result Summary

Table 2-3: Test Result Summary – FCC Part 15, Subpart C (Section 15.247) – FHSS

Standard	Test	Pass/Fail or N/A
FCC 15.207	AC Power Conducted Emissions	Pass
FCC 15.209	Radiated Emissions	Pass
FCC 15.247(b)	Maximum Peak Power Output	Pass
FCC 15.247(d)	Antenna Conducted Spurious Emissions	Pass
FCC 15.247(d)	Band Edge Measurement	Pass
FCC 15.247 (a)(1)	Carrier Frequency Separation	Pass
FCC 15.247 (a)(1)(ii)	20 dB Bandwidth	Pass
FCC 15.247 (a)(1)(iii)	Hopping Characteristics	Pass
FCC 15.247 (a)(1)(iii)	Average Time of Occupancy	Pass

2.4 Test System Details

The test sample was received on April 10, 2008. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in the following tables.

Table 2-4: Equipment Under Test

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
WMR	McQ Inc.	IS2200	10032.0208	NVQ-OMNI2431	N/A	18375
Antenna – 2.3 dBi	MobileMark	CVT-925	N/A	N/A	RG-174	18376
Antenna – 5 dBi	MobileMark	MAG3-900	N/A	N/A	RG-174	18286

2.5 Configuration of Tested System

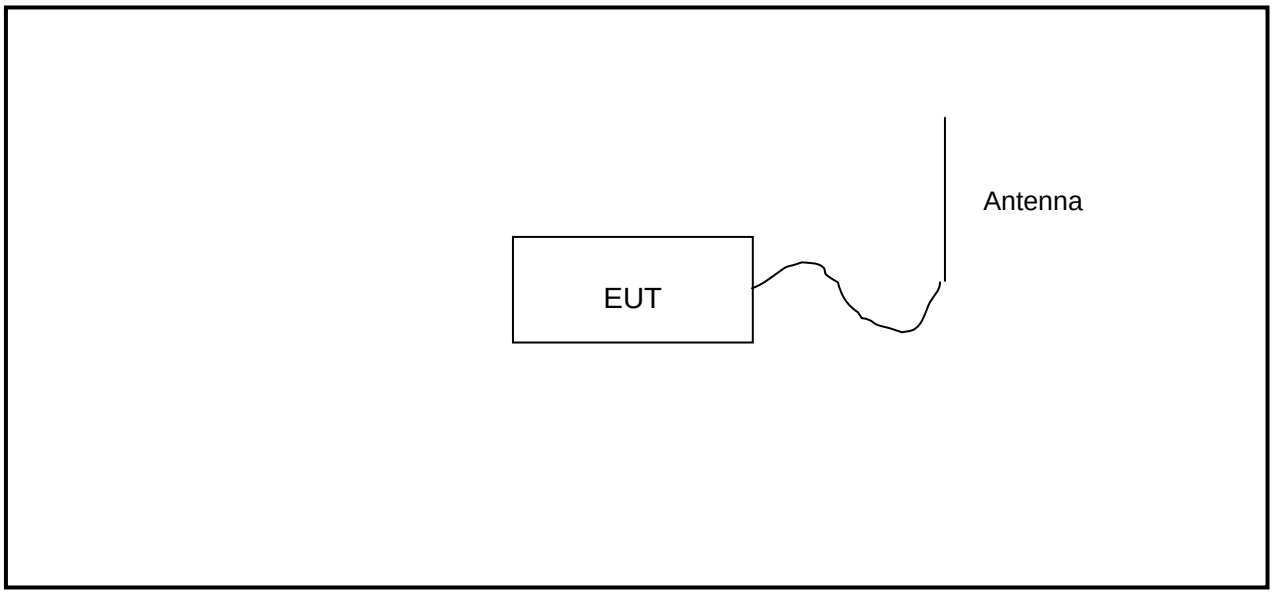


Figure 2-1: Configuration of System Under Test

3 Peak Output Power – FCC 15.247(b)(1)

3.1 Power Output Test Procedure

A conducted power measurement of the EUT was taken using an Agilent 4416A EPM-P Series Power Meter with an E9323A Peak and Average Power Sensor.

Table 3-1: Power Output Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	10/24/08
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	10/24/08
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	6/13/08
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz-12.8 GHz)	3826A00144	10/17/08

3.2 Power Output Test Data

Table 3-2: Power Output Test Data – 900 MHz FHSS MaxStream

Channel	Frequency (MHz)	Peak Power Conducted Output (dBm)
Low	902.9	29.3
Middle	915.2	29.0
High	927.1	28.7

Table 3-3: Power Output Test Data – 2.4 GHz FHSS Bluetooth

Channel	Frequency (MHz)	Peak Power Conducted Output (dBm)
2	2402	4.3
41	2441	4.1
80	2480	3.8

Test Personnel:

Daniel W. Baltzell		April 28 and 29, 2008
EMC Test Engineer	Signature	Dates of Test

4 Band Edge Compliance of RF Conducted Emissions – FCC 15.247(d)

4.1 Band Edge Test Procedure

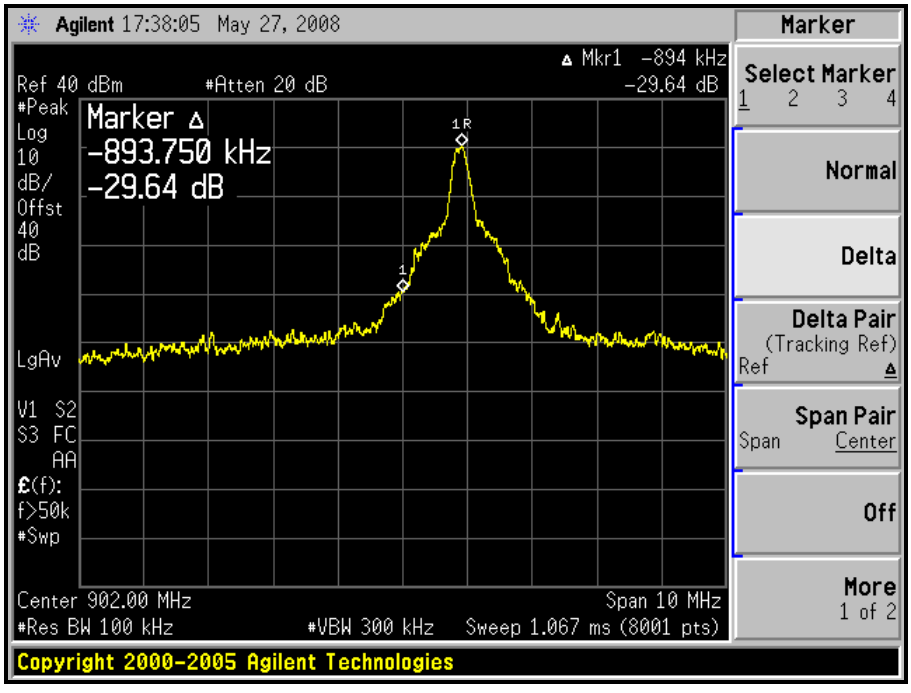
The emissions at the band edges were measured per DA 00-705 “Band-edge Compliance of RF Conducted Emissions”.

Table 4-1: Band Edge Test Equipment

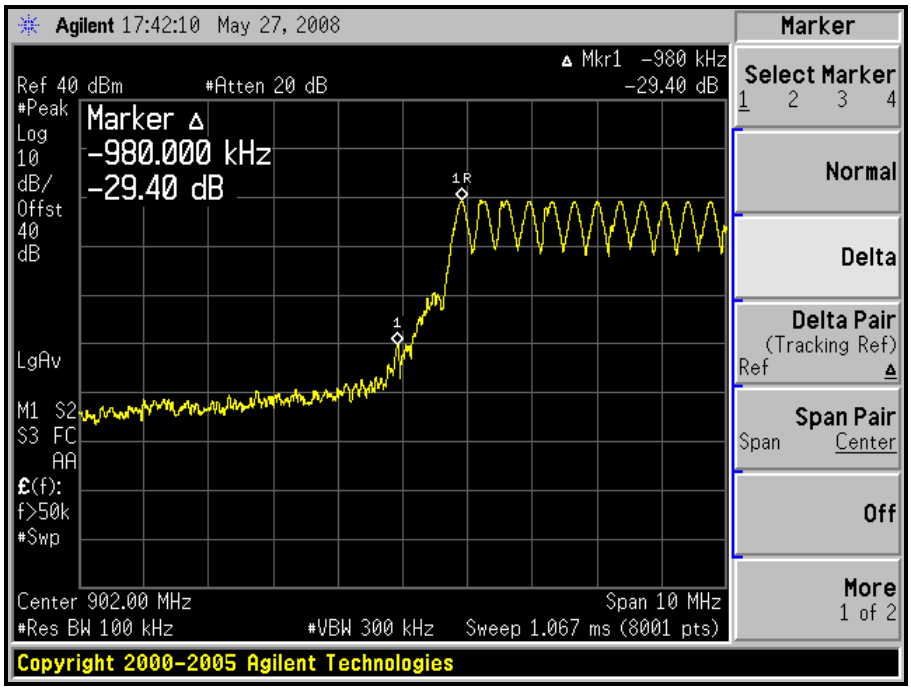
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz-12.8 GHz)	3826A00144	10/17/08
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	6/13/08

