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WIRELESS PRODUCT DEVELOPMENT
ACCREDITED
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TEST REPORT # 310316
LSR Job #: C-1053

Compliance Testing of:
TH6000R1003, MRCH1 Thermostat

Test Date(s):
November 29, 30, December 1, 2, 14, 2010

Prepared For:
Honeywell
Attn: Gabe Bergman
1985 Douglas Drive North
Golden Valley, MN 55422

In accordance with:
Federal Communications Commission (FCC)
Part 15, Subpart C, Section 15.247
Industry Canada (IC) RSS 210 Annex 8
Frequency Hopping Spread Spectrum (FHSS) Operating in the Frequency Band 902-928 MHz

This Test Report is issued under the Authority of:

Signature: Date: 1/7/2011

Test Report Reviewed by:	Tested by: Peter Feilen, EMC Engineer
Signature: Date: 12/21/10	Signature: Date: 12/20/10

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EXHIBIT 1. INTRODUCTION

1.1 - Scope

References:	FCC Part 15, Subpart C, Section 15.247 and 15.209 FCC Part 2, Section 2.1043 paragraph (b)1. RSS GEN and RSS 210 Annex 8
Title:	FCC : Telecommunication – Code of Federal Regulations, CFR 47, Part 15. IC : Low-power License-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment
Purpose of Test:	To gain FCC and IC Certification Authorization for Low-Power License-Exempt Transmitters.
Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 – 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.
Environmental Classification:	Commercial, Industrial or Business Residential

1.2 – Normative References

Publication	Year	Title
47 CFR, Parts 0-15 (FCC)	2009-10	Code of Federal Regulations - Telecommunications
RSS 210 Annex 8	2009-10	Low-power License-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment
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.
CISPR 16-1-1	2006-03 A1: 2006-09 A2: 2007-07	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus.
FCC Public Notice DA00 705	2000	Part 15 Unlicensed Modular Transmitter Approval

1.3 - LS Research, LLC Test Facility

LS Research, LLC is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025, 2005 "General Requirements for the Competence of Calibration and Testing Laboratories".

LS Research, LLC's scope of accreditation includes all test methods listed herein, unless otherwise noted. A copy of the accreditation may be accessed on our web site: www.lsr.com. Accreditation status can be verified at A2LA's web site: www.a2la2.net.

1.4 – Location of Testing

All testing was performed at the following location utilizing the facilities listed below, unless otherwise noted.

LS Research, LLC
W66 N220 Commerce Court
Cedarburg, Wisconsin, 53012 USA,

List of Facilities Located at LS Research, LLC:

Compact Chamber
Semi-Anechoic Chamber
Open Area Test Site (OATS)

1.5 – Test Equipment Utilized

A complete list of equipment utilized in testing is provided in Appendix A of this test report. Calibration dates are indicated in Appendix A. All test equipment is calibrated in accordance with A2LA standards.

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1 – Client Information

Manufacturer Name:	Honeywell
Address:	1985 Douglas Drive North, Golden Valley, MN 55422
Contact Name:	Gabe Bergman

2.2 - Equipment Under Test (EUT) Information

The following information has been supplied by the applicant.

Product Name:	Thermostat
Model Number:	TH6000R1003, MRCH1
Serial Number:	Engineering Sample

2.3 - Associated Antenna Description

An inverted L PCB trace antenna is used in the TH6000R1003/MRCH1. This antenna has a theoretical gain of 0 dBi.

2.4 - EUT'S Technical Specifications

EUT Frequency Range (in MHz)	903.0 - 926.4 MHz
Radiated RF Power in Watts	0.034277 W
Conducted Output Power (in dBm)	10.8 dBm
Field Strength at 3 meters	110.58 dBuV/m @ 3m
Occupied Bandwidth (99% BW)	69.0 kHz
Type of Modulation	FSK
Emission Designator	69k3F1D
EIRP (in mW)	34.2768 mW Note: Measured over a conductive ground plane
Transmitter Spurious (worst case)	36.7 dBuV/m @ 851 MHz (@ 3m)
Receiver Spurious (worst case)	44.1 dBuV/m @ 5486.5 MHz (@ 1m)
Receiver Bandwidth	101.562 kHz
Receiver Sensitivity	-103.0 dBm
Frequency Tolerance %, Hz, ppm	Better than 100 ppm
Microprocessor Model # (if applicable)	MSP430F5524
Antenna Information	
Detachable/non-detachable	Non-detachable
Type	Trace
Gain (in dBi)	4.55 dBi Note: Measured over a conductive ground plane
EUT will be operated under FCC Rule Part(s)	15.247
EUT will be operated under RSS Rule Part(s)	210 Annex 8
Modular Filing	☐ Yes ☒ No
Portable or Mobile?	Mobile

RF Technical Information:

Type of Evaluation (check one)		SAR Evaluation: Device Used in the Vicinity of the Human Head
		SAR Evaluation: Body-worn Device
	X	RF Evaluation

If RF Evaluation checked above, test engineer to complete the following:

Evaluated against exposure limits: ☒ General Public Use ☐ Controlled Use
Duty Cycle used in evaluation: 100 %
Standard used for evaluation: OET 65 Measurement Distance: 20 cm
RF Value: 0.000682 ☐ V/m ☐ A/m ☒ W/m^2
☐ Measured ☐ Computed ☒ Calculated

2.5 - Product Description

This device is a battery powered wireless thermostat. It provides control data to equipment interface module that controls a minisplit heatpump system.

PHOTO (Optional)

EXHIBIT 3. EUT OPERATING CONDITIONS & CONFIGURATIONS DURING TESTS

3.1 - Climate Test Conditions

Temperature:	20-25 ˚C
Humidity:	35-65 % R.H.
Pressure:	695-745 mmHg

3.2 - Applicability & Summary Of EMC Emission Test Results

FCC and IC Paragraph	Test Requirements	Compliance (Yes/No)
FCC : 15.207 IC : RSS GEN sect. 7.2.2	Power Line Conducted Emissions Measurements	N/A
FCC : 15.247 (a)(1)(i) IC : RSS 210 A8.1 (a)	20 dB Bandwidth	YES
FCC : 15.247(b) & 1.1310 IC : RSS 210 A8.4	Maximum Output Power	YES
FCC : 15.247(i), 1.1307, 1.1310, 2.1091 & 2.1093 IC : RSS 102	RF Exposure Limit	YES
FCC :15.247(c) IC : RSS 210 A8.5	RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	YES
FCC:15.247 (a)(1)(i) IC: RSS 210 (b)	Carrier Frequency Separation	YES
FCC:15.247 (a)(1)(i),(ii),(iii) IC: RSS 210 (c),(d),(e)	Number of hopping channels	YES
FCC:15.247 (a)(1)(i),(ii),(iii) IC: RSS 210 (c),(d),(e)	Time of occupancy (Dwell Time)	YES
FCC : 15.247(c), 15.209 & 15.205 IC : RSS 210 A8.2(b), section 2.2, 2.6 and 2.7	Transmitter Radiated Emissions	YES

3.3 - Modifications Inocorporated In The EUT For Compliance Purposes

☒ None ☐ Yes (explain below)

3.4 - Deviations & Exclusions From Test Specifications

☒ None ☐ Yes (explain below)

EXHIBIT 4. DECLARATION OF CONFORMITY

The EUT was found to MEET the requirements as described within the specification of FCC Title 47, CFR Part 15.247, and Industry Canada RSS-210, Issue 8 (2010), Section Annex 8 (section A8.1) for a Frequency Hopping Spread Spectrum (FHSS) Transmitter.

Note: If some emissions are seen to be within 3 dB of their respective limits; as these levels are within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

LS Research, LLC certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specifications. The results in this Test Report apply only to the item(s) tested on the above-specified dates. Any modifications made to the EUT subsequent to the indicated test date(s) will invalidate the data herein, and void this certification.

EXHIBIT 5. RADIATED EMISSIONS TEST

5.1 - Test Setup

The test setup was assembled in accordance with Title 47, CFR FCC Part 15, RSS GEN and ANSI C63.4-2003. The EUT was placed on an 80cm high non-conductive pedestal, centered on a flush mounted 2-meter diameter turntable inside a 3 meter Semi-Anechoic, FCC listed Chamber. The EUT was operated in continuous modulated transmit mode for final testing using power as provided by 2 AA batteries.

The applicable limits apply at a 3 meter distance. Measurements above 4 GHz were performed at a 1.0 meter separation distance. The calculations to determine these limits are detailed in the following pages. Please refer to Appendix A for a complete list of test equipment. The test sample was operated on one of three (3) standard channels: low (903 MHz), middle (914.6 MHz) and high (926.4 MHz) to comply with FCC Part 15.31(m).

5.2 - Test Procedure

Radiated RF measurements were performed on the EUT in a 3 meter Semi-Anechoic, FCC listed Chamber. The frequency range from 30 MHz to 10000 MHz was scanned and investigated. The radiated RF emission levels were manually noted at the various fixed degree settings of azimuth on the turntable and antenna height. The EUT was placed on a non-conductive pedestal in the 3 meter Semi-Anechoic Chamber, with the antenna mast placed such that the antenna was 3 meters from the EUT. A Bi-conical Antenna was used to measure emissions from 30 MHz to 300 MHz, and a Log Periodic Antenna was used to measure emissions from 300 MHz to 1000 MHz A Double-Ridged Waveguide Horn Antenna was used from 1 GHz to 10 GHz.
The maximum radiated RF emissions were found by raising and lowering the antenna between 1 and 4 meters in height for measurements below 4 GHz, and raising and lowering the antenna from 1.0 to 1.8m in height for measurements above 4 GHz, using both horizontal and vertical antenna polarities regardless of frequency.

The EUT was positioned in one orientation mimicking that of being wall mounted as would be used in typical installation.

5.3 - Test Equipment Utilized

A list of the test equipment and antennas utilized for the Radiated Emissions test can be found in Appendix A. This list includes calibration information and equipment descriptions. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All calibrations of the antennas used were performed at an IEC/ISO 17025 accredited calibration laboratory, traceable to the SI standard. In addition, the Connecting Cables were measured for losses using a calibrated Signal Generator and an EMI Receiver. The resulting correction factors and the cable loss factors from these calibrations were entered into the EMI Receiver database. As a result, the data taken from the EMI Receiver accounts for the antenna correction factor as well as cable loss or other corrections, and can therefore be entered into the database as a corrected meter reading. The EMI Receiver was operated with resolution bandwidths as prescribed in ANSI C63.4.

5.4 - Test Results

The EUT was found to **MEET** the Radiated Emissions requirements of Title 47 CFR, FCC Part 15.247 and Canada RSS-210, Issue 8 (2010), Annex 8 for a FHSS transmitter. The frequencies with significant RF signal strength were recorded and plotted as shown in the Data Charts and Graphs.

5.5 - Calculation of Radiated Emissions Limits

The maximum peak output power of an intentional radiator in the 902 to 928 MHz band, as specified in Title 47 CFR 15.247 and RSS 210 is 1 Watt. The harmonic and spurious RF emissions, as measured in any 100 kHz bandwidth, as specified in 15.247 (d) and RSS 210 A8.5, shall be at least 20 dB below the measured power of the desired signal, and must also meet the requirements described in 15.205(c) for FCC and section 2.2, 2.6 and 2.7 of RSS 210 for IC.

The following table depicts the general radiated emission limits above 30 MHz. These limits are obtained from Title 47 CFR, Part 15.209, for radiated emissions measurements. These limits were applied to any signals found in the 15.205 restricted bands. The mentioned limits correspond to those limits listed in RSS 210 section 2.7.

Frequency (MHz)	3 m Limit μV/m	3 m Limit (dBμV/m)	1 m Limit (dBμV/m)
30-88	100	40.0	-
88-216	150	43.5	-
216-960	200	46.0	-
960-24,000	500	54.0	63.5

Sample conversion of field strength (μV/m to dBμV/m):
dBμV/m = 20 log $_{10}$ (100)= 40 dBμV/m (from 30-88 MHz)

For measurements made at 1.0 meter, a 9.5 dB correction has been invoked.

960 MHz to 10,000 MHz
500μV/m or 54.0 dB/μV/m at 3 meters
54.0 + 9.5 = 63.5 dB/μV/m at 1 meter

For measurements made at 0.3 meter, a 20 dB correction has been invoked.

960 MHz to 10,000 MHz
500μV/m or 54.0 dB/μV/m at 3 meters
54.0 + 20 = 74 dB/μV/m at 0.3 meters

Generic example of reported data at 200 MHz:

Reported Measurement data = 18.2 (raw receiver measurement) + 15.8 (antenna factor) + 1.45 (cable factor) = 35.45 (dBμV/m).

Correction factors and cable loss factors were entered into the EMI Receiver database. As a result, the data taken reflects absolute measurements. Refer to the above for example of reported data.

5.6 - Radiated Emissions Test Data Chart

Frequency Range Inspected: 30 MHz to 10000 MHz

Manufacturer:	Honeywell					
Date(s) of Test:	December 1, 2, 2010					
Project Engineer:	Peter Feilen					
Test Engineer(s):	Peter Feilen					
Voltage:	3 VDC					
Operation Mode:	Continuous transmit, modulated mode					
Environmental Conditions in the Lab:	Temperature: 22° C Relative Humidity: 44 %					
EUT Power:		Single Phase ___VAC		3 Phase ___VAC		
	X	Battery (2 AA)		Other: Bench DC Supply		
EUT Placement:	X	80cm non-conductive table		10cm Spacers		
EUT Test Location:	X	3 Meter Semi-Anechoic FCC Listed Chamber		1m Compact Semi-Anechoic Chamber		
Measurements:		Pre-Compliance		Preliminary	X	Final
Detectors Used:	X	Peak	X	Quasi-Peak	X	Average

The following table depicts the level of significant spurious radiated RF emissions found (other than the fundamentals and its harmonics):

Frequency (MHz)	Ant. Polarity	Height (meters)	Azimuth (degrees)	Measured Peak Field Strength (dBμV/m)	Measured Quasi-Peak Field Strength (dBuV/m)	Limit (dBμV/m)	Margin (dB)
848.4	H	1.00	0	39.9	36.6	46.0	9.4
984.7	H	1.00	0	35.6	30.0	54.0	24.0
999.6	V	1.00	0	35.1	29.5	54.0	24.5
591.0	H	1.37	0	35.4	32.2	46.0	13.8
851.0	H	1.00	357	41.9	36.7	46.0	9.3
981.7	H	1.00	0	35.9	29.8	54.0	24.2
999.8	V	1.00	0	35.1	29.5	54.0	24.5
189.3	H	1.00	0	20.3	14.6	43.5	28.9
299.1	H	1.00	0	30.2	24.6	46.0	21.5
299.4	H	1.00	0	30.2	24.4	46.0	21.6

Note:

1. H: Horizontal, V: Vertical
2. Emissions were present on all channels; not channel specific
3. A quasi-peak detector was used for measurements below 1 GHz. Above 1 GHz a peak detector with a 10Hz video-averaged signal was used

The following table depicts the level of radiated Fundamental emissions seen:

Frequency (MHz)	Ant. Polarity	Chan.	Height (meters)	Azimuth (degrees)	Measured Quasi-Peak Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)
903.00	Horizontal	LOW	1.45	0	110.58	125.23	14.65
914.60	Horizontal	MID	1.49	169	110.18	125.23	15.05
926.40	Horizontal	HIGH	1.40	0	109.30	125.23	15.93

Notes:

1. H: Horizontal, V: Vertical
2. A quasi-peak detector was used for measurements below 1 GHz. Above 1 GHz a peak detector with a 10Hz video-averaged signal was used

RADIATED EMISSIONS DATA CHART (continued)

The following table depicts the level of significant radiated harmonic emissions seen on Low Channel: 903.0 MHz

Antenna Polarity	Frequency (MHz)	Peak (dBuV/m)	Peak Limit (dBuV/m)	Average (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dBuV/m)	Antenna Height (cm)	Azimuth (degrees)
Horizontal	1806.25	63.2	90.6	62.4	90.6	28.2	161	0
Horizontal	2709	Note 3						
Horizontal	3612	Note 3						
Horizontal	4515.17	44.5	83.5	34.4	63.5	29.1	113	324
Horizontal	5418.05	52.1	83.5	47.9	63.5	15.6	102	341
Horizontal	6320.95	46.7	90.6	39.2	90.6	51.4	102	9
Horizontal	7223.92	47.5	90.6	40.0	90.6	50.6	103	347
Horizontal	8127.03	48.0	83.5	39.5	63.5	24.0	108	46
Horizontal	9029.90	50.9	83.5	45.1	63.5	18.4	101	67
Vertical	1806	Note 3						
Vertical	2709	Note 3						
Vertical	3612	Note 3						
Vertical	4514.78	43.6	83.5	34.6	63.5	28.9	113	336
Vertical	5418.02	51.5	83.5	47.7	63.5	15.8	102	341
Vertical	6321.10	48.3	90.6	38.7	90.6	51.9	111	10
Vertical	7223.60	48.9	90.6	40.7	90.6	49.9	104	344
Vertical	8126.70	47.8	83.5	39.0	63.5	24.5	108	47
Vertical	9029.93	51.5	83.5	46.0	63.5	17.5	102	72

Notes:

1. A Quasi-Peak Detector was used in measurements below 1 GHz. To ensure the peak emissions did not exceed 20 dB above the limits a peak detector was used. A peak detector with video averaging was used for measurements above 1 GHz.
2. Measurements above 4 GHz were made at 1 meters of separation from the EUT. Limits have been corrected to reflect the change in measurement distance.
3. Measurement at receiver system noise floor.
4. H: Horizontal, V: Vertical, F: Flat, S: Side.

The following table depicts the level of significant radiated harmonic emissions seen on Middle Channel: 914.6 MHz

Antenna Polarity	Frequency (MHz)	Peak (dBuV/m)	Peak Limit (dBuV/m)	Average (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dBuV/m)	Antenna Height (cm)	Azimuth (degrees)
Horizontal	1829.25	63.3	90.1	62.5	90.1	27.6	157	0
Horizontal	2743.8	Note 3						
Horizontal	3658.4	Note 3						
Horizontal	4572.97	45.4	83.5	36.3	63.5	27.2	120	116
Horizontal	5487.57	49.5	83.5	45.0	63.5	18.5	109	340
Horizontal	6401.85	46.6	90.1	38.6	90.1	51.5	108	25
Horizontal	7317.02	47.6	83.5	39.9	63.5	23.6	100	318
Horizontal	8231.45	47.7	83.5	39.0	63.5	24.5	100	35
Horizontal	9146.15	53.7	83.5	49.3	63.5	14.2	100	80
Vertical	1829.22	54.8	90.1	52.4	90.1	37.7	123	270
Vertical	2743.8	Note 3						
Vertical	3658.4	Note 3						
Vertical	4573.58	45.9	83.5	36.8	63.5	26.7	102	10
Vertical	5487.40	50.9	83.5	46.3	63.5	17.2	104	53
Vertical	6402.33	48.2	90.1	41.1	90.1	49.0	106	124
Vertical	7317.02	50.1	83.5	44.7	63.5	18.8	102	134
Vertical	8231.28	47.4	83.5	38.2	63.5	25.3	102	0
Vertical	9146.08	53.2	83.5	48.3	63.5	15.2	113	315

Notes:

1. A Quasi-Peak Detector was used in measurements below 1 GHz. To ensure the peak emissions did not exceed 20 dB above the limits a peak detector was used. A peak detector with video averaging was used for measurements above 1 GHz.
2. Measurements above 4 GHz were made at 1 meters of separation from the EUT. Limits have been corrected to reflect the change in measurement distance.
3. Measurement at receiver system noise floor.
4. H: Horizontal, V: Vertical, F: Flat, S: Side.

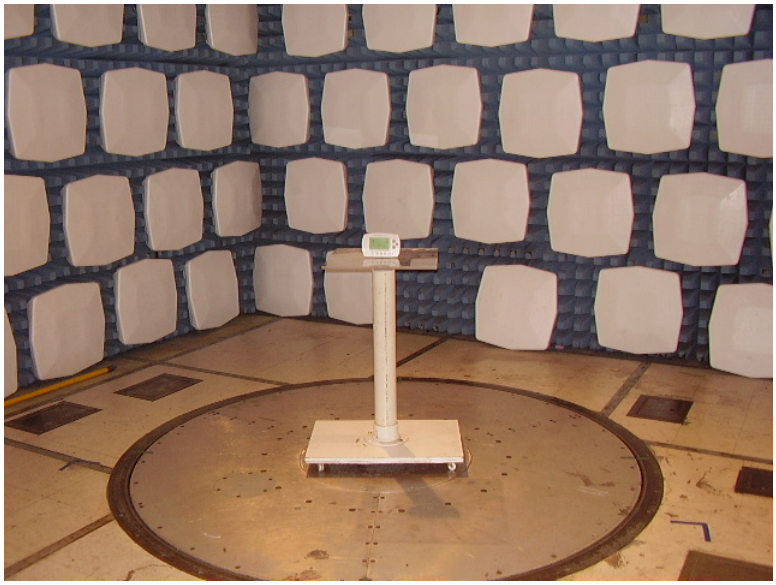
The following table depicts the level of significant radiated harmonic emissions seen on High Channel: 926.4 MHz

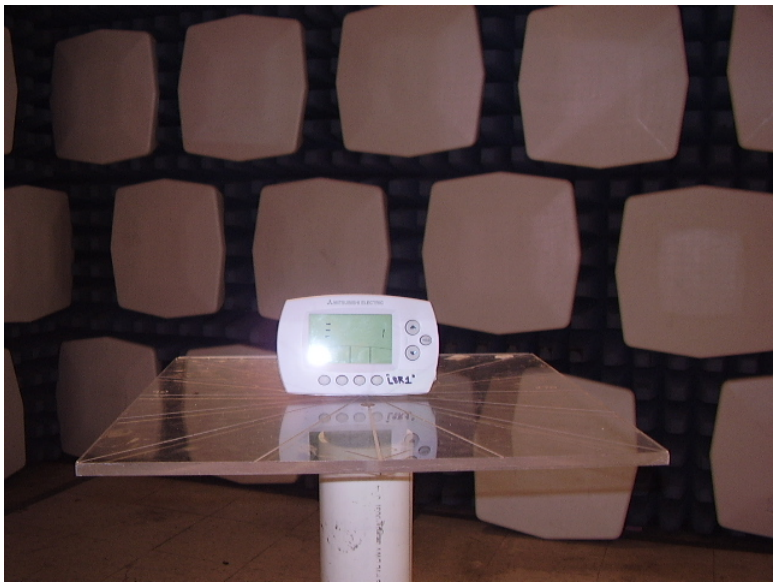
Antenna Polarity	Frequency (MHz)	Peak (dBuV/m)	Peak Limit (dBuV/m)	Average (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dBuV/m)	Antenna Height (cm)	Azimuth (degrees)
Horizontal	1852.83	62.2	89.3	61.3	89.3	28.0	153	0
Horizontal	2779.2	Note 3						
Horizontal	3705.6	Note 3						
Horizontal	4632.02	44.4	83.5	35.5	63.5	28.0	121	250
Horizontal	5558.35	49.0	83.5	43.4	63.5	20.1	102	345
Horizontal	6485.42	47.2	89.3	40.5	89.3	48.8	108	11
Horizontal	7411.68	47.8	83.5	40.4	63.5	23.1	128	323
Horizontal	8337.6	47.2	83.5	38.2	63.5	25.3	104	38
Horizontal	9264.12	55.3	83.5	51.4	63.5	12.1	102	205
Vertical	1852.78	55.5	89.3	53.3	89.3	36.0	119	279
Vertical	2779.2	Note 3						
Vertical	3705.6	Note 3						
Vertical	4632.20	44.8	83.5	35.3	63.5	28.2	109	29
Vertical	5557.97	48.9	83.5	44.6	63.5	18.9	117	193
Vertical	6484.98	47.4	89.3	40.7	89.3	48.6	103	99
Vertical	7411.60	50.4	89.3	45.3	89.3	44.0	113	131
Vertical	8340.20	47.0	83.5	36.2	63.5	27.3	117	351
Vertical	9264.33	54.2	83.5	49.8	63.5	13.7	112	309

Notes:

1. A Quasi-Peak Detector was used in measurements below 1 GHz. To ensure the peak emissions did not exceed 20 dB above the limits a peak detector was used. A peak detector with video averaging was used for measurements above 1 GHz.
2. Measurements above 4 GHz were made at 1 meters of separation from the EUT. Limits have been corrected to reflect the change in measurement distance.
3. Measurement at receiver system noise floor.
4. H: Horizontal, V: Vertical, F: Flat, S: Side.