4.2 Band Edge Test Results

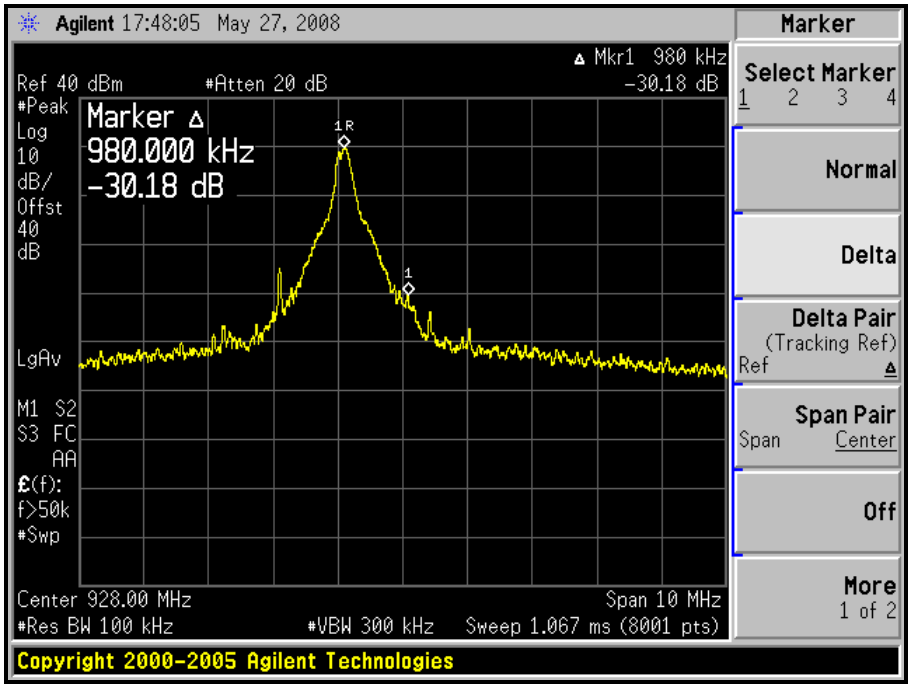
Plot 4-1: Lower Band Edge – MaxStream - 902.9 MHz



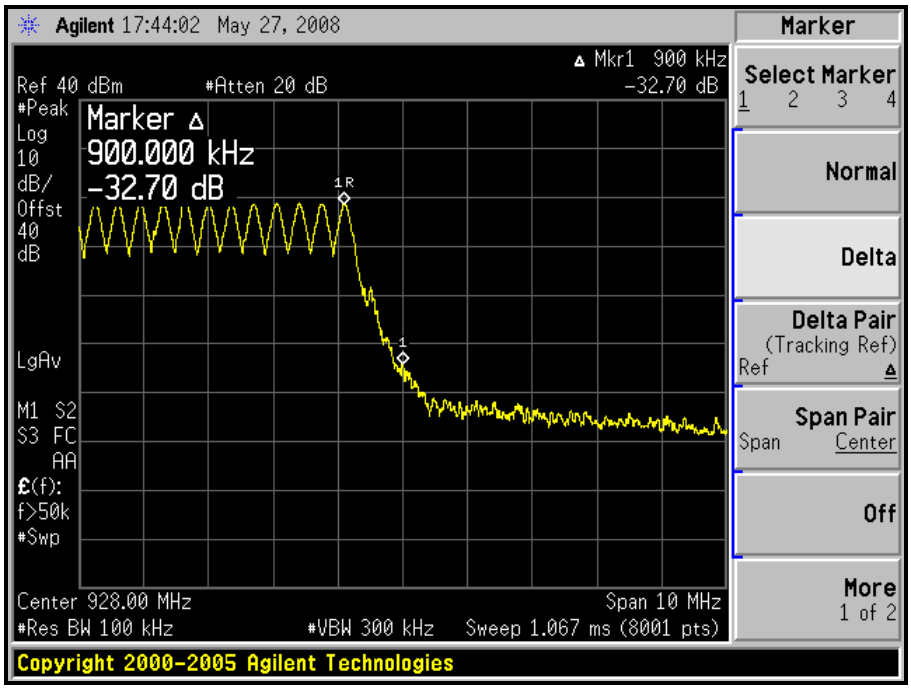
Plot 4-2: Lower Band Edge - MaxStream - Hopping Mode



Plot 4-3: Upper Band Edge – MaxStream - 927.1 MHz



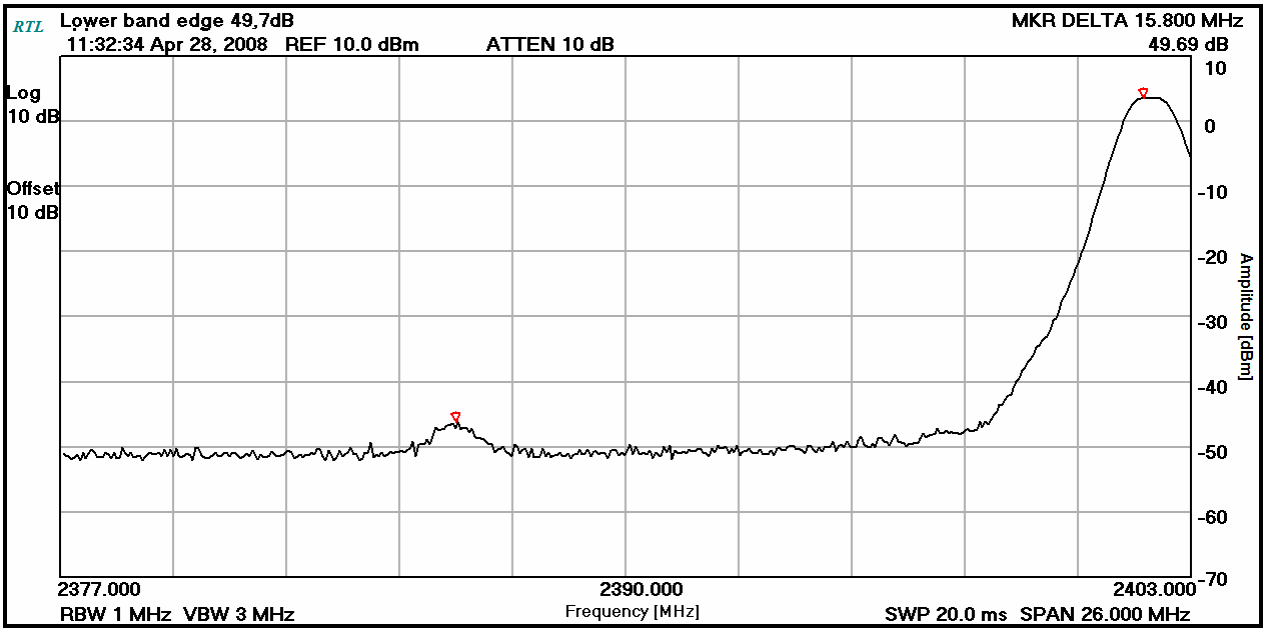
Plot 4-4: Upper Band Edge – MaxStream - Hopping Mode



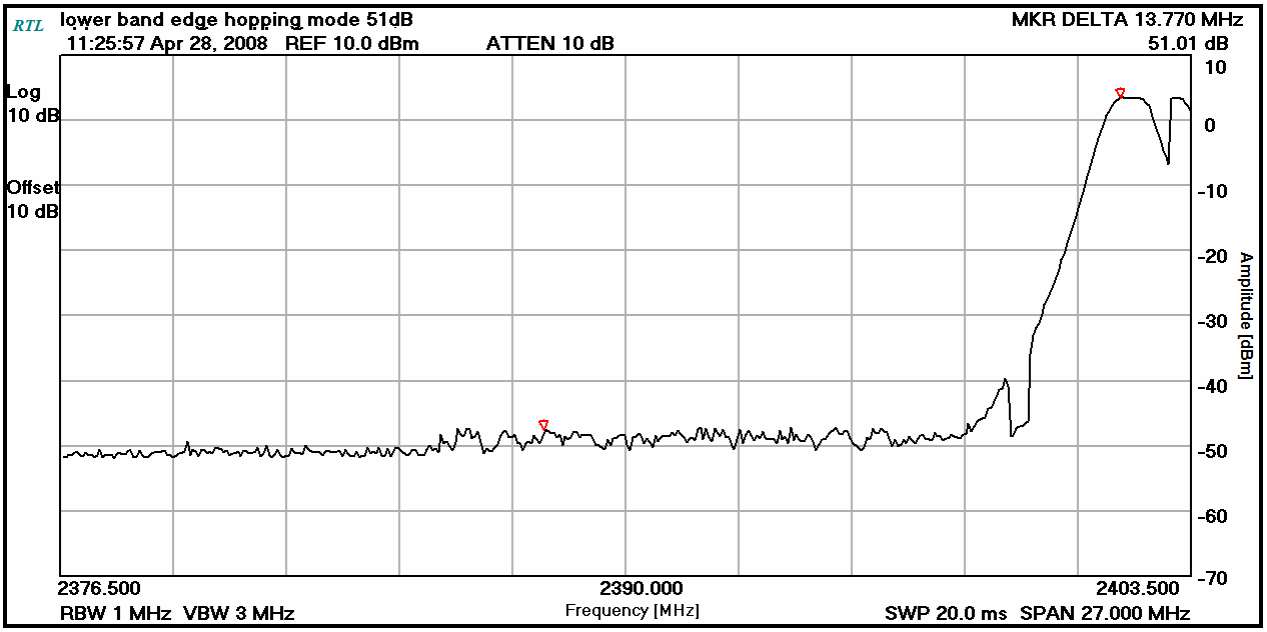
Test Personnel:

Richard B. McMurray, P.E.	Richard B. McMurray	May 27, 2008
EMC Test Engineer	Signature	Date of Test