5.7 - Test Setup Photos – Radiated Emissions Test



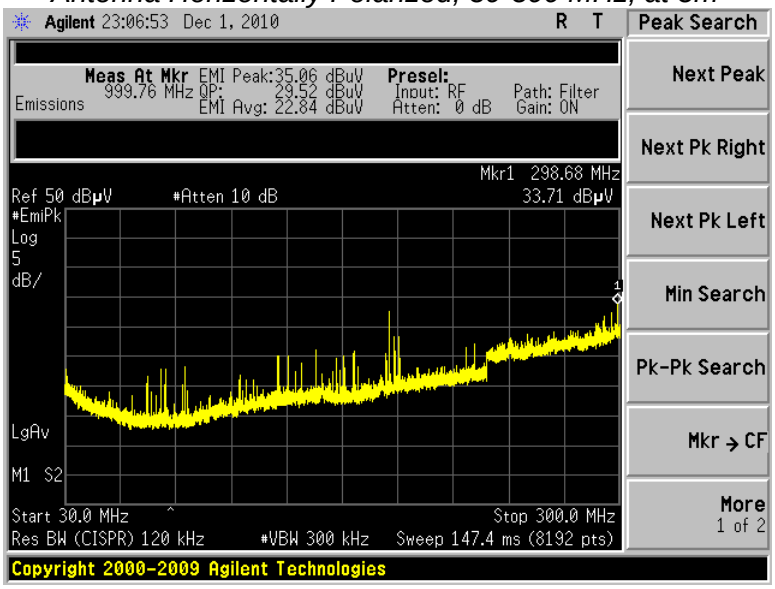


5.8 - Screen Captures - Radiated Emissions Test

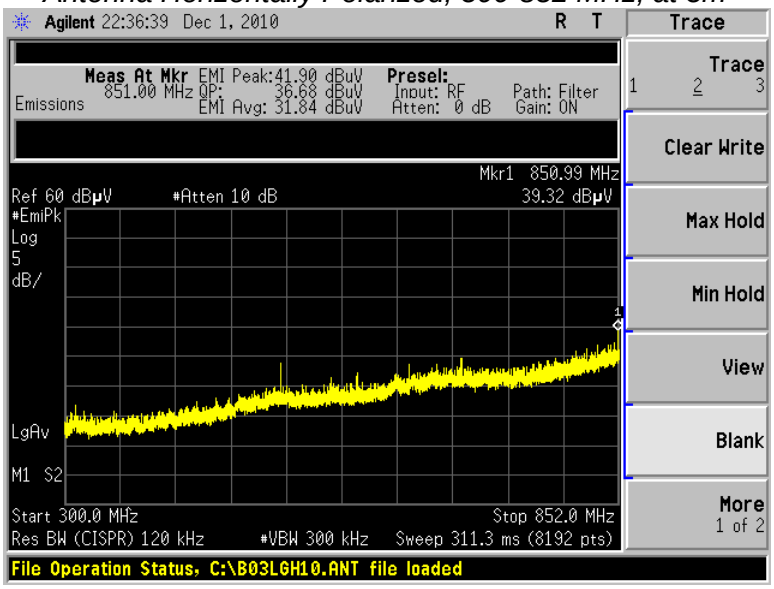
These screen captures represent Peak Emissions. For radiated emission measurements, a Quasi-Peak detector function is utilized when measuring frequencies below 1 GHz, and a video averaged Peak detector function is utilized when measuring frequencies above 1 GHz.

The signature scans shown here are from worst-case emissions, as measured on channels 903 MHz, 914.6 MHz, or 926.4 MHz, with the sense antenna both in vertical and horizontal polarity for worst case presentations.

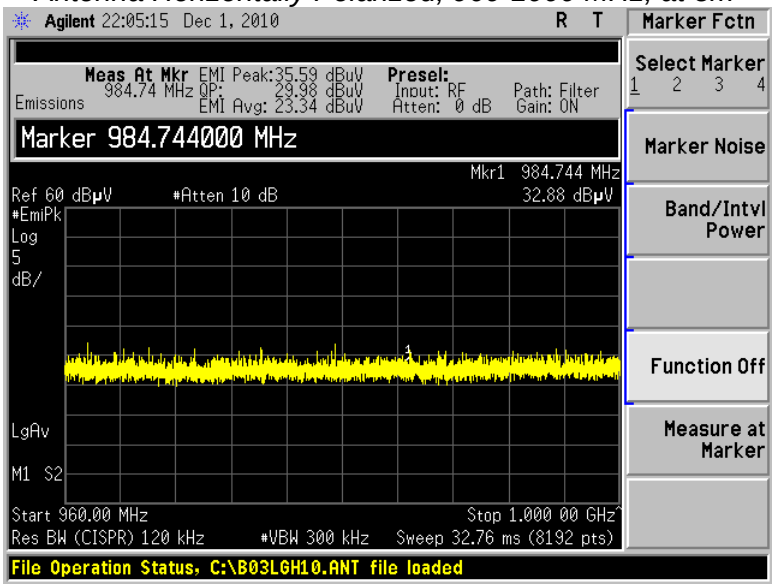
Antenna Horizontally Polarized, 30-300 MHz, at 3m



Antenna Horizontally Polarized, 300-852 MHz, at 3m

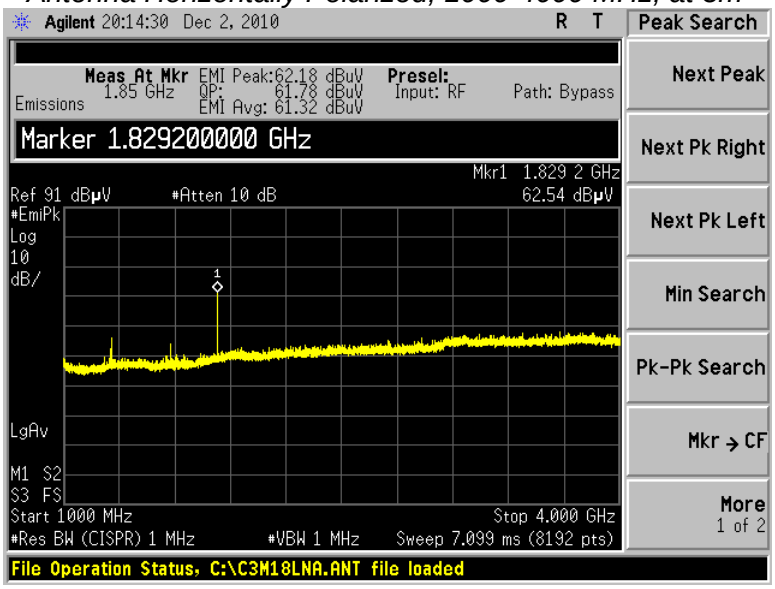


Antenna Horizontally Polarized, 960-1000 MHz, at 3m

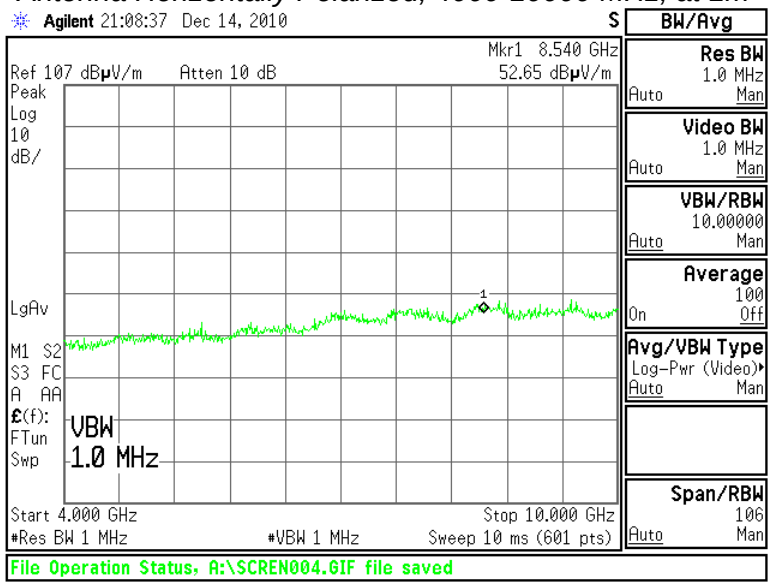


Note: The frequency range 852-902 MHz and 928-960 MHz is in the Band-edge section (Exhibit 8).

Antenna Horizontally Polarized, 1000-4000 MHz, at 3m



Antenna Horizontally Polarized, 4000-10000 MHz, at 1m



5.9 - Receive Mode Testing

Per the requirements of RSS-210 and CFR 47 part 15, the EUT was placed in continuous receive mode and the radiated spurious emissions were measured and compared to the limits stated in RSS-Gen Section 4.10 and CFR 47 15.109.

The test setup, procedure, and equipment utilized were identical to that described in sections 5.1, 5.2, and 5.3 of this document.

Measurement data and screen captures from the receive tests are presented below:

Frequency (MHz)	Ant./EUT Polarity	Chan.	Height/ Azimuth (m / °)	Measured Peak (dBμV/m)	Measured Quasi-Peak (dBμV/m	Measured Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)
987.27	H/TT	903.0	1.00/0	36.5	29.7	23.0	54.0	24.3
299.10	H/TT	903.0	1.00/0	31.8	25.8	19.3	46.0	20.2
3824.00	H/TT	903.0	1.00/0	38.6	34.0	26.1	54.0	27.9
5486.50	H/TT	903.0	1.00/340	51.6	N/A	42.6	63.5 Note 2	20.9
8570.00	H/TT	903.0	1.00/0	52.2	N/A	44.1	63.5 Note 2	19.4

Notes:

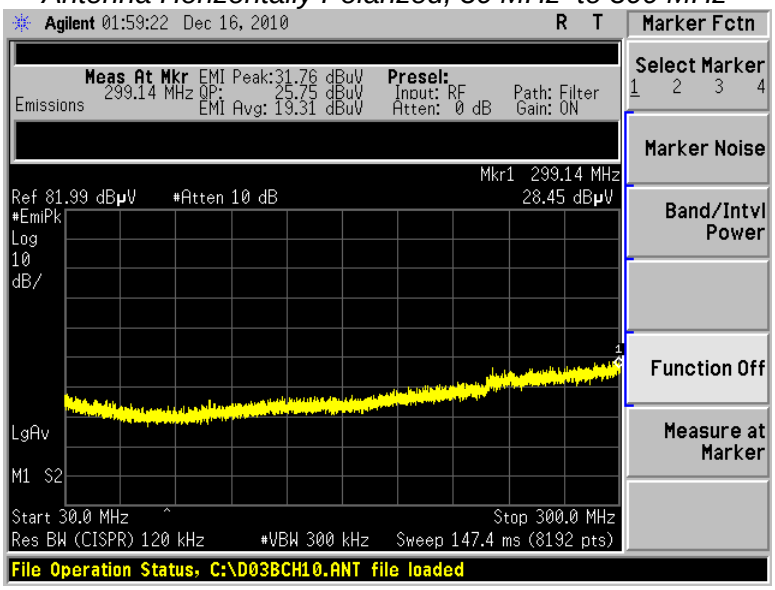
1. A Quasi-Peak Detector was used in measurements below 1 GHz. To ensure the peak emissions did not exceed 20 dB above the limits a peak detector was used. A peak detector with video averaging was used for measurements above 1 GHz.
2. Measurements above 4 GHz were made at 1 meters of separation from the EUT.
3. H: Horizontal, V: Vertical, F: Flat, S: Side., TT: Pedistal Table Top

5.10 - Screen Captures - Radiated Emissions Testing – Receive Mode

These screen captures represent Peak Emissions. For radiated emission measurements, a Quasi-Peak detector function is utilized when measuring frequencies below 1 GHz, and a video averaged Peak detector function is utilized when measuring frequencies above 1 GHz.

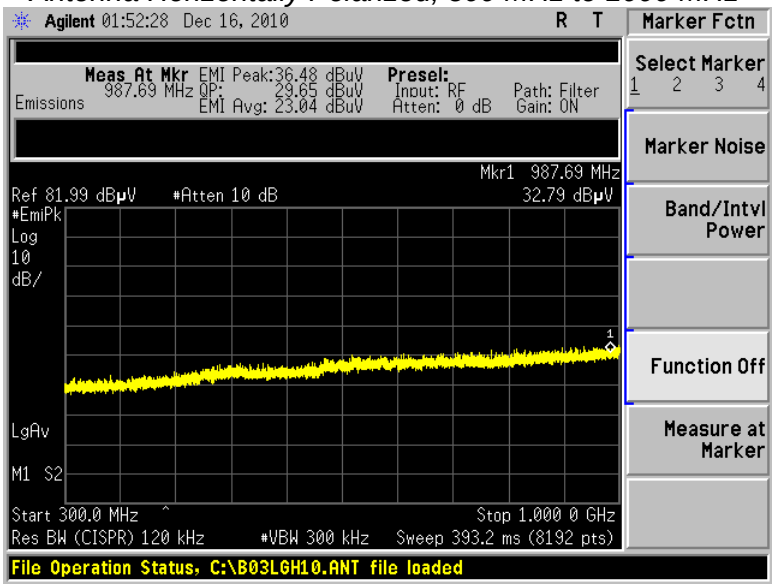
The signature scans shown here are from worst-case emissions, as measured on channels 903 MHz, 914.6 MHz, or 926.4 MHz, with the sense antenna both in vertical and horizontal polarity for worst case presentations. The results did not vary per channel.

Antenna Horizontally Polarized, 30 MHz to 300 MHz

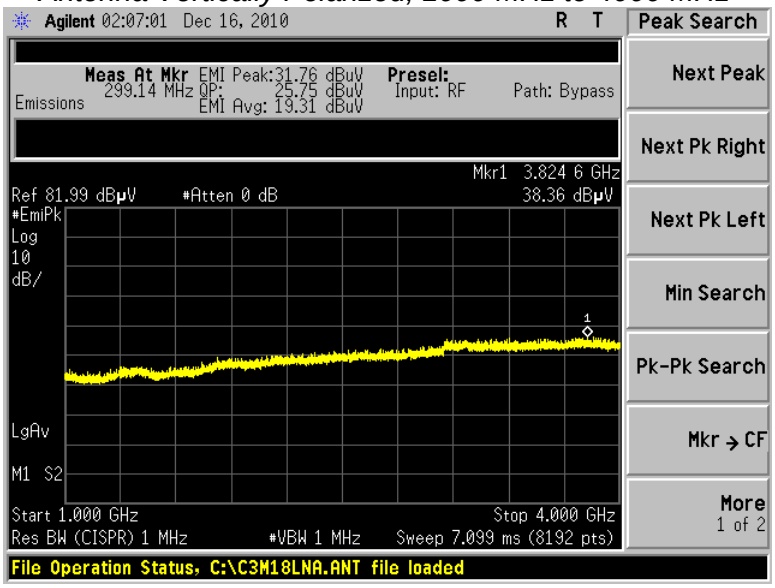


Screen Captures - Radiated Emissions Testing – Receive Mode (continued)

Antenna Horizontally Polarized, 300 MHz to 1000 MHz



Antenna Vertically Polarized, 1000 MHz to 4000 MHz



Antenna Horizontally Polarized, 4000 MHz to 10000MHz

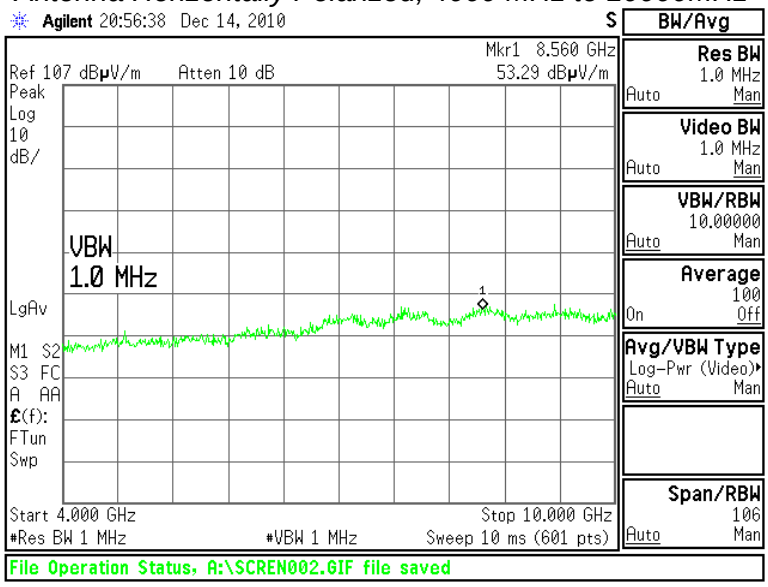


EXHIBIT 6. OCCUPIED BANDWIDTH

6.1 - Limits

For a frequency Hopping system in the 902 to 928 MHz band, the 20 dB bandwidth shall not exceed 500 kHz for FCC CFR 47 15.247 (a)(1)(i) and IC RSS 210 A8.1. (c).

6.2 - Method of Measurements

The transmitter output was connected to the Spectrum Analyzer. The bandwidth of the fundamental frequency was measured with the Spectrum Analyzer using 3 kHz RBW and VBW=10 kHz.

For this portion of the tests, a direct measurement of the transmitted signal was performed at the antenna port of the EUT, via a cable connection to a spectrum analyzer. An attenuator was placed in series with the cable to protect the spectrum analyzer. The loss from the cable and the attenuator were added on the analyzer as gain offset settings, allowing direct measurements, without the need for any further corrections. A spectrum analyzer was used with the resolution bandwidth set to 1 kHz for this portion of the tests. The EUT was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source. The spectrum analyzer was used in peak-hold mode while measurements were made, as presented in the chart below.

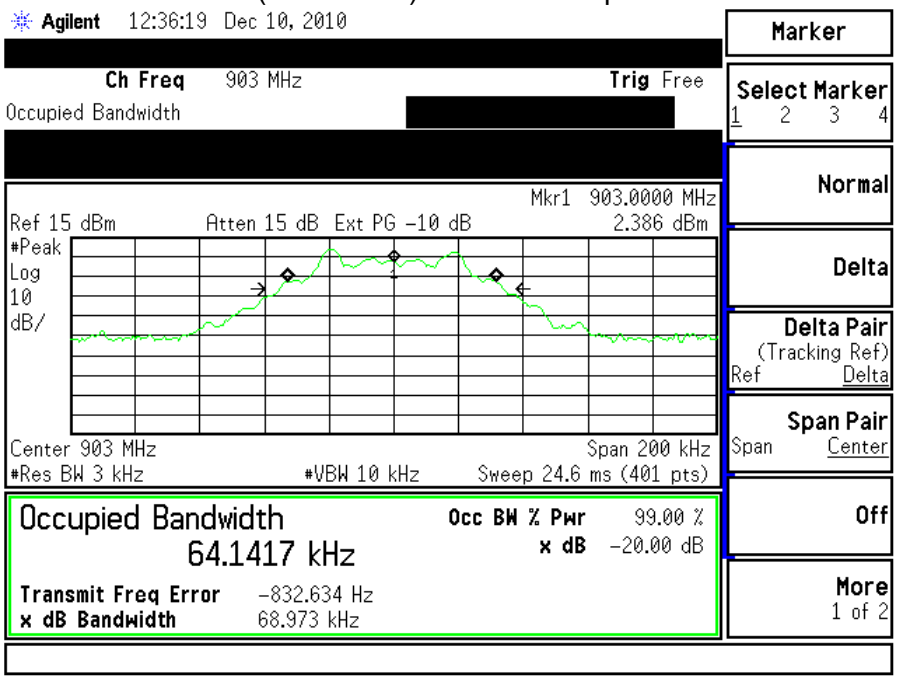
From this data, the closest measurement (20 dB bandwidth) when compared to the specified limit, is 69.0 kHz, which is below the maximum of 500 kHz by 431 kHz.

6.3 - Test Data

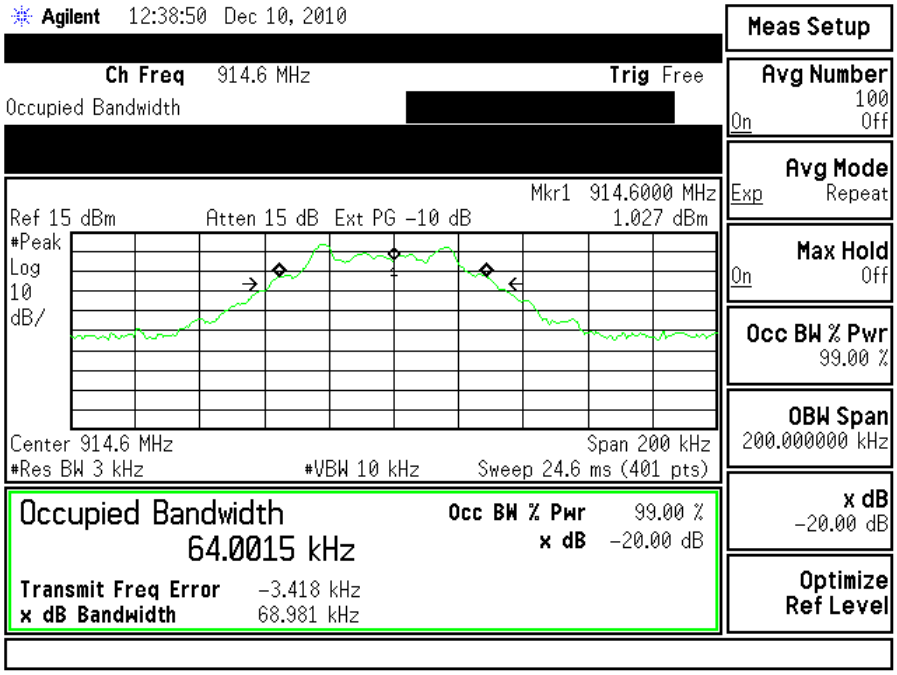
Channel	Center Frequency (MHz)	99% Occup. BW	Measured -20 dBc Occ. BW (kHz)	Maximum - 20 dBc Limit (kHz)	Margin (kHz)
LOW	903.0	64.1	69.0	500	431
MIDDLE	914.6	64.0	69.0	500	431
HIGH	926.4	63.9	69.0	500	431