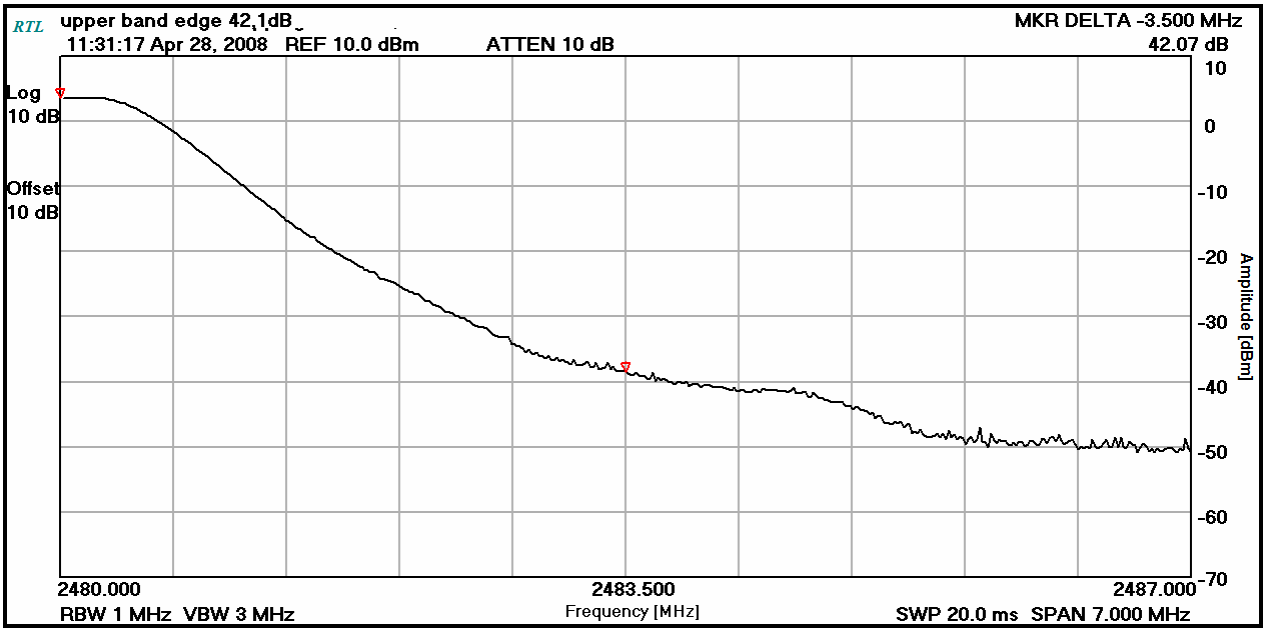
Plot 4-5: Lower Band Edge – Bluetooth - 2402 MHz



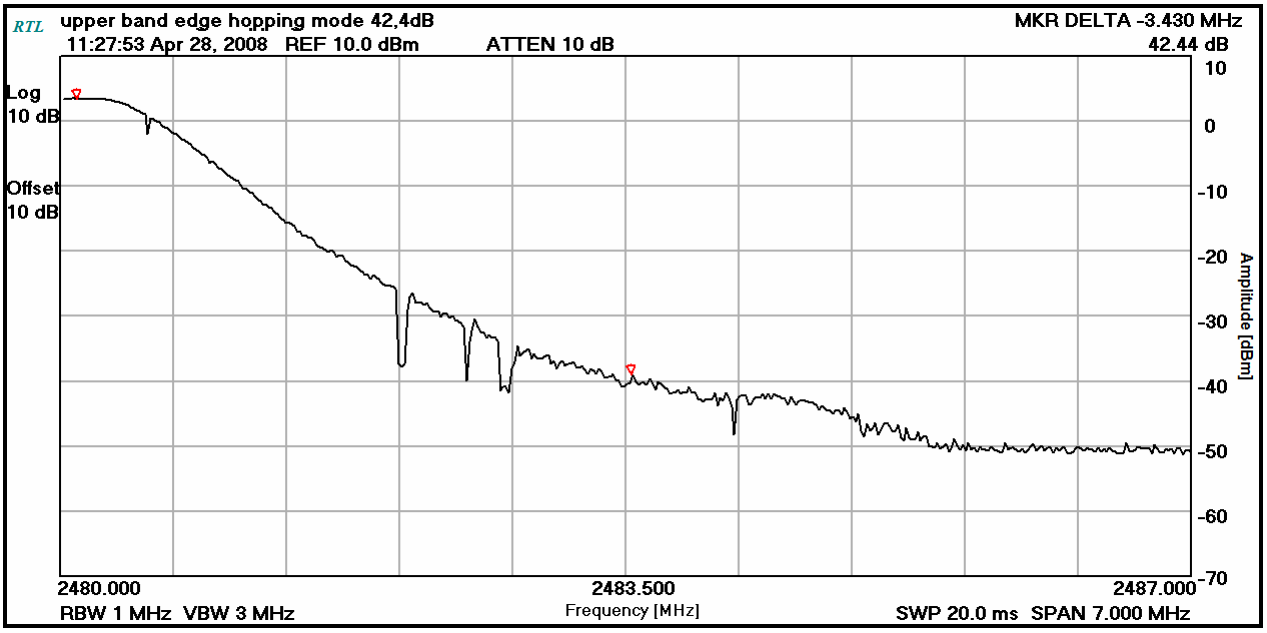
Plot 4-6: Lower Band Edge - Hopping



Plot 4-7: Upper Band Edge – Bluetooth - 2480 MHz



Plot 4-8: Upper Band Edge – Bluetooth - Hopping



Test Personnel:

Daniel W. Baltzell	Daniel W. Baltzell	April 28, 2008
Test Engineer	Signature	Date of Test

5 Antenna Conducted Spurious Emissions – FCC 15.247(d)

5.1 Antenna Conducted Spurious Emissions Test Procedures

Antenna spurious emissions per FCC 15.247(d) were measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz. The modulated carrier was identified at the following frequencies: 902.9, 915.2, 927.1, 2402, 2441 and 2480 MHz.

5.2 Antenna Conducted Spurious Emissions Test Results

No harmonics or spurs were found within 20 dB (note that we are reporting power as peak) of the carrier level from the carrier to the 10th harmonic of the carrier frequency. Per FCC 15.31(o), no data is being reported.

Table 5-1: Antenna Conducted Spurious Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	6/13/08

Test Personnel:

Daniel W. Baltzell		April 28, 2008
Test Engineer	Signature	Date of Test

6 20 dB Bandwidth – FCC 15.247(a)(1)(ii)

6.1 20 dB Bandwidth Test Procedure

The minimum 20 dB bandwidths were measured using a 50 ohm spectrum analyzer. The carrier was adjusted on the analyzer so that it was displayed entirely on the spectrum analyzer. The sweep time was set to auto and allowed through several sweeps with the max hold function used in peak detector mode. The resolution bandwidth was set to 100 kHz, and the video bandwidth set at 1 MHz. The minimum 20 dB bandwidths were measured using the spectrum analyzer delta marker set 20 dB down from the peak of the carrier and modulated. The table below contains the bandwidth measurement results. For the 900 MHz band the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Table 6-1: 20 dB Bandwidth Test Equipment

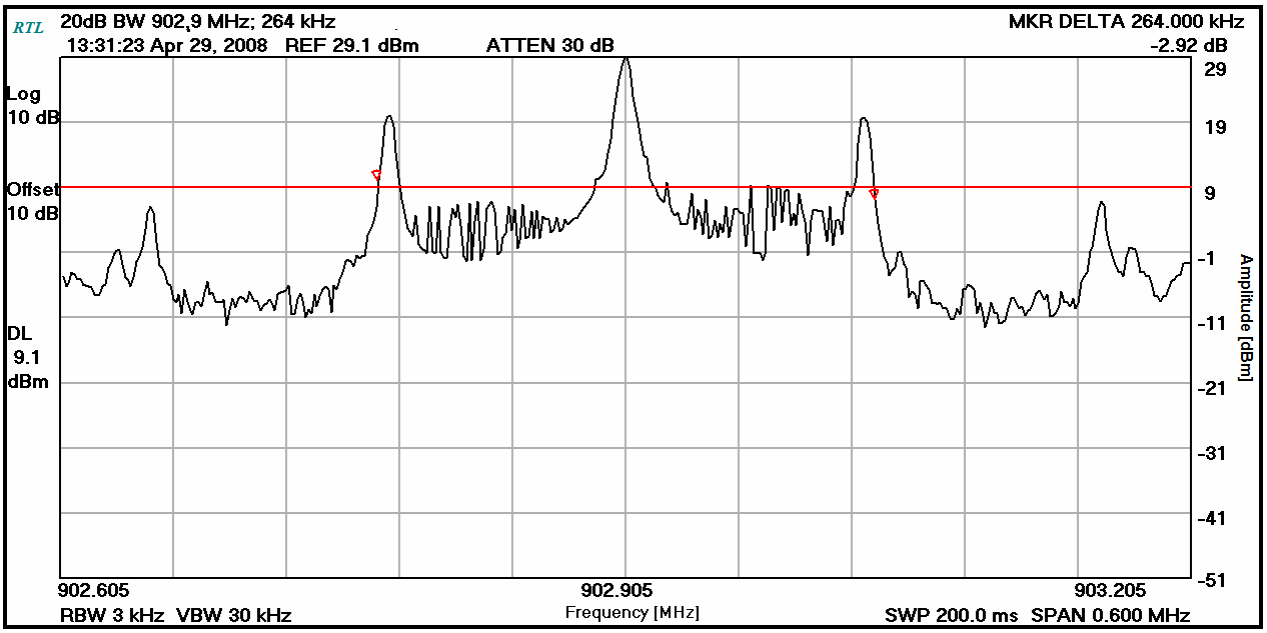
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz-12.8 GHz)	3826A00144	10/17/08