6.4 - Screen Captures - Occupied Bandwidth

Channel low (903.0 MHz) -20 dBc Occupied Bandwidth



Channel middle (914.6 MHz) -20 dBc Occupied Bandwidth



Channel high (926.4 MHz) -20 dBc Occupied Bandwidth

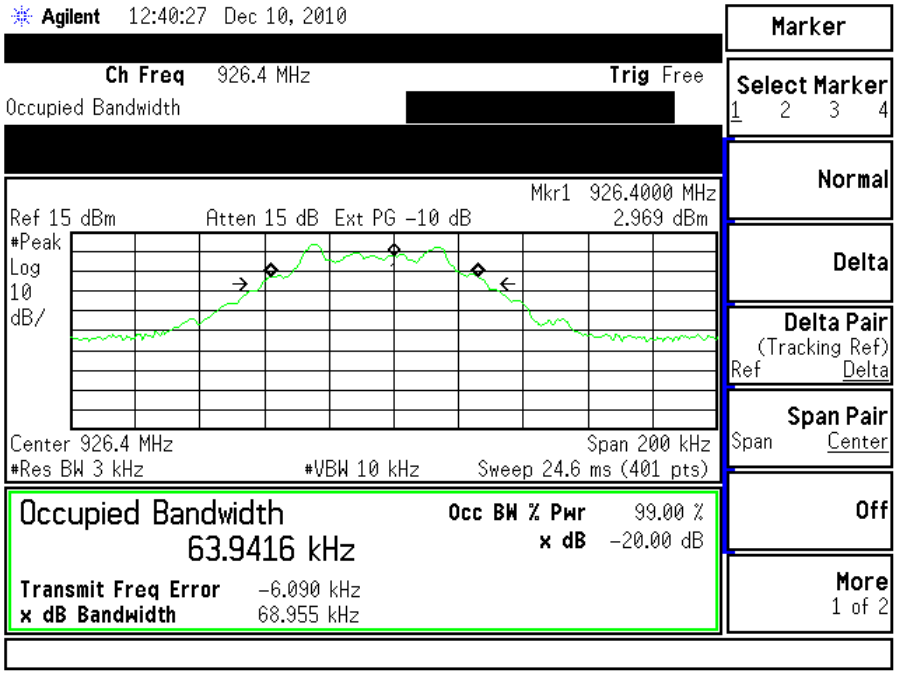
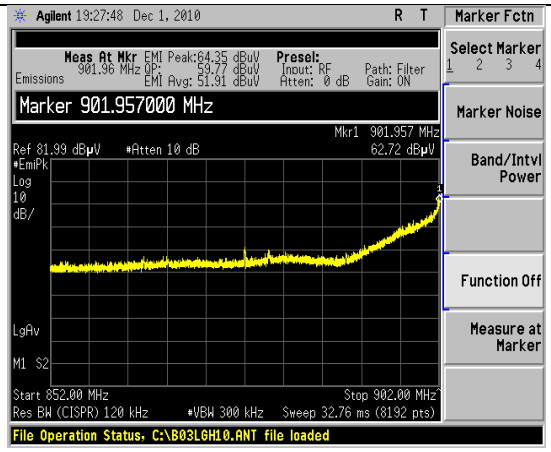
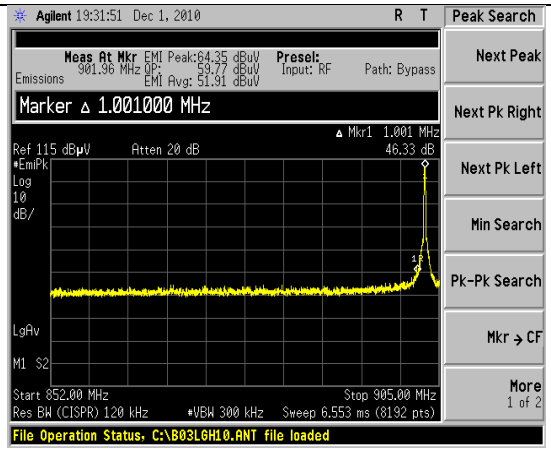


EXHIBIT 7. BAND EDGE MEASUREMENTS

7.1 - Method of Measurements

FCC 15.209(b) and 15.247(d) require a measurement of spurious emission levels to be at least 20 dB lower than the fundamental emission level, in particular at the Band-Edges where the intentional radiator operates. Also, RSS 210 Section 2.2 requires that unwanted emissions meet limits listed in tables 2 and 3 of the same standard and also to the limits in the applicable annex. The following screen captures demonstrate compliance of the intentional radiator at the 902 MHz to 928 MHz Band-Edges. The EUT was operated in continuous transmit mode with continuous modulation, with internally generated data as the modulating source. The EUT was operated at the lowest channel for the investigation of the lower Band-Edge, and at the highest channel for the investigation of the uppers Band-Edge.

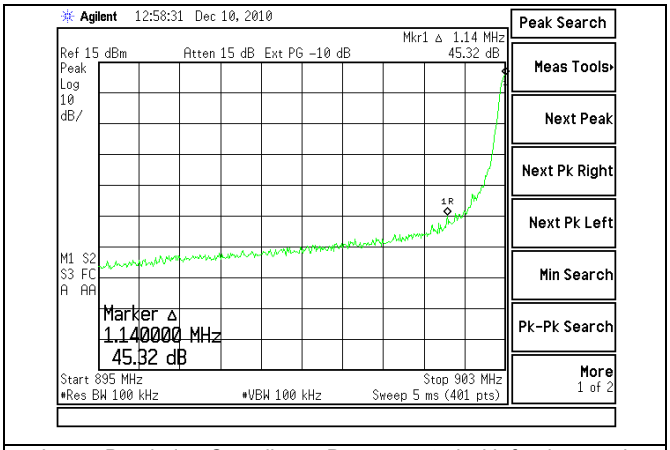
Screen Captures Demonstrating Compliance at the Lower Band-Edge

<table>
<tr>
<td> 
</td>
<td> 
</td>
</tr>
<tr>
<td>Lower Bandedge Compliance Demonstrated

Radiated Fashion</td>
<td>Lower Bandedge Compliance Demonstrated with fundamental shown providing screen capture of greater than 20dB difference from band edge to lowest frequency fundamental

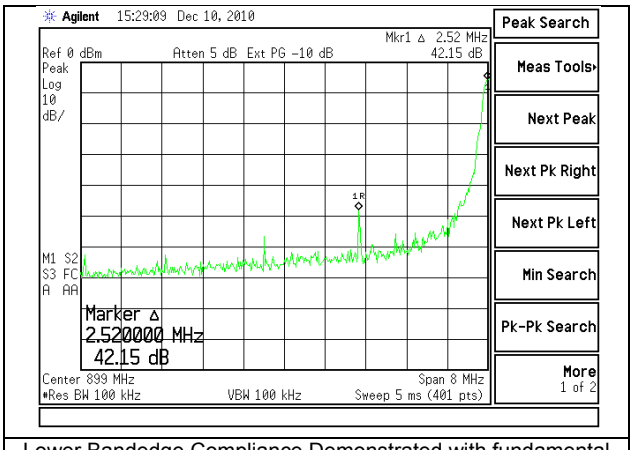
Radiated Fashion</td>
</tr>
</table>

The Lower Band-Edge limit, in this case, would be 90.6 dBuV/m at 3m.



Lower Bandedge Compliance Demonstrated with fundamental shown providing screen capture of greater than 20dB difference from band edge to lowest frequency fundamental

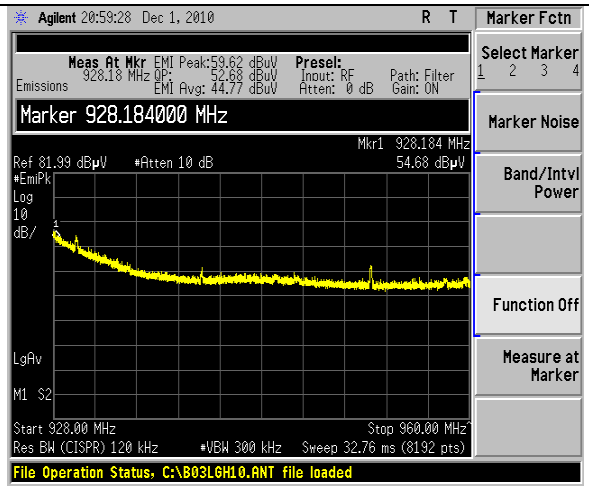
Conducted Fashion, Continuous Modulated Mode



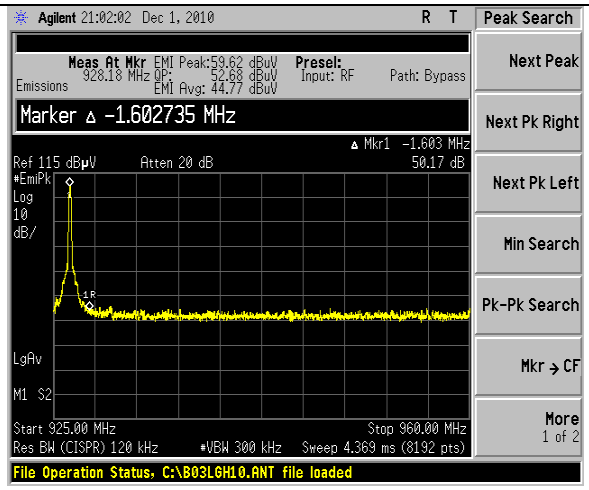
Lower Bandedge Compliance Demonstrated with fundamental shown providing screen capture of greater than 20dB difference from band edge to lowest frequency fundamental

Conducted Fashion, Hopping Mode

Screen Capture Demonstrating Compliance at the Higher Band-Edge

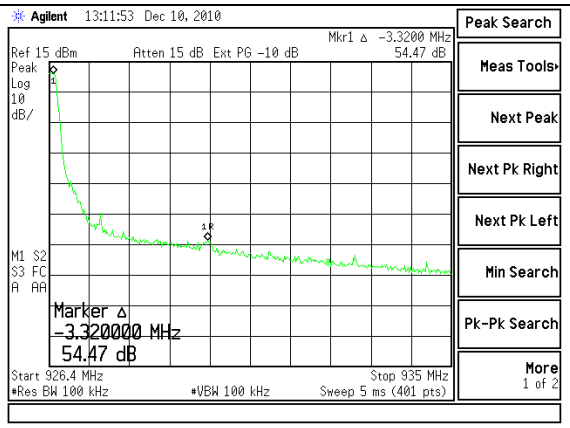


Upper Bandedge Compliance Demonstrated



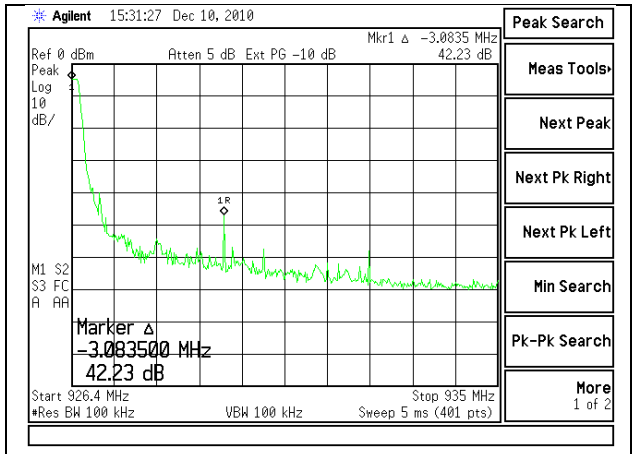
Upper Bandedge Compliance Demonstrated with fundamental shown providing screen capture of greater than 20dB difference from highest frequency fundamental to band edge

The Upper Band-Edge limit, in this case, would be 89.3 dBuV/m at 3m.



Upper Bandedge Compliance Demonstrated. The highest fundamental frequency is present in this screen capture; the delta marker shows greater than 20dB difference from highest fundamental (926.4 MHz) to band edge frequency (928.0 MHz)

Conducted Fashion



Upper Bandedge Compliance Demonstrated with fundamental shown providing screen capture of greater than 20dB difference from band edge to lowest frequency fundamental

Conducted Fashion, Hopping Mode

EXHIBIT 8. POWER OUTPUT (CONDUCTED)

8.1 - Method of Measurements

The conducted RF output power of the EUT was measured at the antenna port using a short RF cable along with an attenuator as protection for the spectrum analyzer. The loss from the cable and the attenuator were added on the analyzer as gain offset settings, allowing direct measurements without the need for any further corrections. The unit was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source. The spectrum analyzer was used with resolution bandwidths set to 100 kHz and a span of 500 kHz, with measurements from a peak detector presented in the chart below.

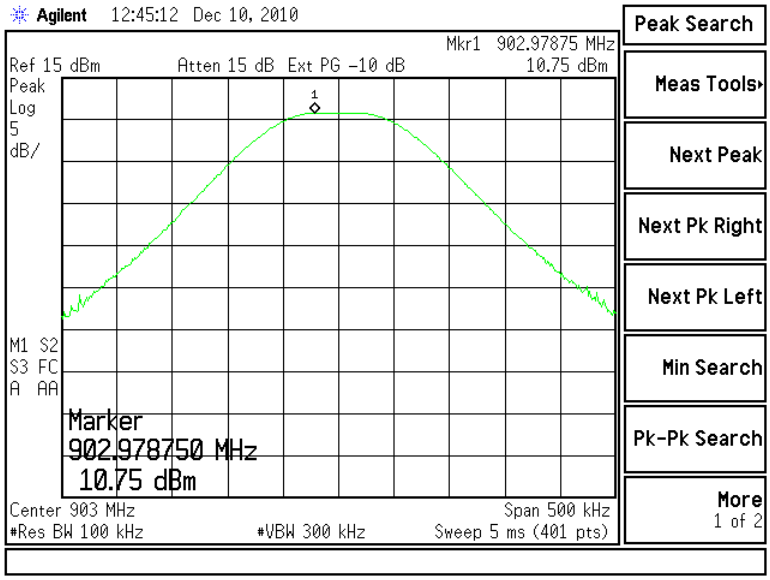
8.2 - Test Data

CHANNEL	CENTER FREQ (MHz)	LIMIT (dBm)	MEASURED POWER (dBm)	MARGIN (dB)
LOW	903.0	30.0	10.8	19.2
MIDDLE	914.6	30.0	10.8	19.2
HIGH	926.4	30.0	10.8	19.2

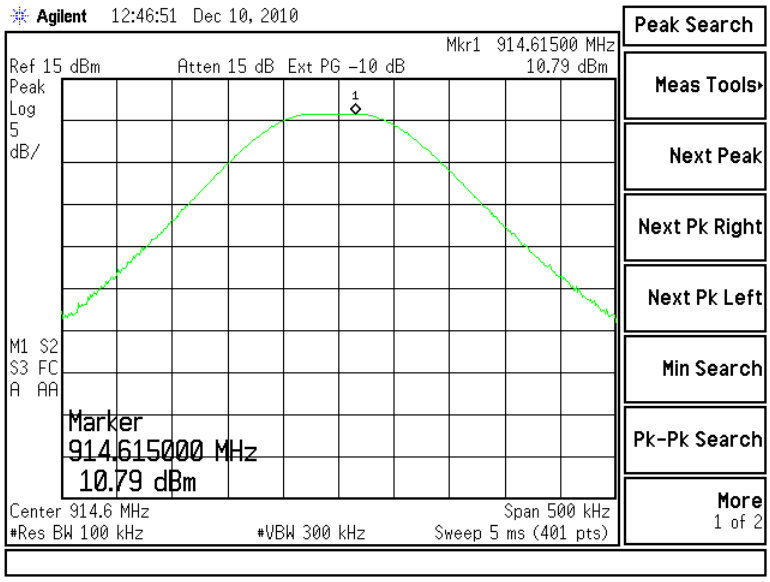
Measured RF Power Output (in Watts): 0.012023 W
Declared RF Power Output (in Watts): 0.012023 W

8.3 - Screen Captures – Power Output (Conducted)

Channel Low



Channel Middle



Channel High

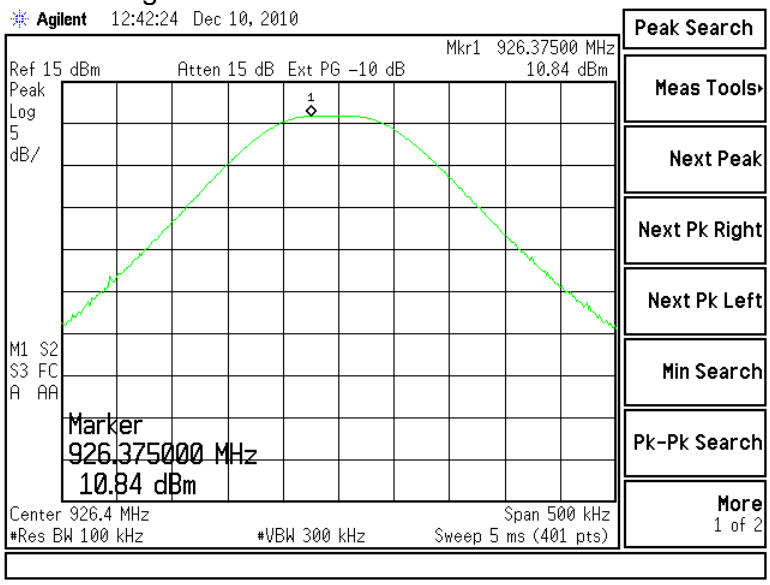


EXHIBIT 9. CONDUCTED SPURIOUS EMISSIONS: 15.247(d)

9.1 - Limits

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.

9.2 – Conducted Harmonic And Spurious RF Measurements

FCC Part 15.247(d) and IC RSS 210 A8.5 both require a measurement of conducted harmonic and spurious RF emission levels, as reference to the carrier level when measured in a 100 kHz bandwidth. For this test, the spurious and harmonic RF emissions from the EUT were measured at the EUT antenna port using a short RF cable along with an attenuator as protection for the spectrum analyzer. The loss from the cable and the attenuator were added on the analyzer as gain offset settings, thereby allowing direct readings of the measurements made without the need for any further corrections. A spectrum analyzer was used with the resolution bandwidth set to 100 kHz for this portion of the tests. The unit was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source. The spectrum analyzer was used with measurements from a peak detector presented in the chart below. Screen captures were acquired and any noticeable spurious and harmonic signals were identified and measured.

Conducted harmonics:

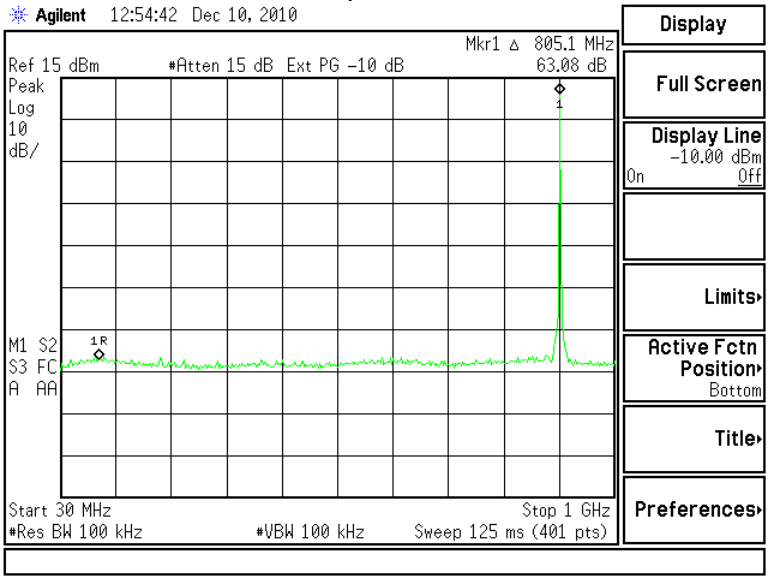
Freq\Chan	LOW Channel 903.0 MHz	Middle Channel 914.6 MHz	High Channel 926.4 MHz
2fo	**10.8**	**10.8**	**10.8**
3fo	**-40.5**	**-38.8**	**-38.2**
4fo	**-43.0**	**-42.0**	**-41.3**
5fo	**NOISE**	**NOISE**	**NOISE**
6fo	**NOISE**	**NOISE**	**NOISE**
7fo	**NOISE**	**NOISE**	**NOISE**
8fo	**-52.2**	**-52.1**	**-49.6**
9fo	**-55.9**	**-55.2**	**-56.9**
10fo	**NOISE**	**NOISE**	**NOISE**

Note: All conducted power measurements made are listed in dBm.

9.3- Screen Captures – Spurious Radiated Emissions

Emissions demonstrated are when device is programmed to low channel, 903.0 MHz. Emissions were not significantly different based on the fundamental channel the device is programmed to.

30 MHz up to 1000 MHz



1000 MHz up to 10000 MHz

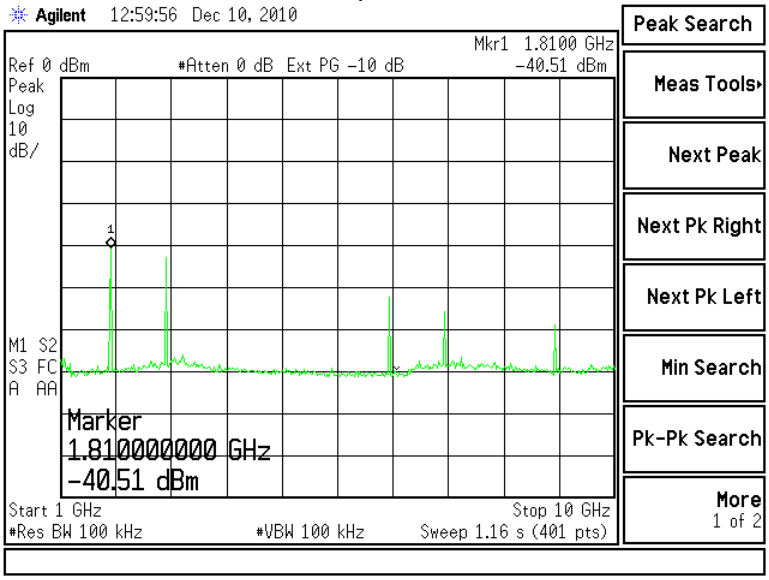


EXHIBIT 10. FREQUENCY & POWER STABILITY OVER VOLTAGE VARIATIONS

For measurements of the frequency and power stability, the transmitter was powered by an external bench-type variable power supply. A Spectrum Analyzer was used to measure the frequency at the appropriate frequency markers and also the output power at the antenna port.

4.25		8.0		13.8		
Power	Frequency	Power	Frequency	Power	Frequency	Channel
11.0	**902999070**	**11.1**	**902999500**	**11.1**	**902999670**	LOW
11.0	**914596370**	**10.9**	**914596870**	**11.0**	**914596870**	MID
10.8	**926394080**	**10.9**	**926394490**	**10.8**	**926394410**	HIGH

Data for this test was gathered from an alternate unit than all other conducted data. The unit used for all other conducted measurements had faulty firmware that did not allow it to enter continuous unmodulated transmission mode. An alternate unit was substituted for these measurements. Please note that the power is different at the nominal voltage.

The power was then cycled On/Off to observe system response. No unusual response was observed, the emission characterizes were well behaved, and the system returned to the same state of operation as before the power cycle.

The maximum shift in frequency is 122 Hz which is better than 100 ppm in the 902 MHz to 928 MHz band.

EXHIBIT 11. CHANNEL PLAN AND SEPARATION

A spectrum analyzer was used with a resolution bandwidth of 30 kHz to measure the channel separation of the EUT.

The minimum and maximum channel-separations measured for this device are 375 kHz and 412.5 kHz respectively. The maximum occupied bandwidth of the device, as reported in the previous section is 69.0 kHz.

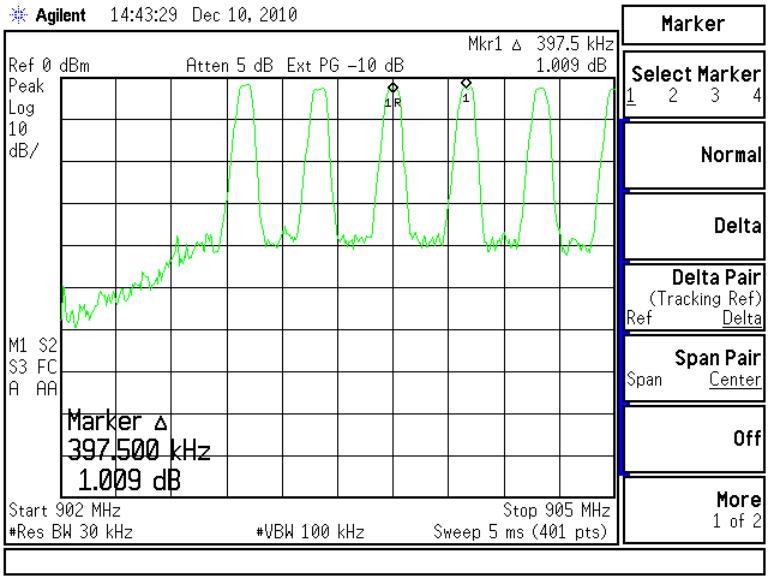
The minimum channel separation limit as stated in FCC CFR 47 15.247 and IC RSS210 is 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

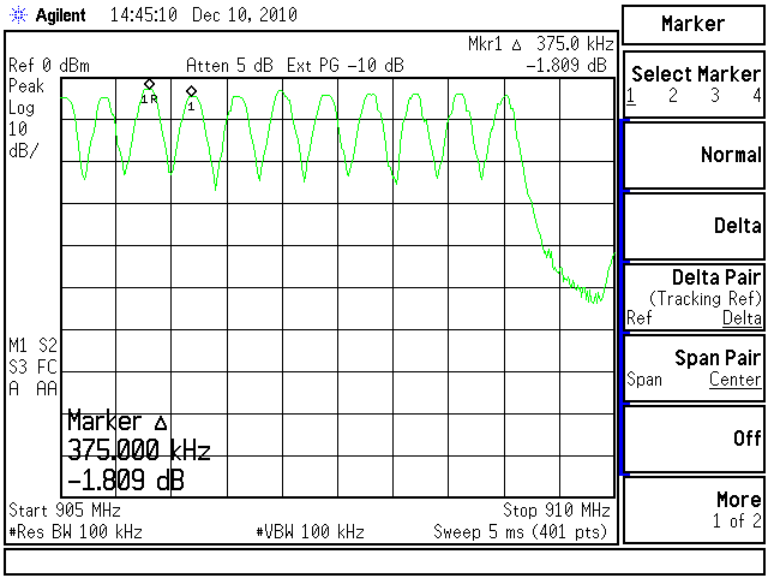
The minimum number of channels limit as stated in FCC CFR 47 15.247 and IC RSS210 is 50 channels for channel bandwidth less than 250 kHz and 25 channels for channel bandwidth greater than 250 kHz. As this device has an occupied bandwidth of 69.0 kHz and contains 50 channels the number of channels criterion is met. In addition, as the 20 dB bandwidth is greater than 25 kHz and and the minimum channel separation is greater than the 20 dB bandwidth, this second criterion is also met.