6.2 20 dB Modulated Bandwidth Test Data

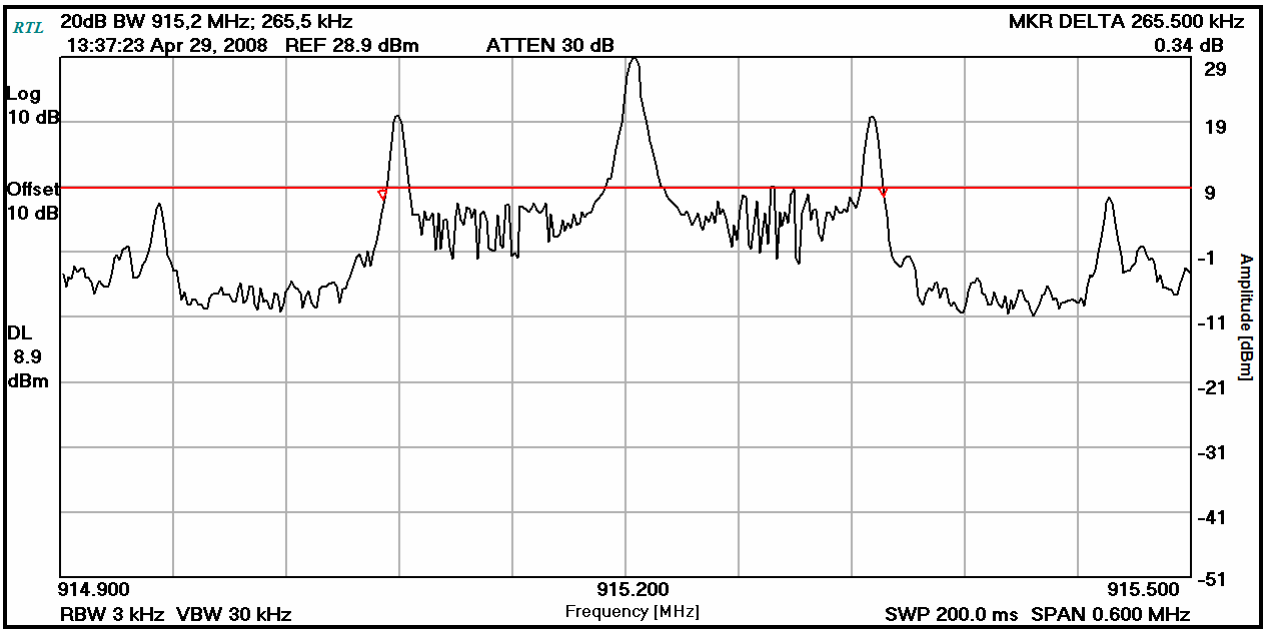
Table 6-2: 20 dB Modulated Bandwidth Test Data – 900 MHz FHSS - MaxStream

Frequency (MHz)	20 dB Bandwidth (kHz)
902.9	264.0
915.2	265.5
927.1	265.5

Plot 6-1: 20 dB Bandwidth - 902.9 MHz



Plot 6-2: 20 dB Bandwidth - 915.2 MHz



Plot 6-3: 20 dB Bandwidth - 927.1 MHz

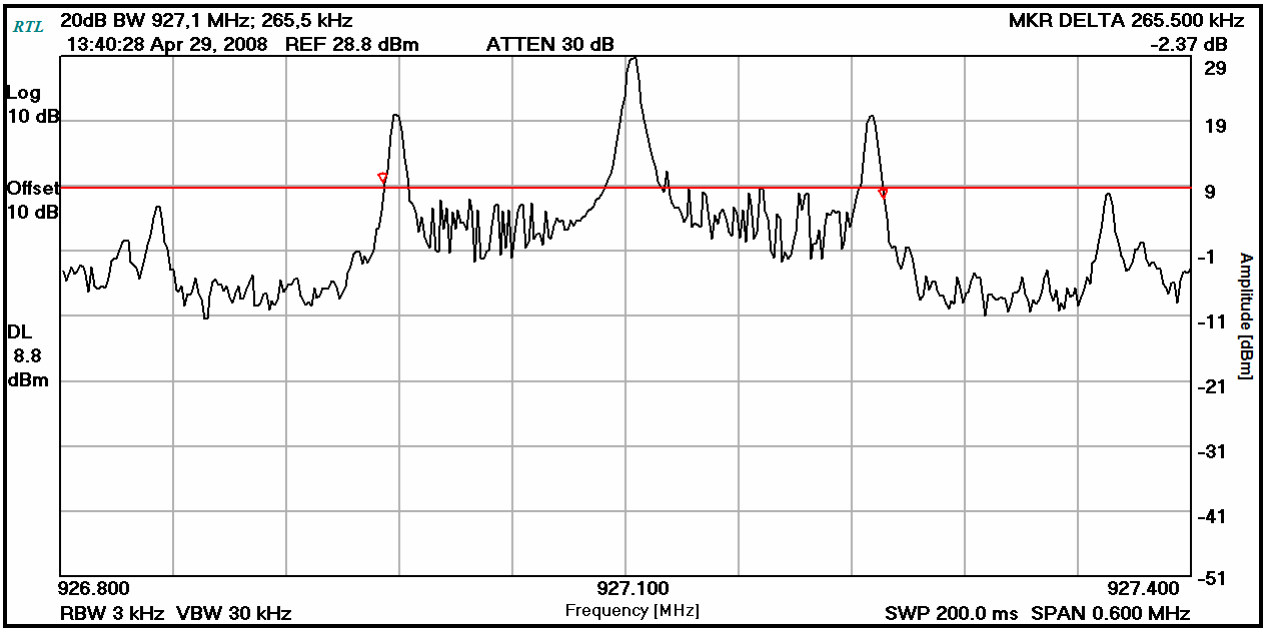
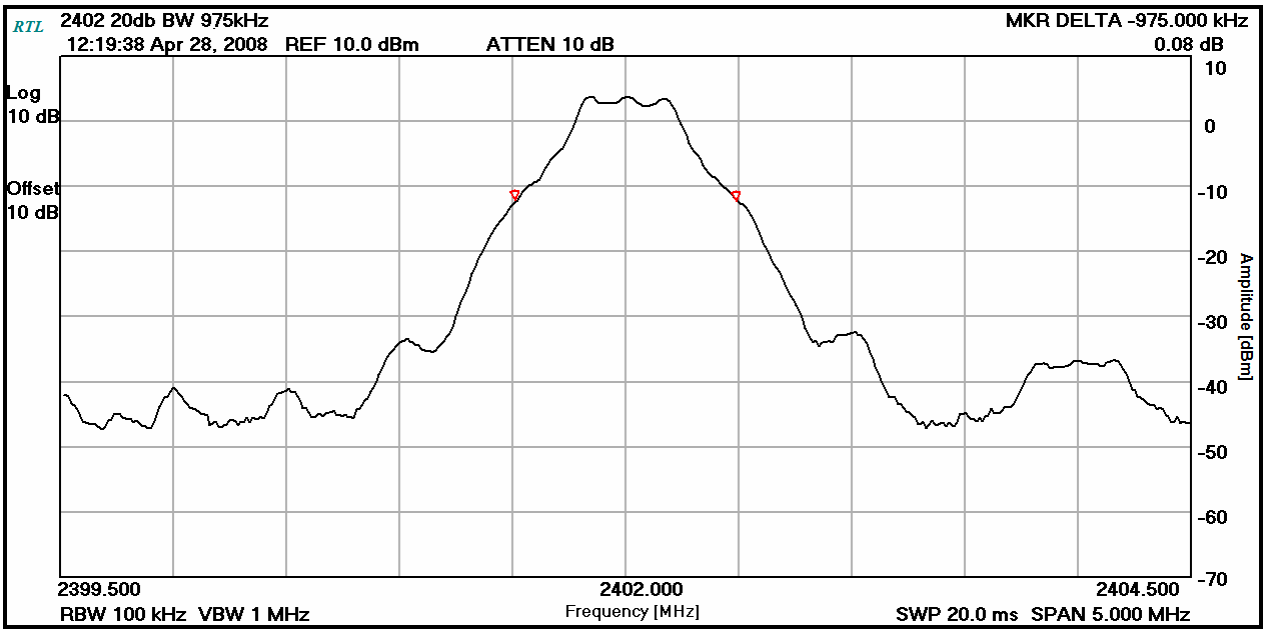


Table 6-3: 20 dB Modulated Bandwidth Test Data – 2.4 GHz FHSS Bluetooth

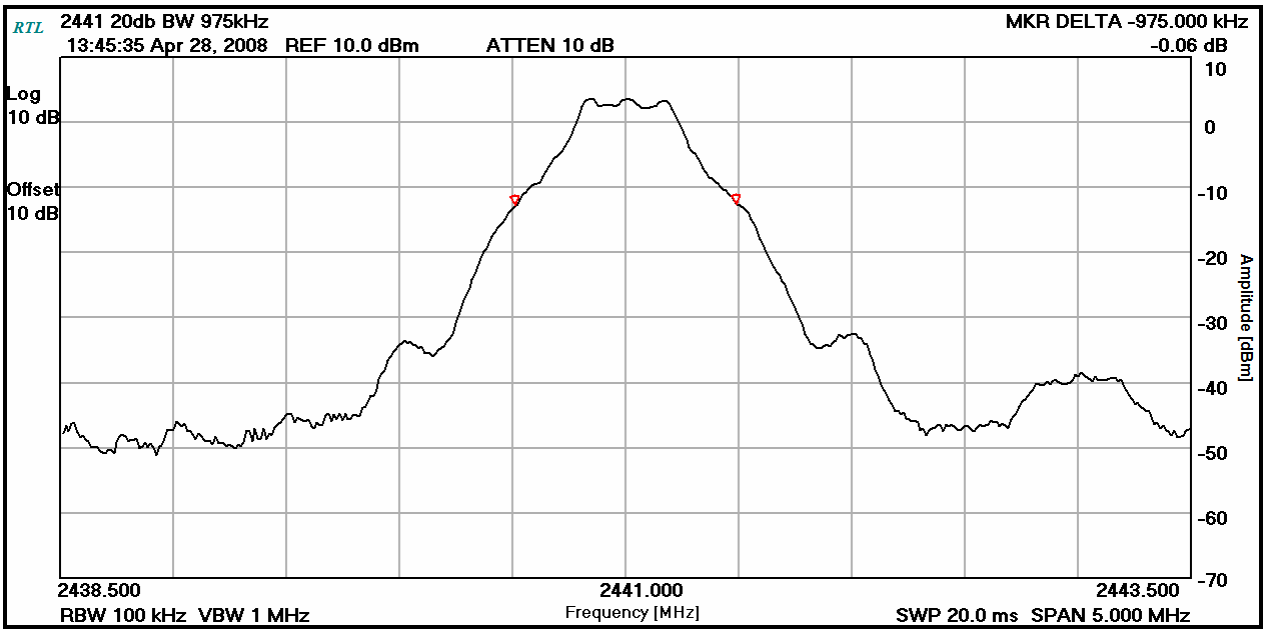
Minimum 20 dB bandwidths

Channel	20 dB Bandwidth (kHz)
0	975
41	975
80	975

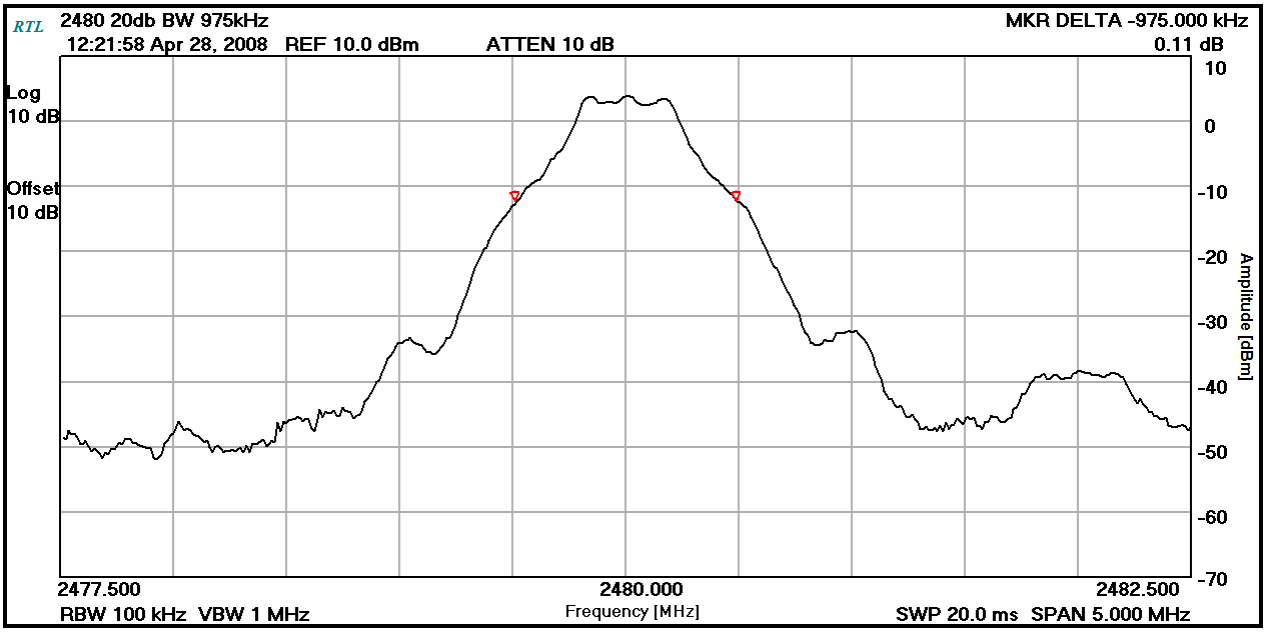
Plot 6-4: 20 dB Bandwidth Channel 0



Plot 6-5: 20 dB Bandwidth Channel 41



Plot 6-6: 20 dB Bandwidth Channel 80



Test Personnel:

Daniel W. Baltzell	Daniel W. Baltzell	April 28 & 29, 2008
Test Engineer	Signature	Dates of Test

7 Carrier Frequency Separation – FCC 15.247(a)(1)

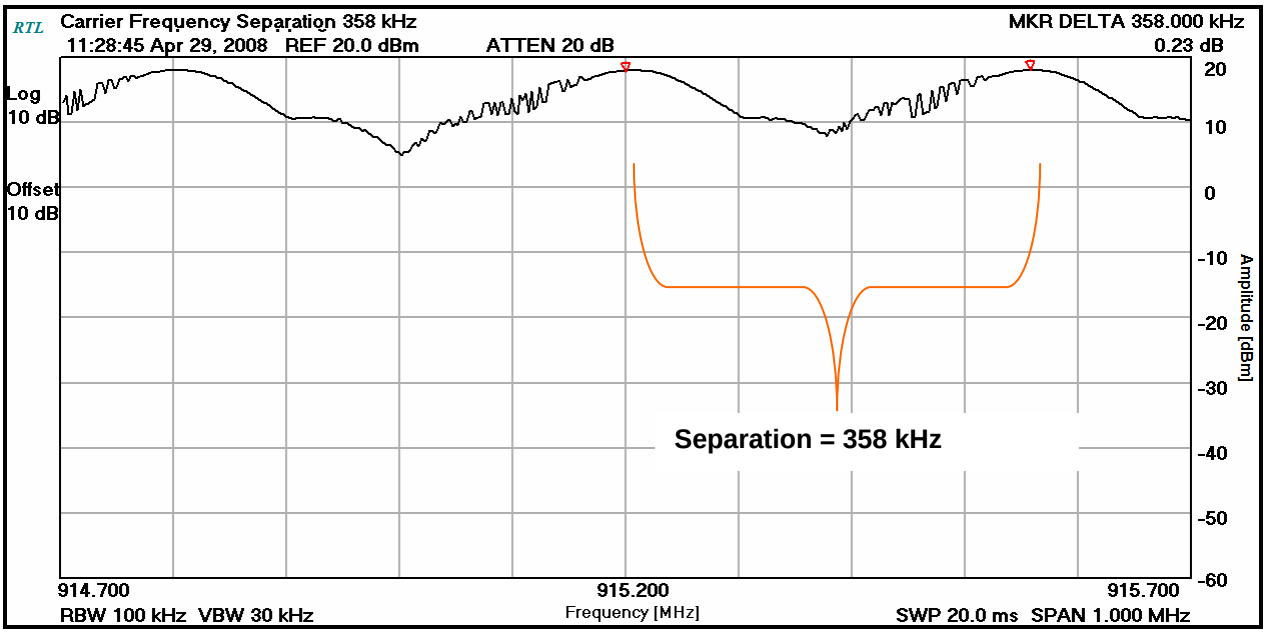
7.1 Carrier Frequency Separation Test Procedure

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.

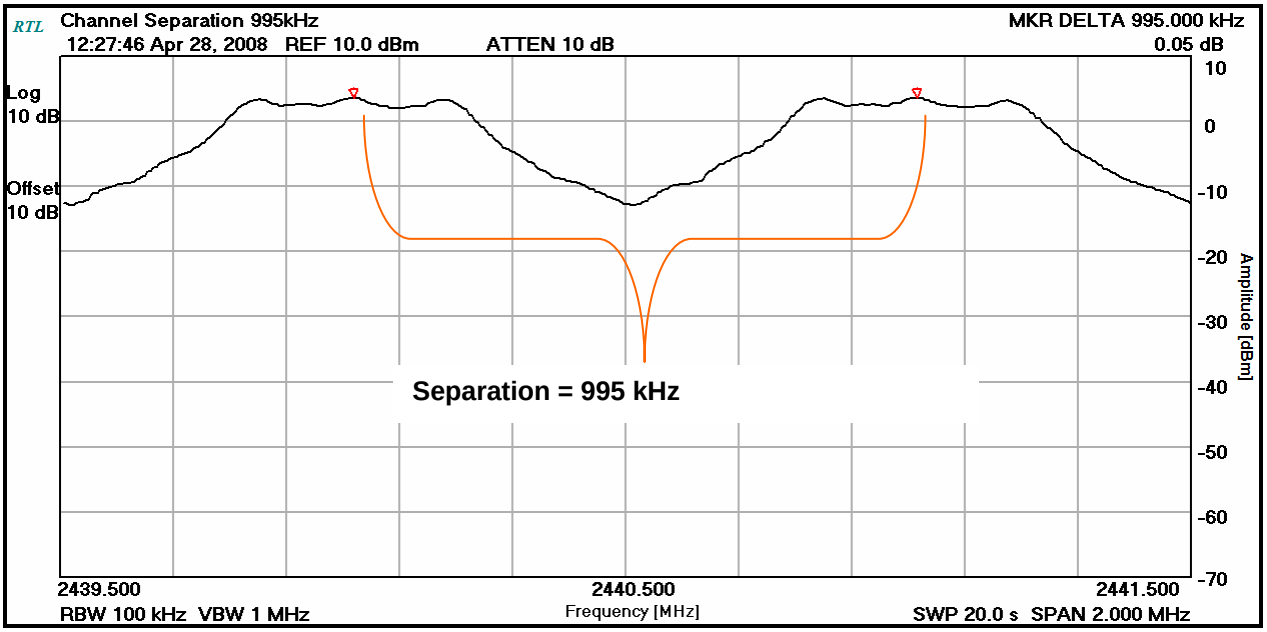
Measured frequency separation: 358 kHz 900 MHz MaxStream
995 kHz 2.4 GHz Bluetooth

7.2 Carrier Frequency Separation Test Data

Plot 7-1: Carrier Frequency Separation – 900 MHz FHSS – MaxStream



Plot 7-2: Carrier Frequency Separation – 2.4 GHz FHSS - Bluetooth



Test Personnel:

Daniel W. Baltzell	Daniel W. Baltzell	April 28 and 29, 2008
Test Engineer	Signature	Dates Of Test