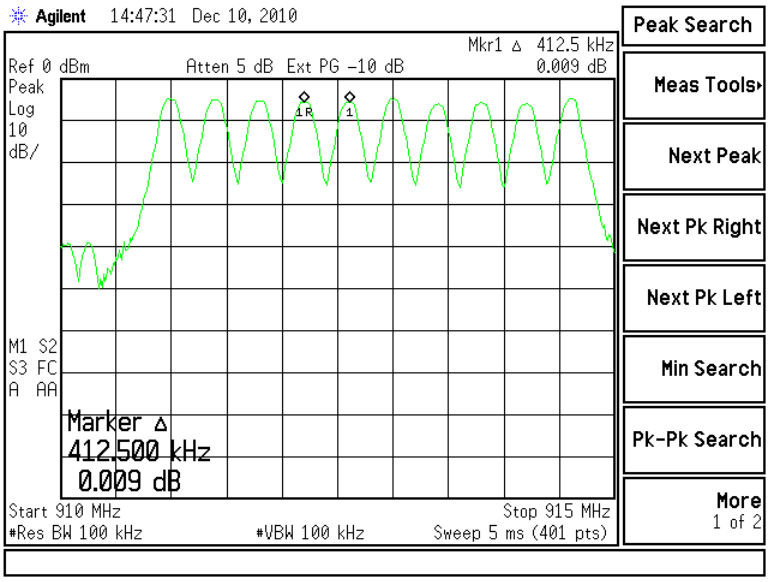
The following plots describe this spacing, and also establish the channel separation and plan.

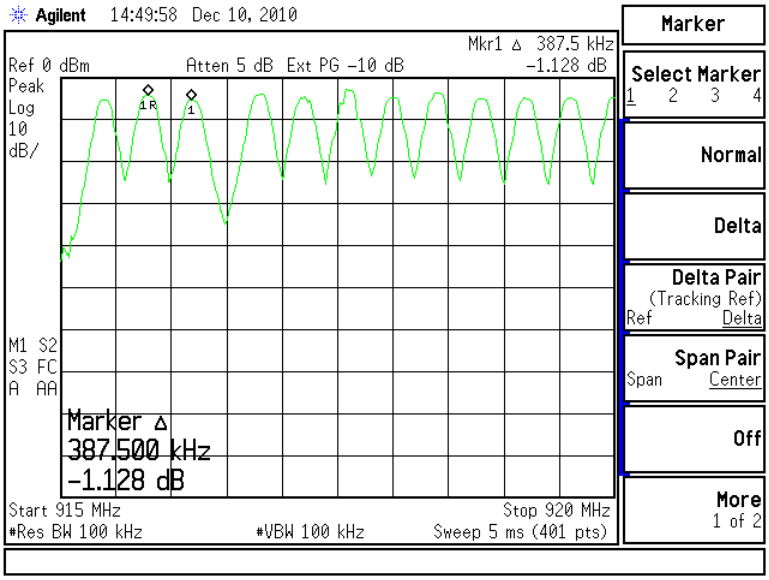
RANGE (MHz)	# OF CHANS	separation (kHz)
902-905	5.5	397.50
905-910	10.5	375.00
910-915	10.0	412.50
915-920	11.5	387.50
920-925	8.5	387.50
925-930	4.0	400.00

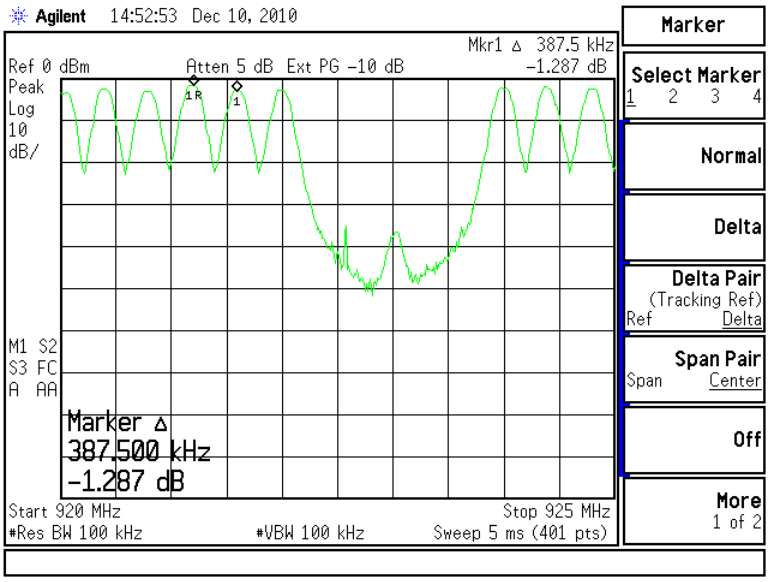
11.1 - Screen Captures – Channel Separation

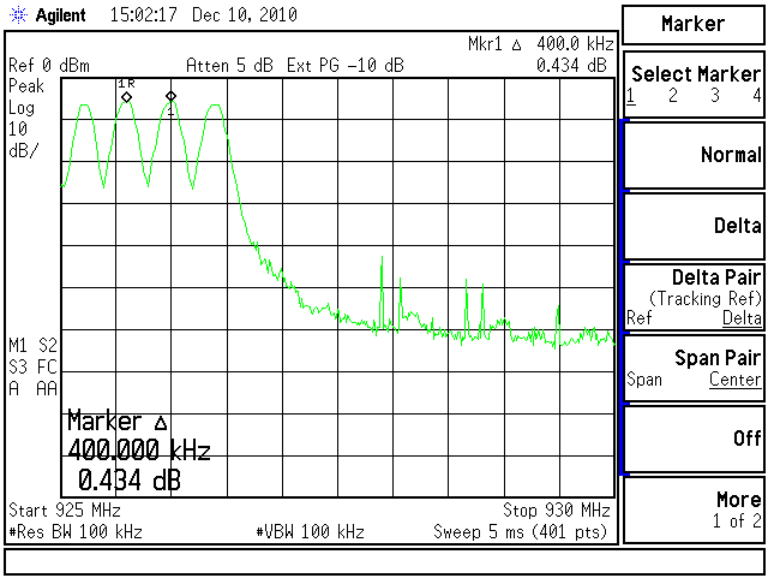





Agilent 14:47:31 Dec 10, 2010
Mkr1 Δ 412.5 kHz
Ref 0 dBm
Atten 5 dB Ext PG -10 dB
0.009 dB
Peak
Log
10
dB/
M1 S2
S3 FC
A AA
Marker Δ
412.500 kHz
0.009 dB
Start 910 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 915 MHz
Sweep 5 ms (401 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2


Agilent 14:49:58 Dec 10, 2010
Mkr1 Δ 387.5 kHz
Ref 0 dBm
Atten 5 dB Ext PG -10 dB
-1.128 dB
Peak
Log
10
dB/
M1 S2
S3 FC
A AA
Marker Δ
387.500 kHz
-1.128 dB
Start 915 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 920 MHz
Sweep 5 ms (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2





Total Chans	50
Max separation	412.50 kHz
Min Separation	375.00 kHz

EXHIBIT 12. CHANNEL OCCUPANCY

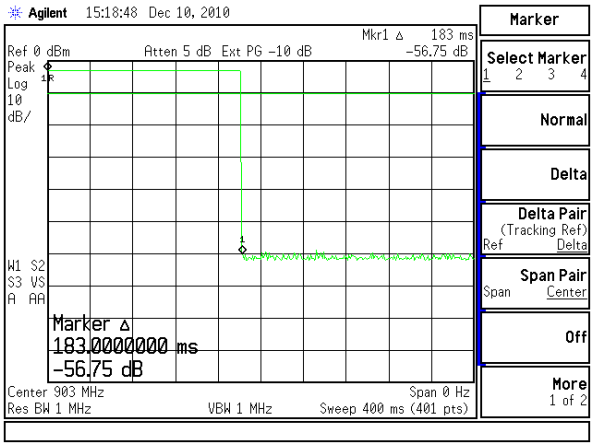
Part 15.247(a)(1) requires a channel occupancy, for this device, of no more than 400 milliseconds in a 20 second window. The channel occupancy for this EUT was measured using a spectrum analyzer, set to zero-span at the frequency of interest. With the analyzer in peak-hold mode, the transmission lengths can be measured by adjusting the sweep rate of the analyzer. A suitable sweep rate was used to measure the channel occupancy at the low, mid and high channels.

The longest time any transmission will occur on a single channel is 183.0 milliseconds. In a 20 second window, each channel has 1 transmission cycle. The maximum occupancy in a 20 second window is calculated by multiplying 1 transmission cycle by 183.0 milliseconds transmission duration per cycle, to arrive at 183.0 milliseconds total occupancy.

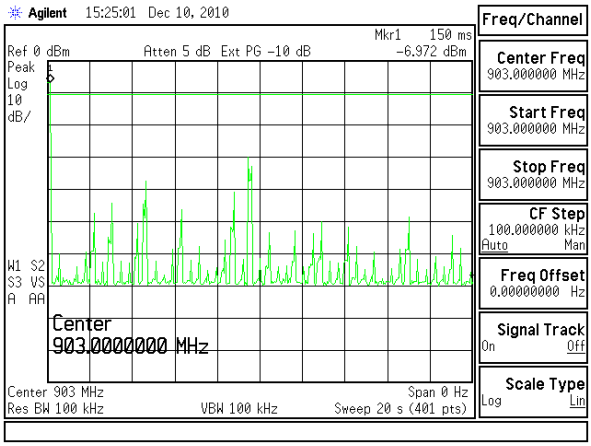
Channel	Frequency (MHz)	Total Occupancy in 20 seconds (ms)	Occupancy in 20 s window (ms)
Low	903.0	1	183.0
Middle	914.6	1	183.0
High	926.4	1	183.0

Plots of Channel Occupancy

Low Channel Occupancy

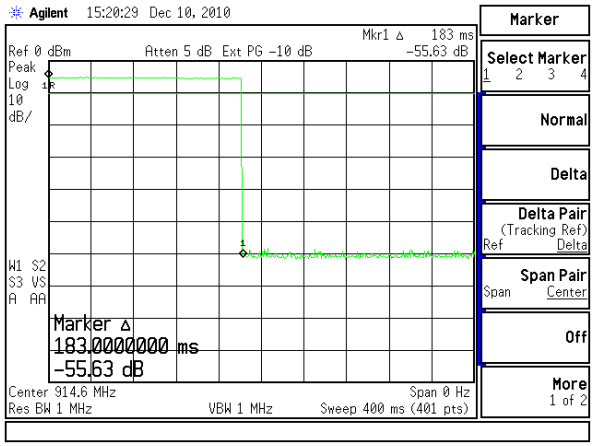


1 Data Packet

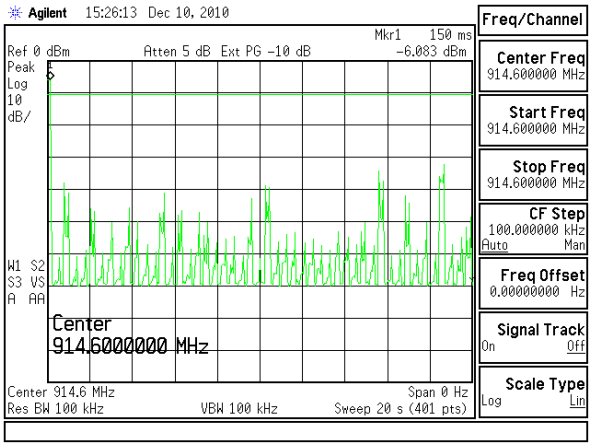


20 seconds window

Middle Channel Occupancy

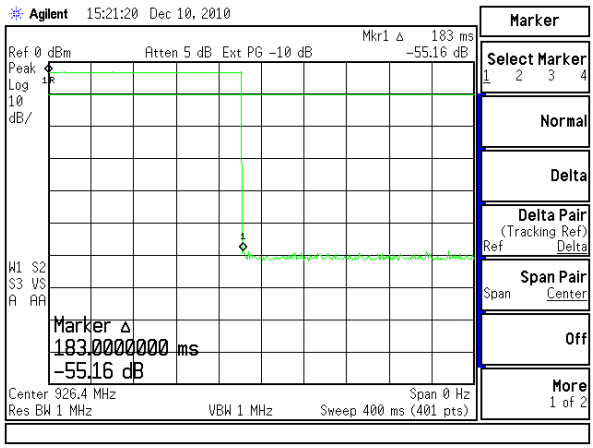


1 Data Packet

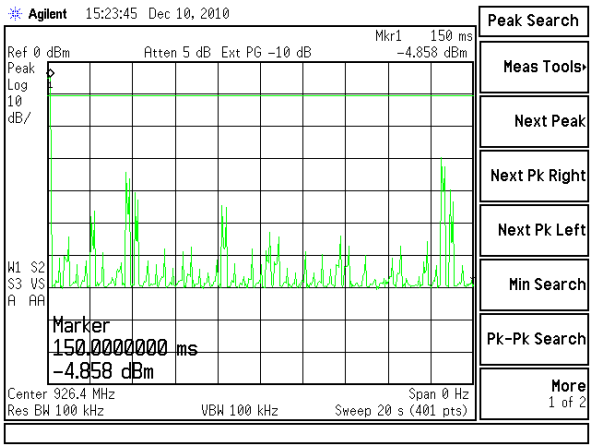


20 seconds window

Channel High Occupancy



1 Data Packet



20 seconds window

EXHIBIT 13. EQUAL CHANNEL USAGE AND PSEUDORANDOM HOPPING SEQUENCE.

The 50 channels generated by a pseudo random number generator are arrayed in a table which the system uses to determine the next hopping channel. The pseudo-random channel table is incorporated as a constant table of values used by the transmitter software running on board.

Table 2 (typical hop sequence)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Transmission #
6	31	33	8	48	23	26	1	17	42	38	13	19	44	35	10	Channel used
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Transmission #
9	34	37	12	0	25	3	28	16	41	24	49	18	43	45	20	Channel used
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	Transmission #
21	46	30	5	7	32	47	22	29	4	40	15	14	39	27	2	Channel used
48	49	50														Transmission #
11	36	repeat														Channel used

This sample hop sequence shows usage of all channels and randomness of channel selections.

Each EUT has its own pseudorandom frequency sequence use for the transmitting channel. The transmit sequences are derived from a 15 bit seed value chosen randomly and automatically at the time the system is commissioned with client devices. The characteristics of the pseudorandom frequency sequence are:

- Each possible random seed value results in a unique pseudorandom frequency sequence.
- Each of the 50 frequencies occurs in the sequence once and only once before the sequence repeats.
- There are no circumstances or special conditions that skip frequencies in the sequence.

Once chosen, the sequence does not change unless re-commissioned.

Note: The information in this section is provided by the manufacturer.

EXHIBIT 14. RECEIVER SYNCHRONIZATION AND RECEIVER INPUT BANDWIDTH.

Note: The information in this section is provided by the manufacturer.

At the core of the radio block is an integrated transceiver, CC1101 manufactured by Texas Instruments. The CC1101 is configured by the RF protocol microcontroller to operate at frequencies as determined by a frequency sequencing algorithm. The bandwidth, transmit power, and modulation rate and type are set identically for all of the 50 frequencies utilized by this system.
The protocol microcontroller provides the commissioned network with a synchronization signal periodically.

EXHIBIT 16. MPE CALCULATIONS

The following MPE calculations are based on the custom design trace antenna, with a measured conducted RF power 10.80 dBm as presented to the antenna. The declared maximum gain of this antenna is 4.55 dBi.

Prediction of MPE limit at a given distance

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

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the 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:	10.80	(dBm)
Maximum peak output power at antenna input terminal:	12.023	(mW)
Antenna gain(typical):	4.55	(dBi)
Maximum antenna gain:	2.851	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	903	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm^2)
Power density at prediction frequency:	0.006819	(mW/cm^2)
Maximum allowable antenna gain:	26.2	(dBi)
Margin of Compliance at 20 cm =	21.7	dB

APPENDIX A – Test Equipment List

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 14-Dec-2010 Type Test : Radiated Emissions Job # : C-1053

Prepared By: Peter Feilen Customer : Honeywell Quote #: 310316

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/7/2010	6/7/2011	Active Calibration
2	EE 960158	RF Preselecter	Agilent	N9039A	MY46520110	6/7/2010	6/7/2011	Active Calibration
3	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	11/9/2010	11/9/2011	Active Calibration
4	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6707	12/8/2010	12/8/2011	Active Calibration
5	AA 960150	Bicon Antenna	ETS	3110B	0003-3346	10/19/2010	10/19/2011	Active Calibration

Project Engineer: Peter Feilen Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 14-Dec-2010 Type Test : Band-Edge Job # : C-1053

Prepared By: Peter Feilen Customer : Honeywell Quote #: 310316

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/7/2010	6/7/2011	Active Calibration
2	EE 960158	RF Preselecter	Agilent	N9039A	MY46520110	6/7/2010	6/7/2011	Active Calibration
3	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	11/9/2010	11/9/2011	Active Calibration
4	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6707	12/8/2010	12/8/2011	Active Calibration
5	AA 960150	Bicon Antenna	ETS	3110B	0003-3346	10/19/2010	10/19/2011	Active Calibration
6	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/22/2010	9/22/2011	Active Calibration
7	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/4/2010	6/4/2011	Active Calibration

Project Engineer: Peter Feilen Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 14-Dec-2010 Type Test : Occupied Bandwidth (20dB) Job # : C-1053

Prepared By: Peter Feilen Customer : Honeywell Quote #: 310316

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/22/2010	9/22/2011	Active Calibration
2	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/4/2010	6/4/2011	Active Calibration

Project Engineer: Peter Feilen Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 14-Dec-2010 Type Test : Conducted Power Output Job # : C-1053

Prepared By: Peter Feilen Customer : Honeywell Quote #: 310316

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/22/2010	9/22/2011	Active Calibration
2	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/4/2010	6/4/2011	Active Calibration

Project Engineer: Peter Feilen Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 14-Dec-2010 Type Test : Spurious Emissions Job # : C-1053

Prepared By: Peter Feilen Customer : Honeywell Quote #: 310316

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/22/2010	9/22/2011	Active Calibration
2	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/4/2010	6/4/2011	Active Calibration
3	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/7/2010	6/7/2011	Active Calibration
4	EE 960158	RF Preselecter	Agilent	N9039A	MY46520110	6/7/2010	6/7/2011	Active Calibration
5	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	11/9/2010	11/9/2011	Active Calibration
6	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6707	12/8/2010	12/8/2011	Active Calibration
7	AA 960150	Bicon Antenna	ETS	3110B	0003-3346	10/19/2010	10/19/2011	Active Calibration

Project Engineer: Peter Feilen Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 14-Dec-2010 Type Test : Channel Plan & Separation Job # : C-1053

Prepared By: Peter Feilen Customer : Honeywell Quote #: 310316

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/22/2010	9/22/2011	Active Calibration
2	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/4/2010	6/4/2011	Active Calibration

Project Engineer: Peter Feilen Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 14-Dec-2010 Type Test : Channel Occupancy Job # : C-1053

Prepared By: Peter Feilen Customer : Honeywell Quote #: 310316

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/22/2010	9/22/2011	Active Calibration
2	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/4/2010	6/4/2011	Active Calibration

Project Engineer: Peter Feilen Quality Assurance:

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 14-Dec-2010 Type Test : Radiated Emissions (109) Job # : C-1053

Prepared By: Peter Feilen Customer : Honeywell Quote #: 310316

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY48250225	6/7/2010	6/7/2011	Active Calibration
2	EE 960158	RF Preselecter	Agilent	N9039A	MY46520110	6/7/2010	6/7/2011	Active Calibration
3	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	11/9/2010	11/9/2011	Active Calibration
4	AA 960081	Double Ridge Horn Antenna	EMCO	3115	6707	12/8/2010	12/8/2011	Active Calibration
5	AA 960150	Bicon Antenna	ETS	3110B	0003-3346	10/19/2010	10/19/2011	Active Calibration

Project Engineer: Peter Feilen Quality Assurance:

APPENDIX B – Test Standards: CURRENT PUBLICATION DATES RADIO

STANDARD #	DATE	Am. 1	Am. 2
ANSI C63.4	2009		
ANSI C63.10	2009		
CISPR 11	2009-05	2009-12 P	
CISPR 12	2007-05		
CISPR 14-1	2005-11	2008-11	
CISPR 14-2	2001-11	2001-11	2008-05
CISPR 16-1-1 Note 1	2010-01		
CISPR 16-1-2 Note 1	2003	2004-04	2006-07
CISPR 22	2008-09		
CISPR 24	1997-09	2001-07	2002-10
EN 55011	2009		
EN 55014-1	2006		
EN 55014-2	1997		
EN 55022	2006	2007	
EN 60601-1-2	2007-03		
EN 61000-3-2	2006-05		
EN 61000-3-3	2008-12		
EN 61000-4-2	2009-05		
EN 61000-4-3	2006-07	2008-05	
EN 61000-4-4	2004		
EN 61000-4-5	2006-12		
EN 61000-4-6	2009-05		
EN 61000-4-8	1994	2001	
EN 61000-4-11	2004-10		
EN 61000-6-1	2007-02		
EN 61000-6-2	2005-12		
EN 61000-6-3	2007-02		
EN 61000-6-4	2007-02		
FCC 47 CFR, Parts 0-15, 18, 90, 95	2009		
FCC Public Notice DA 00-1407	2000		
FCC ET Docket # 99-231	2002		
FCC Procedures	2007		
ICES 001	2006-06		
ICES 002	2009-08		
ICES 003	2004-02		
IEC 60601-1-2 Note 1	2007-03		
IEC 61000-3-2	2005-11	2008-03	2009-02
IEC 61000-3-3	2008-06		
IEC 61000-4-2	2008-12		
IEC 61000-4-3	2008-04	incl in 2008-04	2009-12 FD

STANDARD #	DATE	Am. 1	Am. 2
IEC 61000-4-4	2004-07	2010-10	
IEC 61000-4-5	2005-11		
IEC 61000-4-6	2008-10		
IEC 61000-4-8	2009-09		
IEC 61000-4-11	2004-03		
IEC 61000-6-1	2005-03		
IEC 61326-1	2006-06		
ISO 14982	1998-07		
MIL Std. 461E	1999-08		
RSS GEN	2010-12		
RSS 119	2007-06		
RSS 123	1999-11		
RSS 125	2000-03		
RSS 131	2003-07		
RSS 136	2002-10		
RSS 137	2009-02		
RSS 210	2010-12		
RSS 213	2005-12		
RSS 243	2010-02		
RSS 310	2007-06		

Note 1: Test not on LSR Scope of Accreditation.

APPENDIX C - Uncertainty Statement

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of k=2.

Table of Expanded Uncertainty Values, (K=2) for Specified Measurements

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 – Meter chamber, Biconical Antenna	4.24 dB
Radiated Emissions	3-Meter Chamber, Log Periodic Antenna	4.8 dB
Radiated Emissions	10-Meter OATS, Biconical Antenna	4.18 dB
Radiated Emissions	10-Meter OATS, Log Periodic Antenna	3.92 dB
Conducted Emissions	Shielded Room/EMCO LISN	1.60 dB
Radiated Immunity	3 Volts/Meter in 3-Meter Chamber	1.128 Volts/Meter
Conducted Immunity	3 Volts level	1.0 V