8 Hopping Characteristics – FCC 15.247(a)(1)(i), (iii)

8.1 Hopping Characteristics Test Procedure

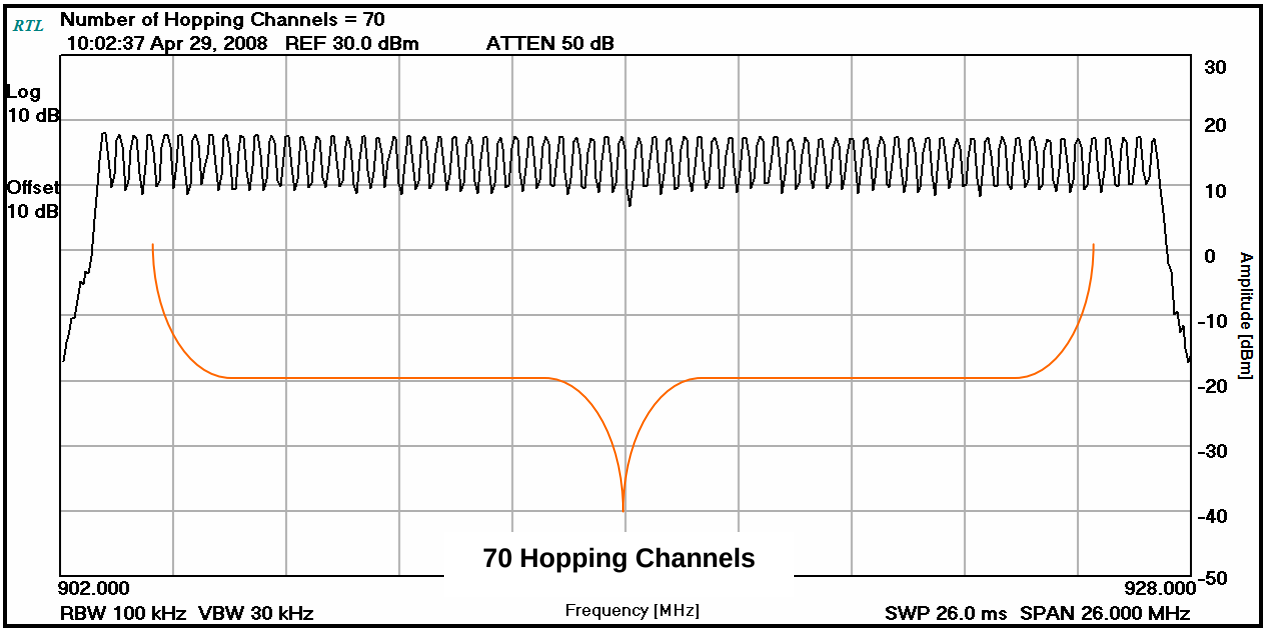
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; 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.

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 is used.

8.2 Number of Hopping Frequencies – 900 MHz FHSS - MaxStream

Measured number of hopping frequencies = 70

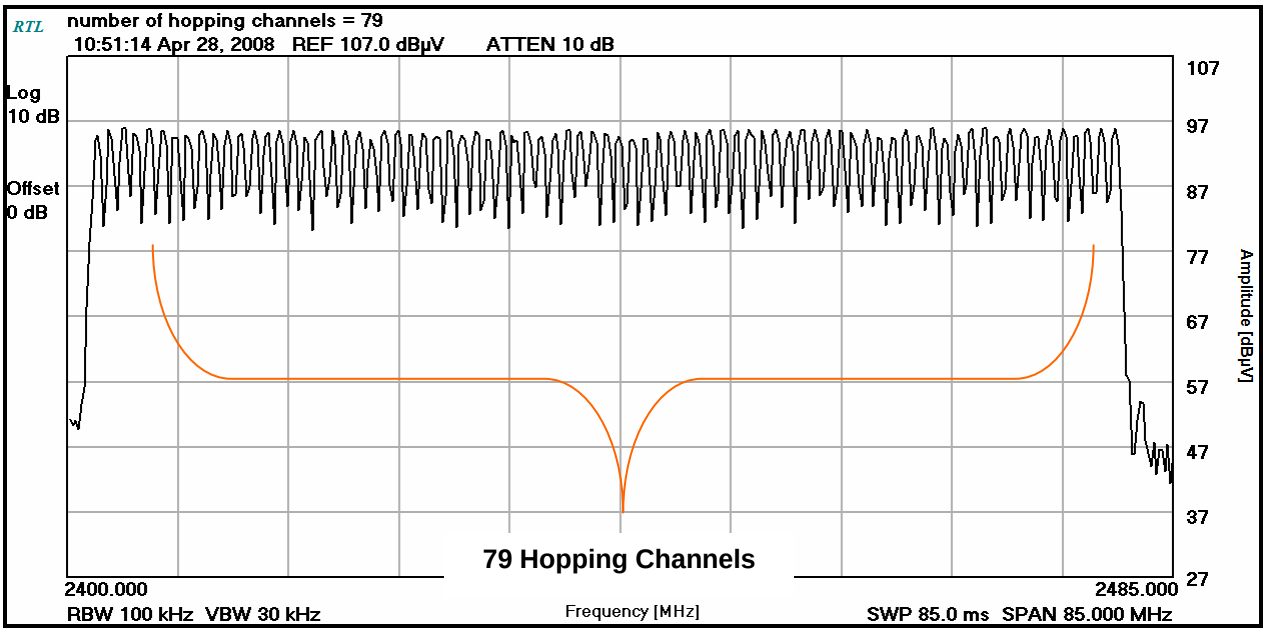
Plot 8-1: Number of Hopping Frequencies



8.3 Number of Hopping Frequencies - 2.4 GHz FHSS -Bluetooth

Measured number of hopping frequencies = 79

Plot 8-2: Number of Hopping Frequencies



Test Personnel:

Daniel W. Baltzell	Daniel W. Baltzell	April 28 & 29, 2008
Test Engineer	Signature	Dates Of Test

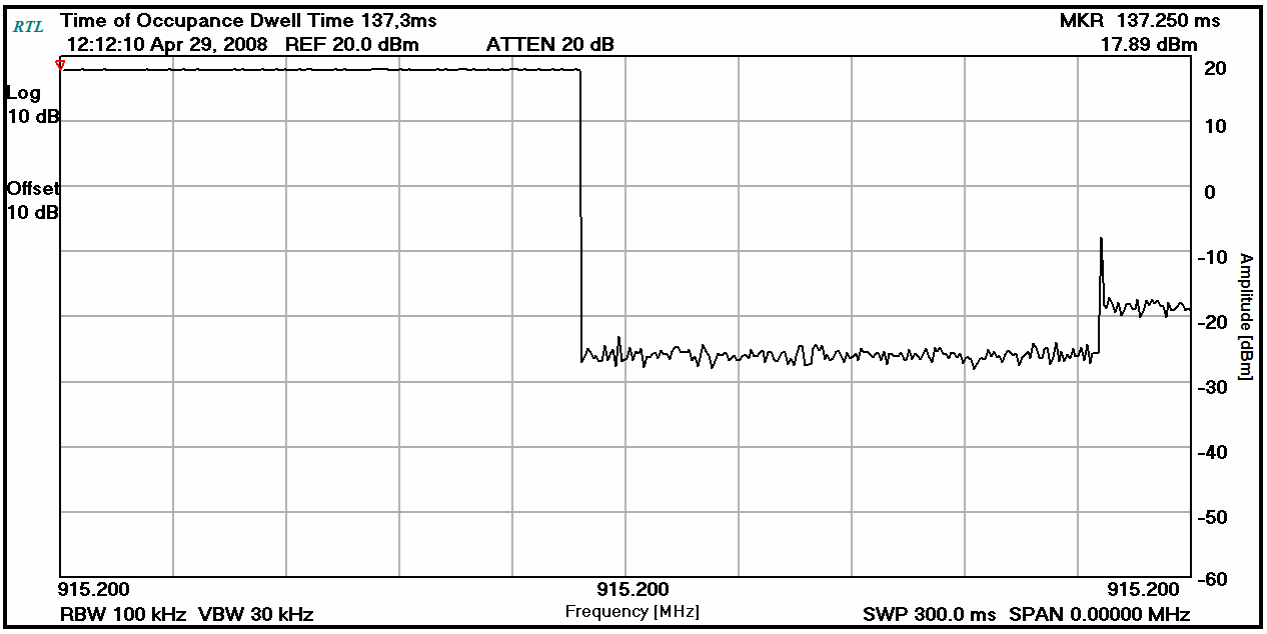
8.4 Average Time of Occupancy 900 MHz FHSS - MaxStream

The spectrum analyzer sweep was set to 0.3 second, with a zero span and max hold until a pulse from the device under test was captured. A marker delta was used to measure the dwell time for this pulse. The sweep was then set to single sweep for 20 s.

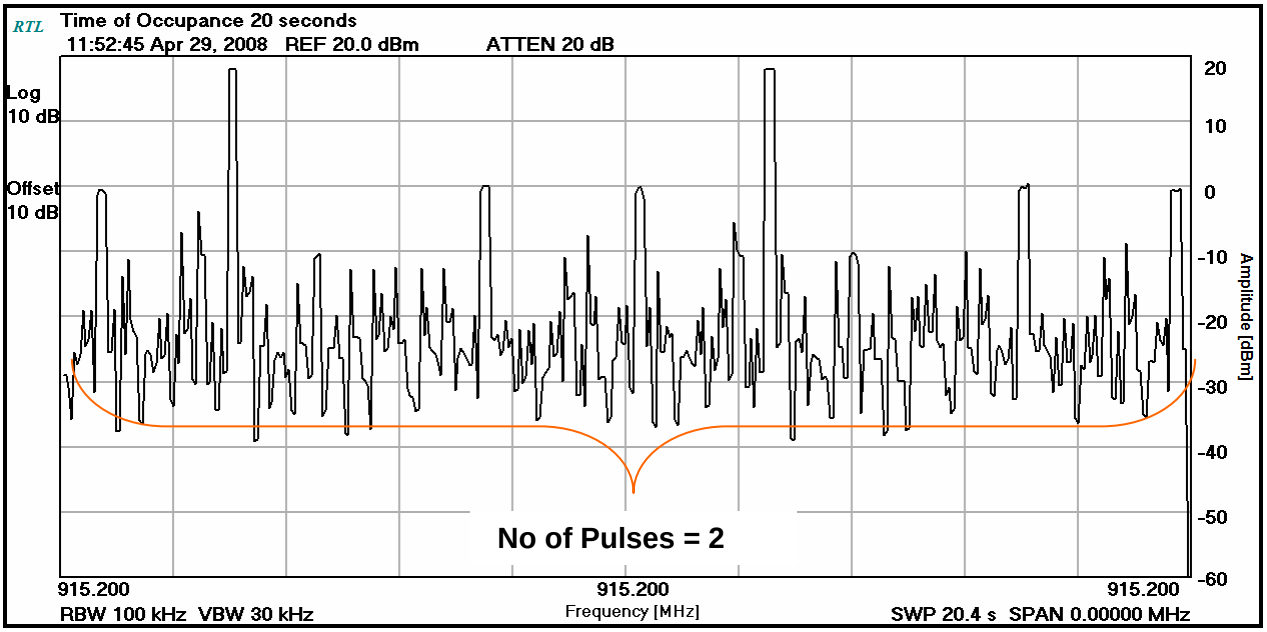
The number of pulses in 20 s was 2 and the pulse width is 137.3 ms in duration.

The average time of occupancy in the above period (20 s) is equal to 2 pulses x 0.1373 s = 274.6 ms, which meets the limit as defined by 15.247(a)(1)(iii) of 0.4 seconds.

Plot 8-3: Time of Occupancy (Dwell Time)



Plot 8-4: Time of Occupancy (Dwell Time 20 Second Sweep)



Number of pulses in 20 seconds: 2

Test Personnel:

Daniel W. Baltzell		April 29, 2008
Test Engineer	Signature	Date of Test

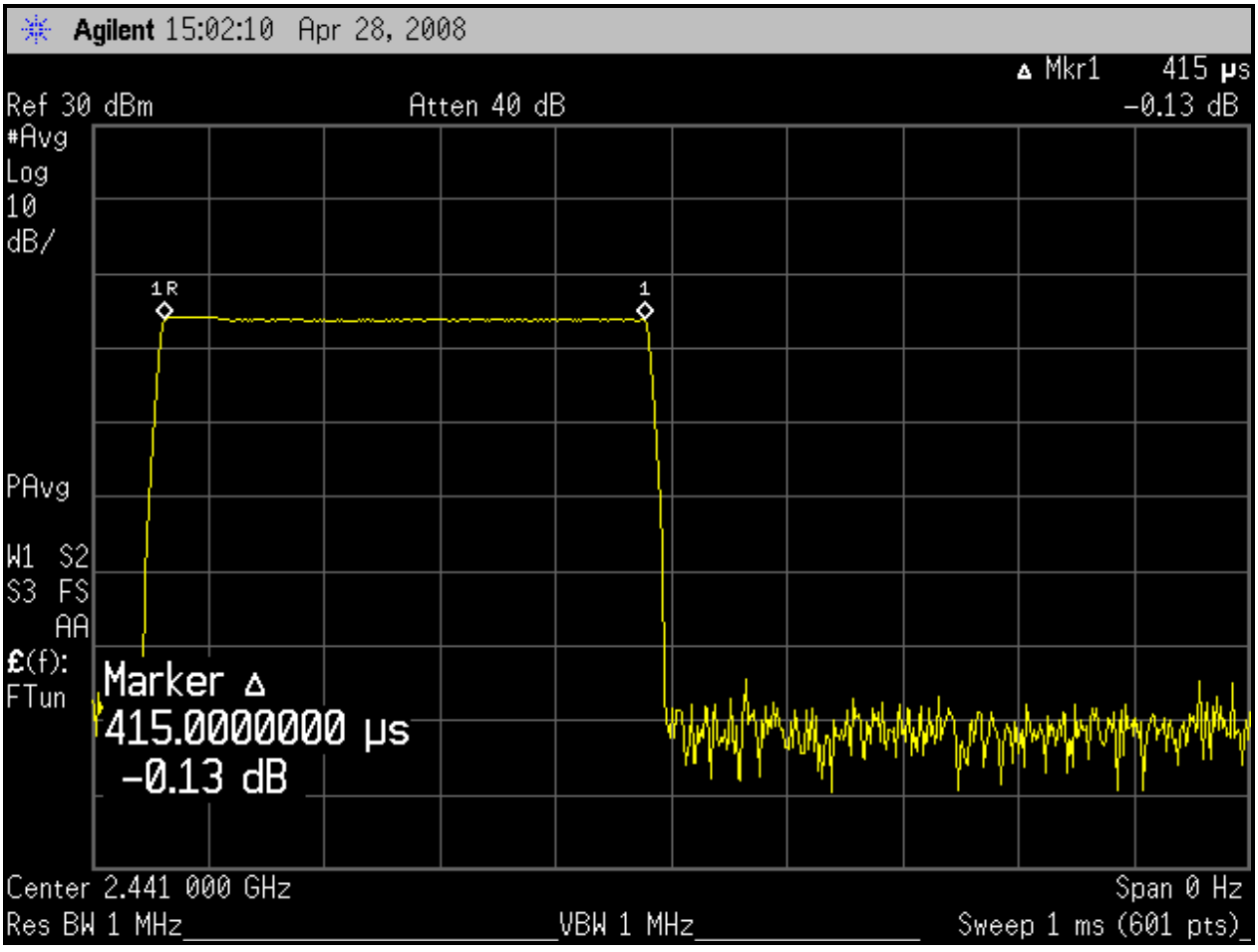
8.5 Average Time of Occupancy 2.4 GHz FHSS - Bluetooth

The spectrum analyzer sweep was set to 0.02 seconds, with a zero span and max hold until a pulse from the device under test was captured. A marker delta was used to measure the dwell time for this pulse. The sweep was then set to single sweep for 5 s (it was not possible to get a suitable display with a sweep time of 31.6 s).

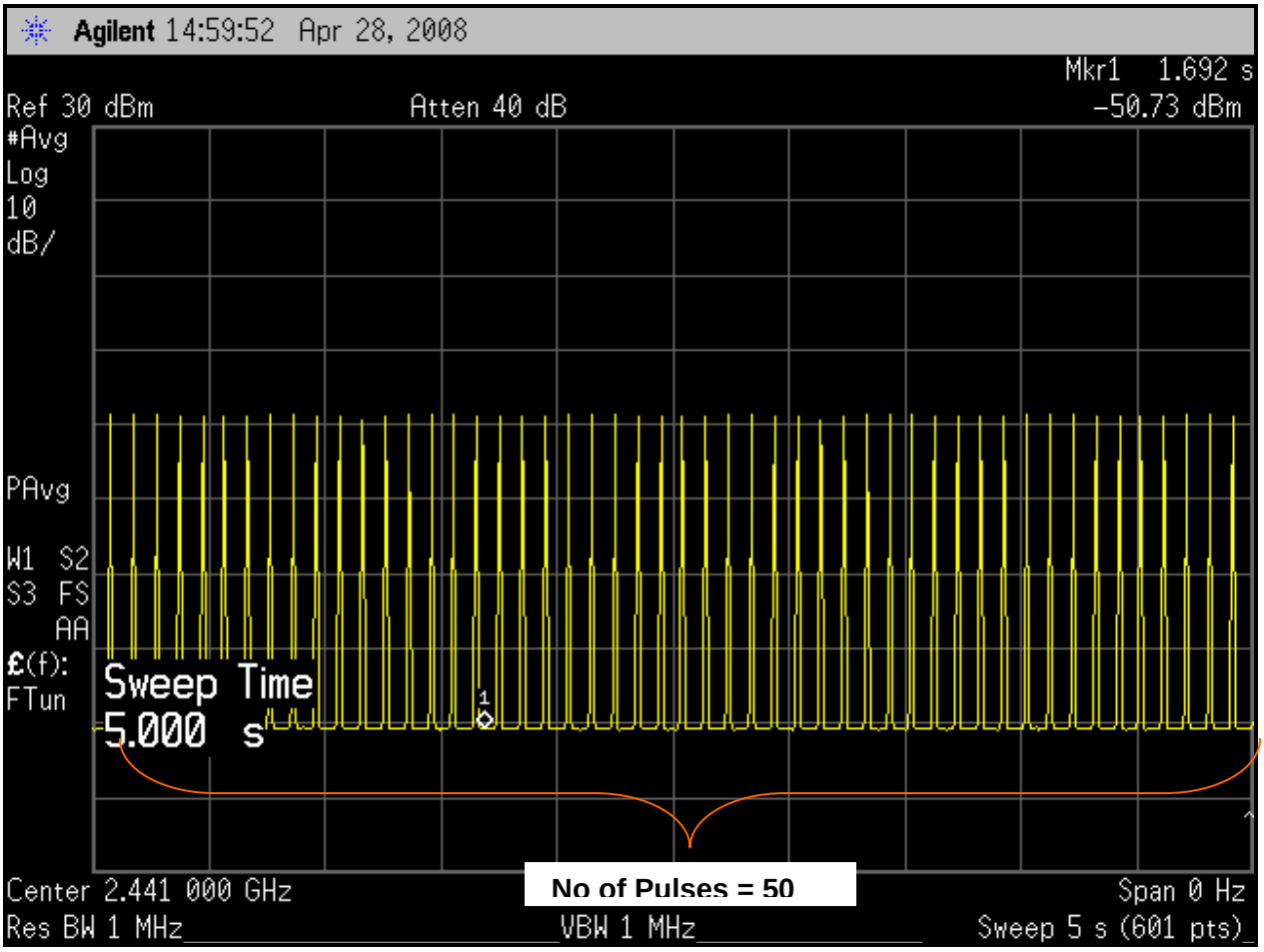
The number of pulses in 5 s was 50. Therefore, the number of pulses in a period of 0.4 seconds x 79 hopping channels (31.6 s) would be 316 pulses.

The average time of occupancy in the above period (31.6 s) is equal to 316 pulses x 0.415 ms = 131.1 ms, which meets the limit as defined by 15.247(a)(1)(iii) of 0.4 seconds.

Plot 8-5: Time of Occupancy (Dwell Time)



Plot 8-6: Time of Occupancy (Dwell Time 5 Second Sweep)



Number of pulses in 5 seconds: 50

Therefore, the number of pulses in the period of 0.4 s x 79 channels would be 316 pulses.

Test Personnel:

Daniel W. Baltzell		April 28, 2008
Test Engineer	Signature	Date of Test

9 Conducted Emissions Measurement Limits – FCC 15.207

9.1 Limits of Conducted Emissions Measurement

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

9.2 Conducted Emissions Measurement Test Procedure

The conducted emissions measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 0.8 meters high. Power was fed to the EUT through a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an AC filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed AC power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 7 kHz high-pass filter. The filter was used to prevent overload of the spectrum analyzer from noise below 7 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or average mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements were performed in a linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by decreasing the sweep time in order to obtain a calibrated measurement. The highest emissions amplitudes relative to the appropriate limits were measured and have been recorded in this report.

Table 9-1: Conducted Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900897	Hewlett Packard	8567A	HP Spectrum Analyzer (10 KHz-1.5 GHz)	2727A00535	4/2/09
900896	Hewlett Packard	85662A	Display Section	2816A16471	4/2/09
901082	AFJ International	LS16	16A LISN	16010020081	4/2/09
900901	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz-1 GHz)	3145A01599	4/2/09
N/A	Rhein Tech Laboratories, Inc.	Automated Emission Tester	Emissions testing software Rev. 14.0.2	N/A	N/A

9.3 Conducted Emissions Test Results

9.3.1 Conducted Emissions Hopping (900 MHz and 2.4 GHz)

Table 9-2: Conducted Emissions Neutral Side (Line 1)

Temperature: 74°F Humidity: 36%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)	Pass/ Fail
0.163	Pk	37.6	0.2	37.8	65.3	-27.5	55.3	-17.5	Pass
0.309	Pk	33.5	0.2	33.7	60.0	-26.3	50.0	-16.3	Pass
0.416	Pk	34.7	0.2	34.9	57.5	-22.6	47.5	-12.6	Pass
10.380	Pk	28.3	1.8	30.1	60.0	-29.9	50.0	-19.9	Pass
13.950	Pk	35.0	2.2	37.2	60.0	-22.8	50.0	-12.8	Pass
22.710	Pk	31.8	2.7	34.5	60.0	-25.5	50.0	-15.5	Pass

Table 9-3: Conducted Emissions Hot Side (Line 2)

Temperature: 74°F Humidity: 36%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)	Pass/ Fail
0.196	Pk	45.2	0.2	45.4	63.8	-18.4	53.8	-8.4	Pass
0.306	Pk	35.8	0.2	36.0	60.1	-24.1	50.1	-14.1	Pass
0.416	Pk	38.1	0.2	38.3	57.5	-19.2	47.5	-9.2	Pass
9.560	Pk	29.1	1.8	30.9	60.0	-29.1	50.0	-19.1	Pass
14.480	Pk	32.0	2.2	34.2	60.0	-25.8	50.0	-15.8	Pass
22.420	Pk	30.2	2.7	32.9	60.0	-27.1	50.0	-17.1	Pass

9.3.2 Conducted Emissions Receive (900 MHz and 2.4 GHz)

Table 9-4: Conducted Emissions Neutral Side (Line 1)

Temperature: 74°F Humidity: 36%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)	Pass/ Fail
0.176	Pk	36.8	0.2	37.0	64.7	-27.7	54.7	-17.7	Pass
0.313	Pk	34.0	0.2	34.2	59.9	-25.7	49.9	-15.7	Pass
0.412	Pk	33.9	0.2	34.1	57.6	-23.5	47.6	-13.5	Pass
20.380	Pk	38.0	2.7	40.7	60.0	-19.3	50.0	-9.3	Pass
20.410	Pk	37.8	2.7	40.5	60.0	-19.5	50.0	-9.5	Pass
22.680	Pk	31.5	2.7	34.2	60.0	-25.8	50.0	-15.8	Pass

Table 9-5: Conducted Emissions Hot Side (Line 2)

Temperature: 74°F Humidity: 36%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)	Pass/ Fail
0.240	Pk	38.1	0.2	38.3	62.1	-23.8	52.1	-13.8	Pass
0.306	Pk	33.5	0.2	33.7	60.1	-26.4	50.1	-16.4	Pass
0.413	Pk	34.2	0.2	34.4	57.6	-23.2	47.6	-13.2	Pass
13.720	Pk	34.9	2.2	37.1	60.0	-22.9	50.0	-12.9	Pass
19.560	Pk	34.6	2.6	37.2	60.0	-22.8	50.0	-12.8	Pass
22.800	Pk	33.5	2.7	36.2	60.0	-23.8	50.0	-13.8	Pass

Test Personnel:

Daniel W. Baltzell		April 28, 2008
Test Engineer	Signature	Date of Test

10 Radiated Emissions – FCC 15.209

10.1 Limits of Radiated Emissions Measurement

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009-0.490	2400/f (kHz)	300
0.490-1.705	2400/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

As shown in 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any circumstances of modulation.

10.2 Radiated Emissions Measurement Test Procedure

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane. The spectrum was examined from 9 kHz to the 10^{th} harmonic of the highest fundamental transmitter frequency (24.8 GHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations. For frequencies between 30 and 1000 MHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1000 MHz, emissions are measured using the average detector function with a minimum resolution bandwidth of 1 MHz. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Table 10-1: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900151	Rohde and Schwarz	HFH2-Z2	Antenna (Loop, 9 kHz-30 MHz)	827525/019	9/15/09
901365	Miteq	JS4-00102600-41-5P	Amplifier, 15 V, 0.1-26 GHz, 28 dB gain, power 5 dB	1094152	2/15/09
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz-12.8 GHz)	3826A00144	10/17/08
900905	Rhein Tech Labs	PR-1040	OATS 1 Preamplifier 40 dB (30 MHz–2 GHz)	1006	5/16/08
900878	Rhein Tech Labs	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/5/08
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/5/08
901242	Rhein Tech Labs	WRT-000-0003	Wood rotating table	N/A	Not Required
900772	EMCO	3161-02	Horn Antenna (2-4 GHz)	9804-1044	6/14/10
900321	EMCO	3161-03	Horn Antennas (4-8,2 GHz)	9508-1020	6/14/10
900323	EMCO	3160-7	Horn Antennas (8,2-12,4 GHz)	9605-1054	6/14/10
900356	EMCO	3160-08	Horn Antenna (12.4-18 GHz)	9607-1044	6/14/10
900325	EMCO	3160-9	Horn Antennas (18-26.5 GHz)	9605-1051	6/14/10
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 KHz–6.5 GHz)	3325A00159	4/15/09
900914	Hewlett Packard	8546OA	RF Filter Section, (100 kHz-6.5 GHz)	3330A00107	4/15/09

10.3 Radiated Emissions Test Results

10.3.1 Radiated Emissions Digital/Receiver Test Data

Table 10-2: Digital/Receiver Radiated Emissions

Temperature: 58°F Humidity: 46%								
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass/ Fail**
384.000	Qp	V	39.2	-8.7	30.5	46.0	-15.5	Pass
432.000	Qp	V	48.8	-7.5	41.3	46.0	-4.7	Pass
528.000	Qp	V	36.3	-5.6	30.7	46.0	-15.3	Pass
892.199	Qp	V	44.2	-0.6	43.6	46.0	-2.4	Pass
925.894	Qp	V	44.5	0.1	44.6	46.0	-1.4	Pass
937.796	Qp	V	34.3	0.4	34.7	46.0	-11.3	Pass

10.3.2 Radiated Emissions Harmonics/Spurious Test Data

For the Bluetooth transmitter, no harmonics or spurs were found within 20 dB of the limit. For the MaxStream transmitter, other than the data below, no harmonics or spurs were found within 20 dB of the limit. Per FCC 15.31(o), no other data is being reported.

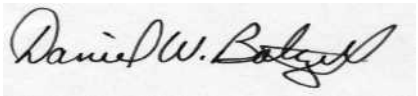
Table 10-3: Radiated Emissions Harmonics/Spurious - MaxStream

Emission Frequency (MHz)	**Analyzer Reading (dBuV)**	**Detector**	**Antenna Polarity**	**Site Correction Factor (dB)**	**Duty Cycle Correction (dB)**	**Corrected Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
3660.8	38.2	average	V	-1.7	0	36.5	54.0	-17.5
9029.0	23.2	average	H	13.4	0	36.6	54.0	-17.4

Notes:

- peak: 1 MHz RBW/VBW
- average: 1 MHz RBW/10 Hz VBW
- measurements taken at 3 m
- Site Correction Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre-amp Gain (dB)
- Simultaneous transmission (co-location) was investigated with both the MaxStream and Bluetooth module transmitting. There was no introduction of intermod or increased spurious emissions.

Test Personnel:



Daniel W. Baltzell		April 29, 2008
Test Engineer	Signature	Date of Test

11 Conclusion

The data in this measurement report shows that the EUT as tested, McQ, Inc. Model WMR, FCC ID: NVQ-OMNI2431, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations.