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MEASUREMENT REPORT FCC PART 15.247 / IC RSS-210 Bluetooth

Applicant Name:

NEC Corporation of America
Radio Communications Systems Division
6535 N. State Highway 161
Irving, TX 75039-2402 USA

Date of Testing:

April 13 - 17, 2012

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

0Y1204040422.A98

FCC ID: A98-FBC3105**APPLICANT:** NEC Corporation of America**Application Type:** Certification**Model(s):** KMP7R4D1-1A**EUT Type:** Portable Tablet Computer**Max. RF Output Power:** 1.746 mW (2.42dBm) Conducted**Frequency Range:** 2402 – 2480MHz (Bluetooth for US)**Type of Modulation:** GFSK, $\pi/4$ -DQPSK, 8DPSK**FCC Classification:** FCC Part 15 Spread Spectrum Transmitter (DSS)**FCC Rule Part(s):** Part 15 Subpart C (15.247)**IC Specification(s):** RSS-210 Issue 8**Test Procedure(s):** ANSI C63.4-2003, ANSI C63.10-2009, DA 00-705

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003 and ANSI C63.10-2009. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

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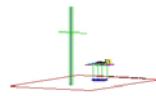
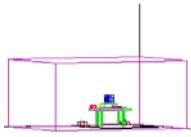
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MEASUREMENT REPORT

FCC Part 15.247



§ 2.1033 General Information

APPLICANT: NEC Corporation of America
APPLICANT ADDRESS: Radio Communications Systems Division
6535 N. State Highway 161, Irving, TX 75039-2402 USA
TEST SITE: PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS: 6660-B Dobbin Road, Columbia, MD 21045 USA
FCC RULE PART(S): Part 15 Subpart C (15.247)
IC SPECIFICATION(S): RSS-210 Issue 8
BASE MODEL: KMP7R4D1-1A
FCC ID: A98-FBC3105
Test Device Serial No.: 004401200910053 & 004401200910061 Production Pre-Production Engineering
FCC CLASSIFICATION: FCC Part 15 Spread Spectrum Transmitter (DSS)
Method/System: Frequency Hopping Spread Spectrum (FHSS)
DATE(S) OF TEST: April 13 - 17, 2012
TEST REPORT S/N: 0Y1204040422.A98

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21045, U.S.A.



- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451A-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451A-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EVDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Intern'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See *Figure 1-1*).

Testing was conducted at PCTEST Engineering Laboratory, Inc. facility located in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on January 10, 2012.

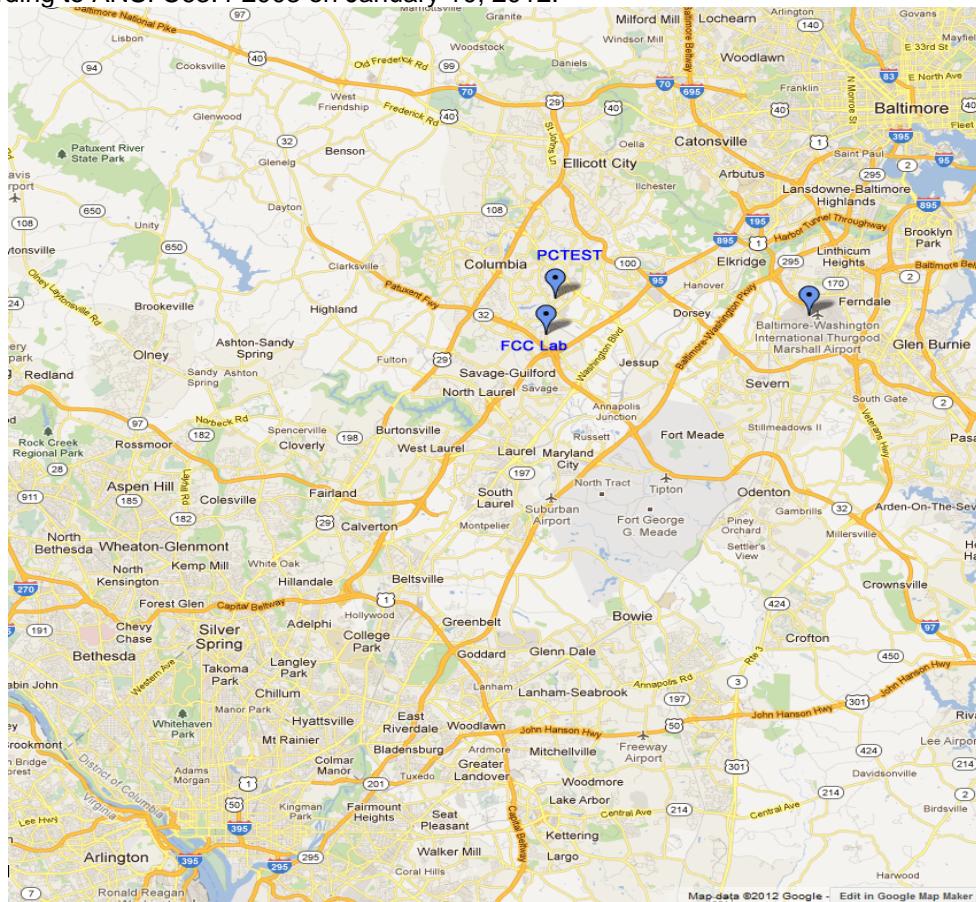


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **NEC Portable Tablet Computer FCC ID: A98-FBC3105**. The test data contained in this report pertains only to the emissions due to the EUT's Bluetooth transmitter.

- This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following:
 - A) The hopping sequence is pseudorandom
 - B) All channels are used equally on average
 - C) The receiver input bandwidth equals the transmit bandwidth
 - D) The receiver hops in sequence with the transmit signal
- 15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.
- 15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection/ hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS, 850 WCDMA, 802.11b/g/n WLAN, Bluetooth (1x, EDR, LE)

2.3 Test Configuration

The NEC Portable Tablet Computer FCC ID: A98-FBC3105 was tested per the guidance of ANSI C63.10-2009. See Sections 3.2, 3.3, and 6.1 of this test report for a description of the AC line conducted emissions, radiated emissions, and antenna port conducted emissions test setups, respectively.

2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

2.5 Labeling Requirements

Per 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(b)(2).

Please see attachment for FCC ID label and label location.

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3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) and the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2010) were used in the measurement of the **NEC Portable Tablet Computer FCC ID: A98-FBC3105**.

Deviation from measurement procedure.....**None**

3.2 AC Line Conducted Emissions

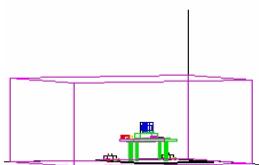


Figure 3-1. Shielded Enclosure Line-Conducted Test Facility

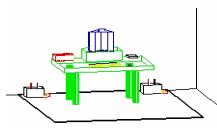


Figure 3-2. Line Conducted Emission Test Set-Up

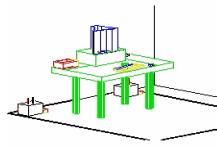


Figure 3-3. Wooden Table & Bonded LISNs

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure, manufactured by Ray Proof Series 81 (see *Figure 3-1*). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the sidewall of the shielded room (see *Figure 3-2*). Two 10kHz-30MHz, 50Ω/50µH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (see *Figure 3-3*). Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filter (100dB 14Hz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with an inner diameter of $\frac{1}{2}$ ".

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the Solar LISN. The LISN schematic diagram is shown (see *Figure 3-4*). All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements. The bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission emission. Each emission was maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz bandwidth for final measurements. Each emission reported was calibrated using a signal generator.

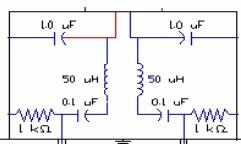


Figure 3-4. LISN Schematic Diagram

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3.3 Radiated Emissions

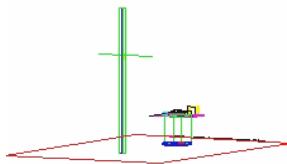


Figure 3-5. 3-Meter Test Site

The radiated test facilities consisted of an indoor semi-anechoic chamber used for exploratory measurements and an open area test site (OATS) used for final measurements. For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies higher than the upper frequency range of the broadband antenna used for testing, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used.

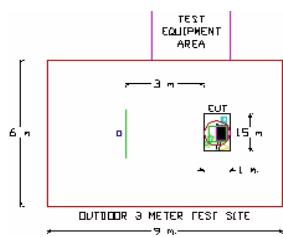


Figure 3-6. Dimensions of Outdoor Test Site

Exploratory measurements were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of a 0.8 meter high non-metallic 1 x 1.5 meter table (see *Figure 3-7*). The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth, and receive antenna height was noted for each frequency found. To record the exploratory measurements, the analyzers' detector function was set to peak mode and the bandwidth was set to 100kHz.

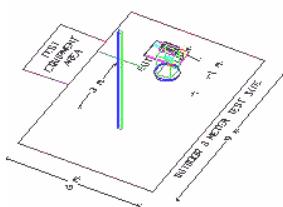


Figure 3-7. Turntable and System Setup

Final measurements were made on the OATS at 3 meter test range using calibrated, linearly polarized broadband or horn antennas (see *Figure 3-5*). The measurement area is situated on an 18 meter x 20 meter galvanized 1/2" hardware cloth as the conducting ground plane. This material is sewn together in sections 4 feet wide and 60 feet long. A total of eighteen sections are required to cover the entire measurement area. Sections are laid across the width of the pad, overlapped 1" and sewn and soldered together at intervals of 3" (7.6 cm.) The terrain of the test site is reasonably flat and level. Power and cable to the test site are buried 18" deep into the ground outside the perimeter of the site. An all-weather non-metallic housing is situated on a 2 x 3 meter area adjacent to the measurement area to house the test equipment (see *Figure 3-6*). The test set-up was again placed on top of the same a 0.8 meter high non-metallic 1 x 1.5 meter table on the OATS as used for exploratory measurements in the indoor chamber. The test set-up was re-configured to the same setup that was previously determined through exploratory measurements to have produced the worst case emissions. The spectrum analyzer was set to the frequencies found to have caused the highest radiated disturbances with respect to the limit during preliminary radiated measurements. The turntable containing the system was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was re-maximized by varying: the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment, powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable, and changing the polarity of the receive antenna, whichever produced the worst-case emissions. To record the final measurements, the analyzer detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 100kHz for frequencies below 1GHz or 1MHz for frequencies above 1GHz. For average measurements above 1GHz, the analyzer was set to peak detector with a reduced VBW setting (RBW = 1MHz, VBW = 10Hz). Each emission reported was calibrated using a signal generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in *Figure 3-8*.

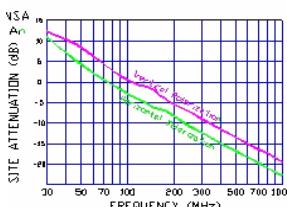


Figure 3-8. Normalized Site Attenuation Curves (H&V)

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4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antennas of the NEC Portable Tablet Computer are **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The **NEC Portable Tablet Computer FCC ID: A98-FBC3105** unit complies with the requirement of §15.203.

Ch.	Frequency (MHz)
00	2402
:	:
39	2441
:	:
78	2480

Table 4-1. Frequency/ Channel Operations

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/7/2011	Annual	6/7/2012	N/A
-	RE2	Radiated Emissions Cable Set (VHF/UHF)	2/13/2012	Annual	2/13/2013	N/A
Agilent	8447D	Broadband Amplifier	5/17/2011	Annual	5/17/2012	1937A03348
Agilent	8447D	Broadband Amplifier	5/17/2011	Annual	5/17/2012	2443A01900
Agilent	8449B	(1-26.5GHz) Pre-Amplifier	2/15/2012	Annual	2/15/2013	3008A00985
Agilent	85650A	Quasi-Peak Adapter	4/4/2012	Annual	4/4/2013	2043A00301
Agilent	8566B	(100Hz-22GHz) Spectrum Analyzer	4/4/2012	Annual	4/4/2013	2618A02866
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/8/2012	Annual	4/8/2013	MY45470194
Agilent	N9038A	MXE EMI Receiver	8/5/2011	Annual	8/5/2012	MY51210133
Agilent	N9030A	PXA Signal Analyzer	2/23/2012	Annual	2/23/2013	MY49432391
Anritsu	MA2411B	Power Sensor	3/5/2012	Annual	3/5/2013	846215
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
Emco	3115	Horn Antenna (1-18GHz)	1/12/2012	Biennial	1/12/2014	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	1/20/2012	Triennial	1/20/2015	9203-2178
Emco	3816/2	LISN	11/5/2010	Biennial	11/5/2012	9707-1077
Emco	3816/2	LISN	11/3/2010	Biennial	11/3/2012	9707-1079
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/22/2011	Annual	7/22/2012	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	5/31/2011	Annual	5/31/2012	135427
Mini-Circuits	VHF-3100+	High Pass Filter	1/15/2012	Annual	1/15/2013	30841
Mini-Circuits	VHF-3100+	High Pass Filter	2/7/2012	Annual	2/7/2013	31144
Sunol	DRH-118	Horn Antenna (1 - 18GHz)	7/5/2011	Biennial	7/5/2013	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/26/2012	Biennial	1/26/2014	A051107

Table 5-1. Annual Test Equipment Calibration Schedule

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6.0 TEST RESULTS

6.1 Summary

Company Name: NEC Corporation of America
 FCC ID: A98-FBC3105
 Method/System: Frequency Hopping Spread Spectrum (FHSS)
 Number of Channels: 79

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (Tx)						
15.247(a)(1)(iii)	RSS-210 [A8.1]	20dB Bandwidth	< 1 MHz only if using less than 15 non-overlapping channels	CONDUCTED	PASS	Section 6.2
15.247(b)(1)	RSS-210 [A8.4(2)]	Peak Transmitter Output Power	< 1 Watt if \geq 75 non-overlapping channels used		PASS	Section 6.3
15.247(a)(1)	RSS-210 [A8.1(2)]	Channel Separation	> 2/3 of 20 dB BW for systems with Output Power < 125mW		PASS	Section 6.5
15.247(a)(1)(iii)	RSS-210 [A8.1(4)]	Number of Channels	> 15 Channels		PASS	Section 0
15.247(a)(1)(iii)	RSS-210 [A8.1(4)]	Time of Occupancy	< 0.4 sec in 31.6 sec period		PASS	Section 6.6
15.247(d)	RSS-210 [A8.5]	Band Edge / Out-of-Band Emissions	Conducted < 20dBc		PASS	Section 6.4, Section 6.8
15.205 15.209	RSS-210 [A8.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-210 table 3 limits)	RADIATED	PASS	Section 6.9, Section 6.10
15.207	RSS-Gen [7.2.2]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits or < RSS-Gen table 2 limits	LINE CONDUCTED	PASS	Section 6.11
RECEIVER MODE (Rx) / DIGITAL DEVICE						
15.107	RSS-Gen [7.2.2]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.107 limits or < RSS-Gen table 2 limits	LINE CONDUCTED	PASS	Part 15B Test Report
15.109	RSS-Gen [7.2.3.2]	General Field Strength Limits (Restricted Bands and Radiated Emissions Limits)	< FCC 15.109 limits or < RSS-Gen limits [Section 6; Table1]	RADIATED (30MHz-1GHz) (1-25 GHz)	PASS	Part 15B Test Report

Table 6-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.

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6.2 20dB Bandwidth Measurement

§15.247 (a)(1)(iii); RSS-210 (A8.1)

The bandwidth at 20dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies. ***The maximum permissible 20dB bandwidth is 1 MHz, unless more than 15 non-overlapping channels are employed.***

Frequency [MHz]	Data Rate [Mbps]	Channel No.	20dB Bandwidth Test Results	
			[kHz]	Pass/Fail
2402	1.0	0	926.4	Pass
2441	1.0	39	928.9	Pass
2480	1.0	78	929.5	Pass
2402	2.0	0	1258	Pass
2441	2.0	39	1172	Pass
2480	2.0	78	1178	Pass
2402	3.0	0	1172	Pass
2441	3.0	39	1180	Pass
2480	3.0	78	1179	Pass

Table 6-2. Conducted 20dB Bandwidth Measurements

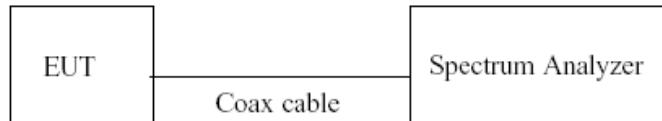
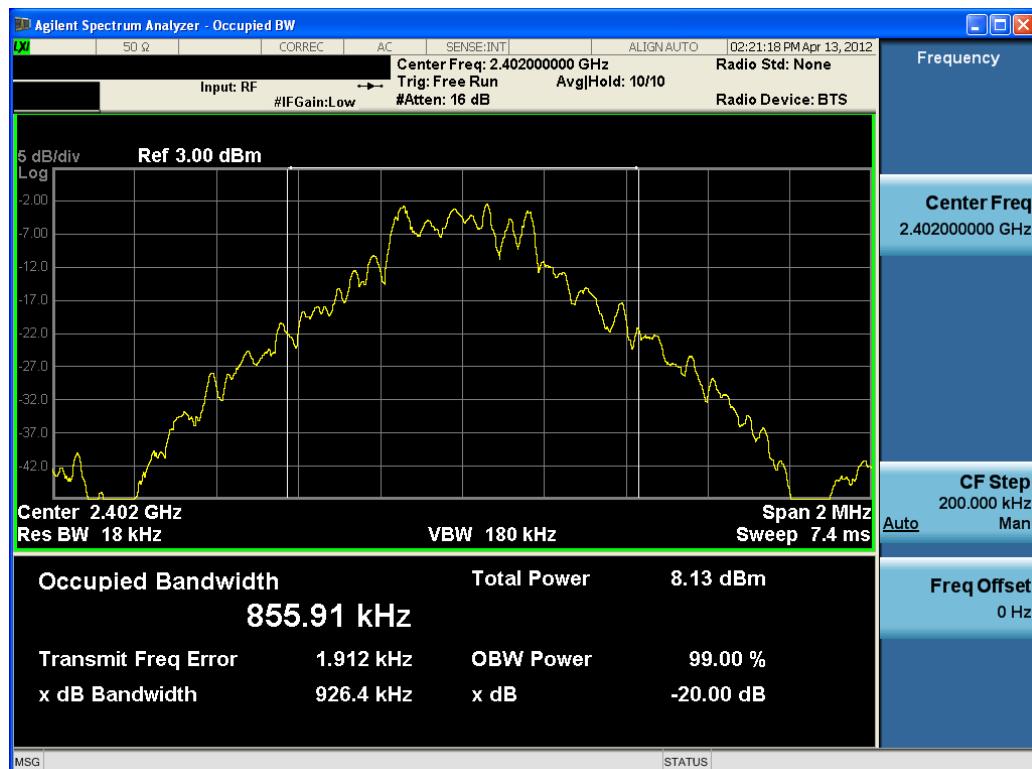


Figure 6-1. Test Instrument & Measurement Setup

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 6-1. 20dB Bandwidth Plot (Bluetooth, 1Mbps – Ch. 0)

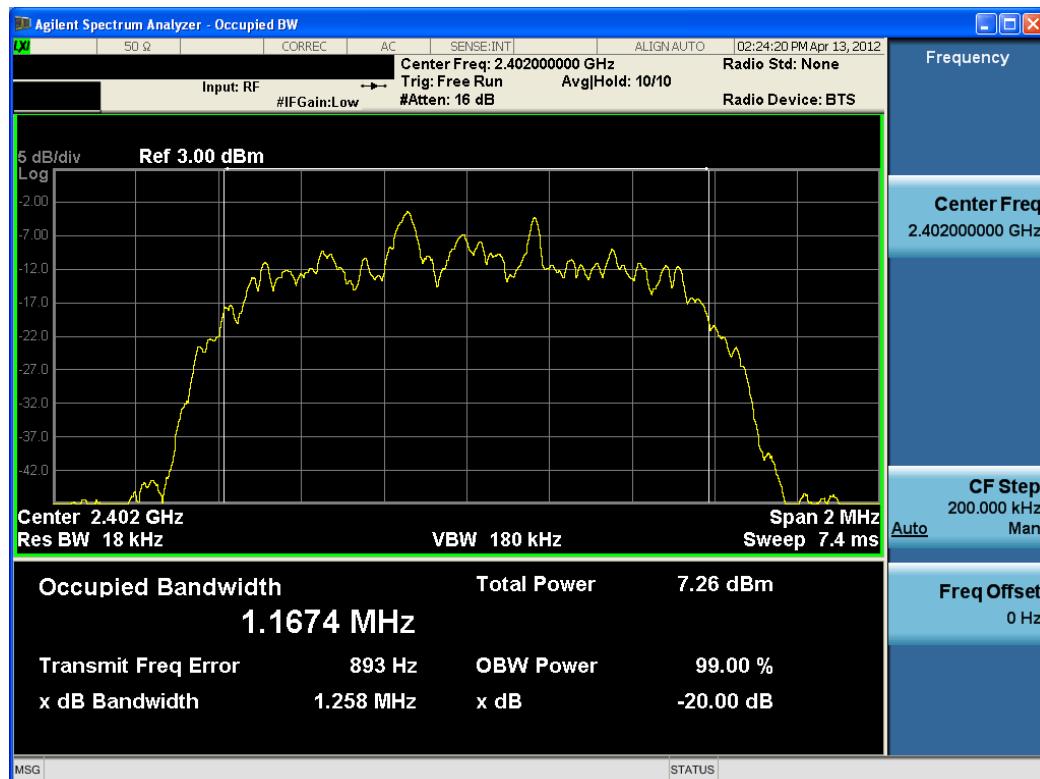


Plot 6-2. 20dB Bandwidth Plot (Bluetooth, 1Mbps – Ch. 39)

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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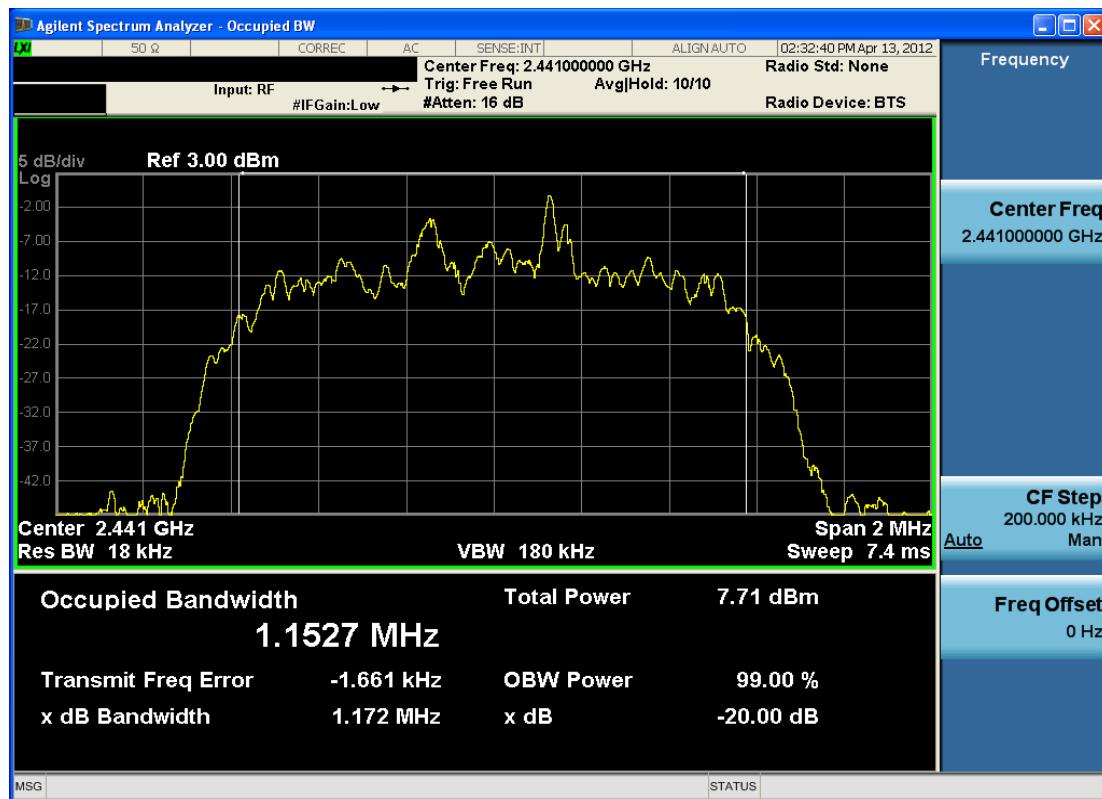


Plot 6-3. 20dB Bandwidth Plot (Bluetooth, 1Mbps – Ch. 78)

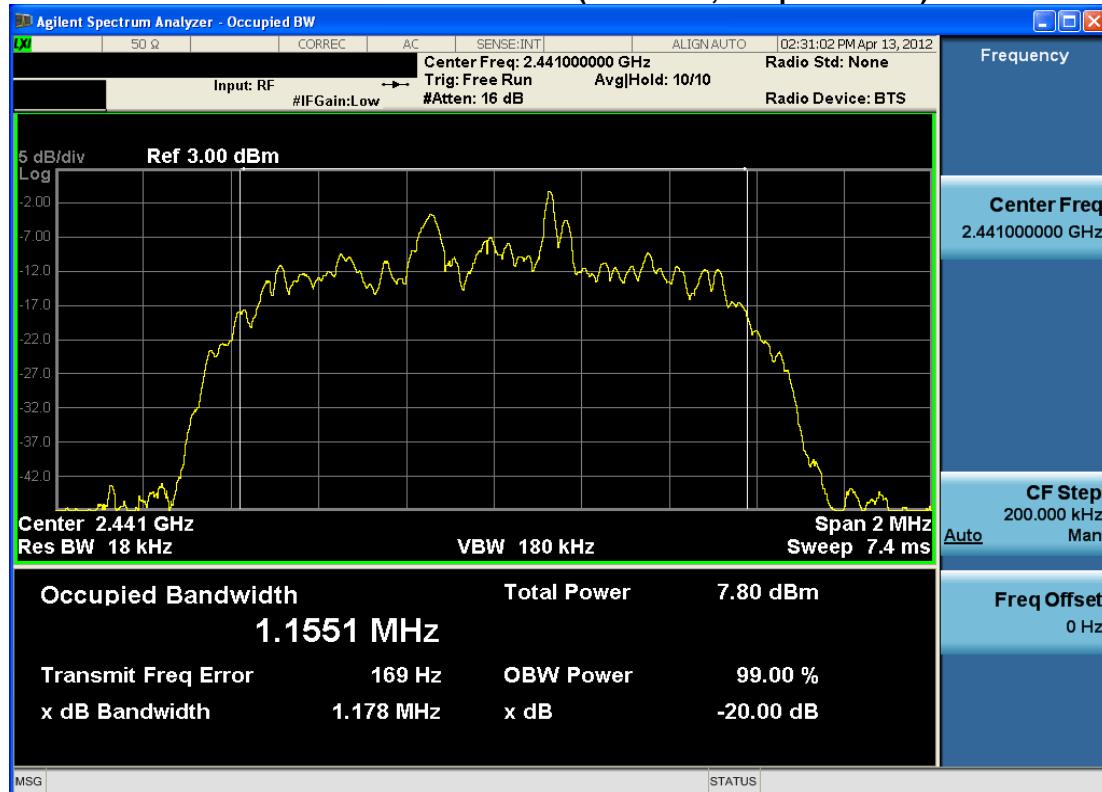


Plot 6-4. 20dB Bandwidth Plot (Bluetooth, 2Mbps – Ch. 0)

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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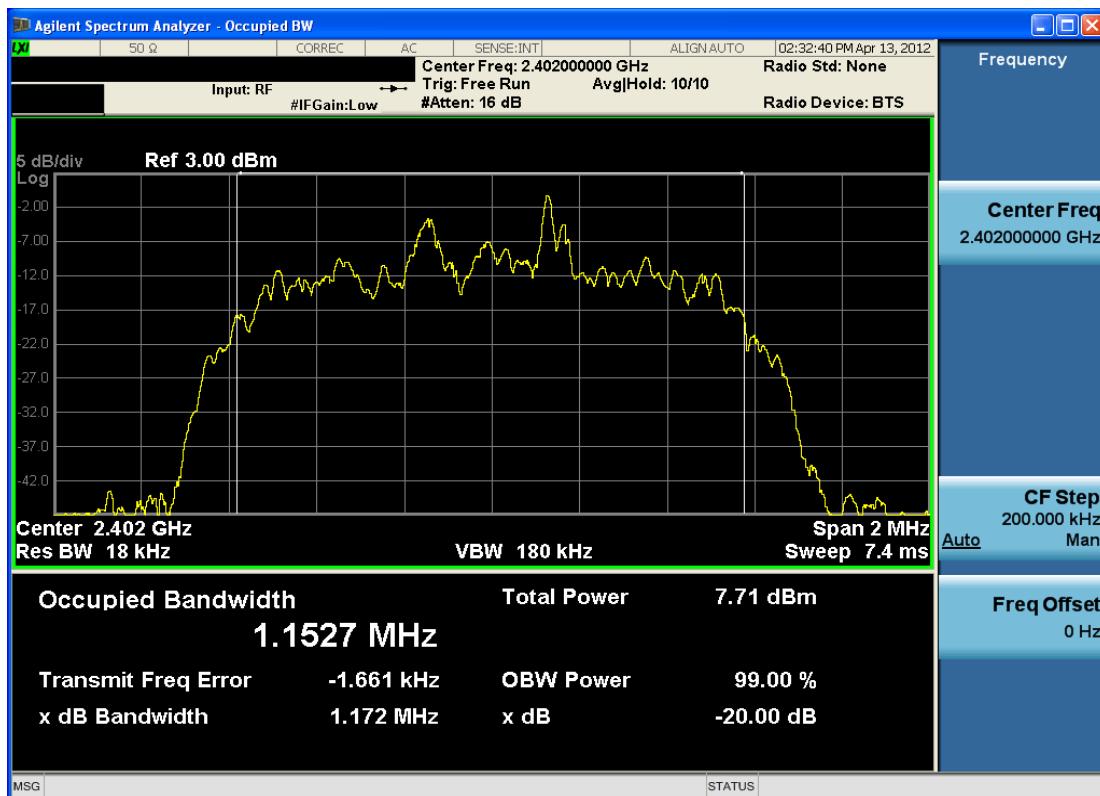


Plot 6-5. 20dB Bandwidth Plot (Bluetooth, 2Mbps – Ch. 39)

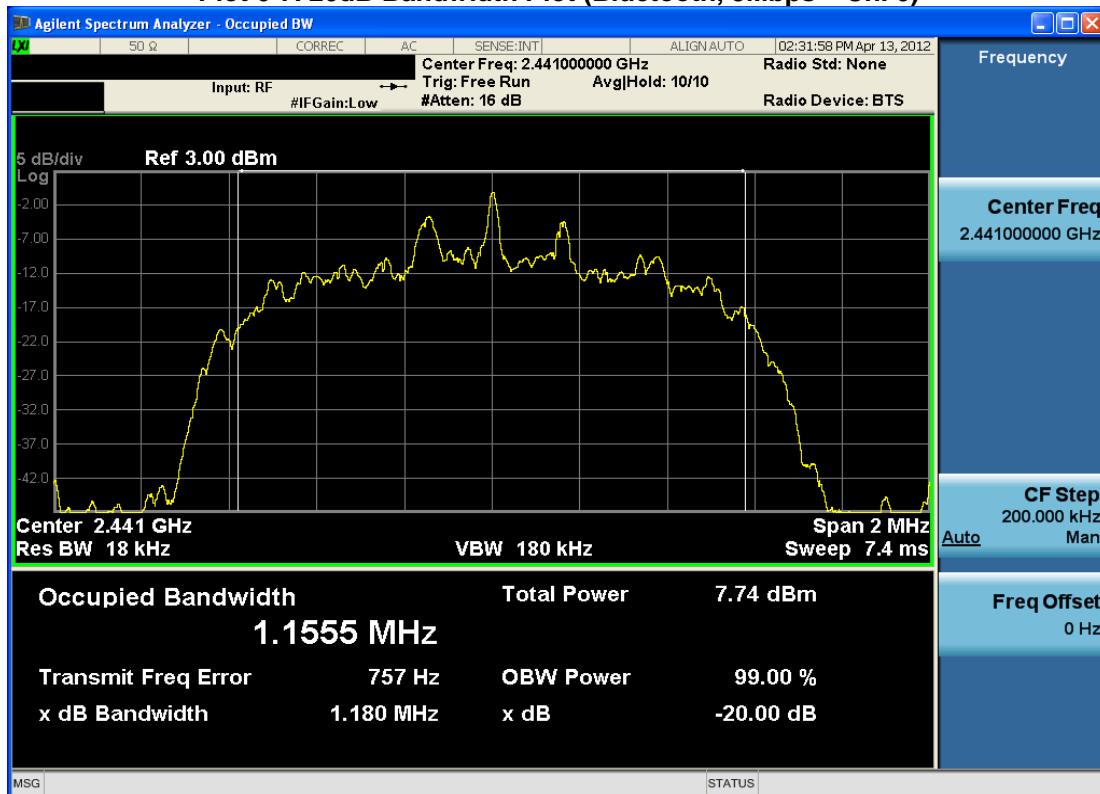


Plot 6-6. 20dB Bandwidth Plot (Bluetooth, 2Mbps – Ch. 78)

FCC ID: A98-FBC3105	 FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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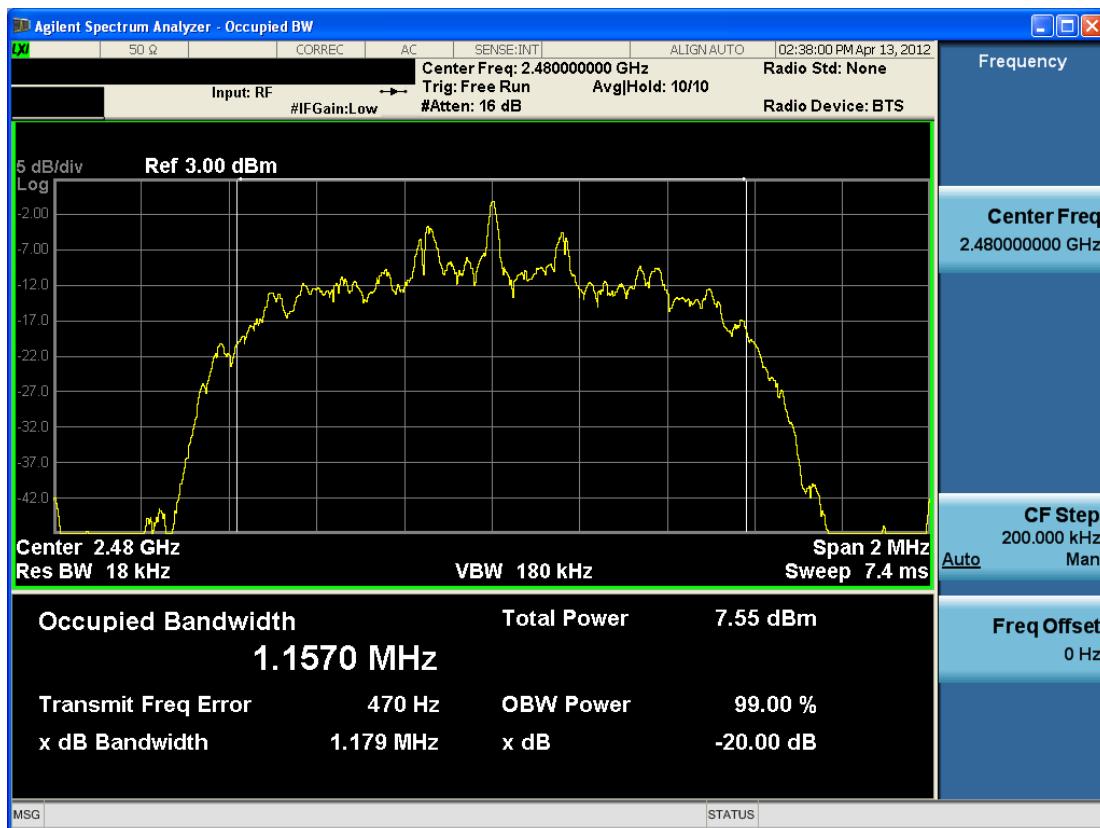


Plot 6-7. 20dB Bandwidth Plot (Bluetooth, 3Mbps – Ch. 0)



Plot 6-8. 20dB Bandwidth Plot (Bluetooth, 3Mbps – Ch. 39)

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)	Reviewed by: Quality Manager
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Plot 6-9. 20dB Bandwidth Plot (Bluetooth, 3Mbps – Ch. 78)

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)	Reviewed by: Quality Manager
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6.3 Output Power Measurement

§15.247 (b)(1); RSS-210 (A8.4 (2))

Measurement is made while the EUT is operating in non-hopping transmission mode. The powers shown below were measured using a spectrum analyzer with a Bluetooth signaling test set (Agilent Model: N4010A) used only to maintain a Bluetooth link with the EUT. Peak power measurements are performed in the analyzers' swept spectrum mode using a peak detector with $RBW = VBW = 3\text{MHz}$. Average power measurements are performed using the analyzer's "burst power" function with $RBW = 3\text{MHz}$. The burst power function triggers on a single burst set to maximum power and measures the maximum average power over the on-time. **The maximum permissible output power is 1 Watt.**

This unit was tested with all possible data rates and the highest peak power is reported with the unit transmitting at 3Mbps.

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Peak Conducted Power	
			[dBm]	[mW]
2402	1.0	0	1.13	1.297
2441	1.0	39	1.03	1.268
2480	1.0	78	0.99	1.256
2402	2.0	0	1.85	1.531
2441	2.0	39	1.71	1.483
2480	2.0	78	1.70	1.479
2402	3.0	0	2.42	1.746
2441	3.0	39	2.37	1.726
2480	3.0	78	2.31	1.702

Table 6-3. Conducted Output Power Measurements

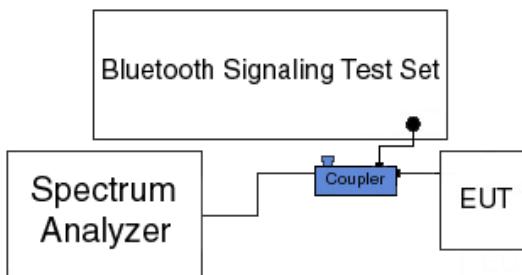


Figure 6-2. Test Instrument & Measurement Setup

Note

Final results were obtained using calibrated couplers, attenuators and cables. The following formula was used:

Output Power (dBm) = Raw Analyzer Level (dBm) + Cable Loss (dB) + Loss in Directional Coupler/Insertion Loss (dB)

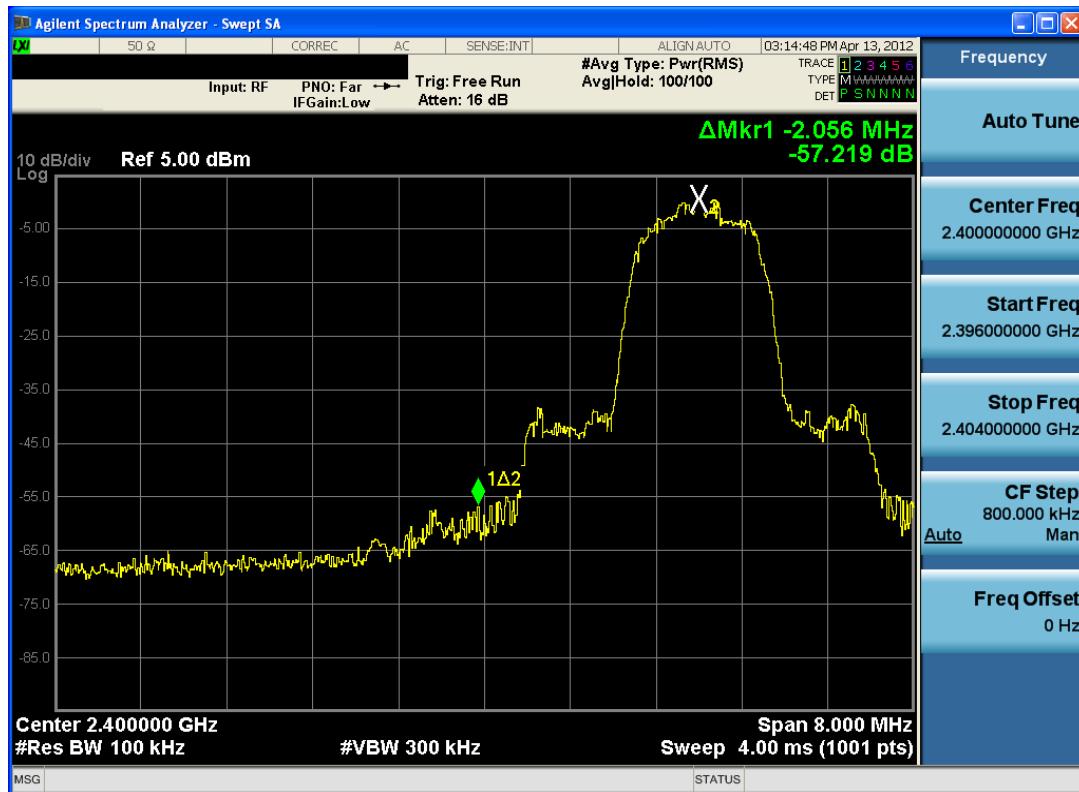
FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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6.4 Band Edge Compliance

§15.247 (d); RSS-210 (A8.5)

Measurement is taken at the highest point located outside of the emission bandwidth. ***The maximum permissible emission level is 20 dBc. Any emission lying outside of the emission bandwidth and in a restricted band is subject to a field strength limit specified in Section 15.209 of the Title 47 CFR.***

Out of band conducted spurious emissions at the band edge were investigated for all data rates and the worst case emissions were found with the EUT transmitting at 3Mbps. Band edge emissions were also investigated with the EUT transmitting in all data rates. Plots of the worst case emissions are shown below.

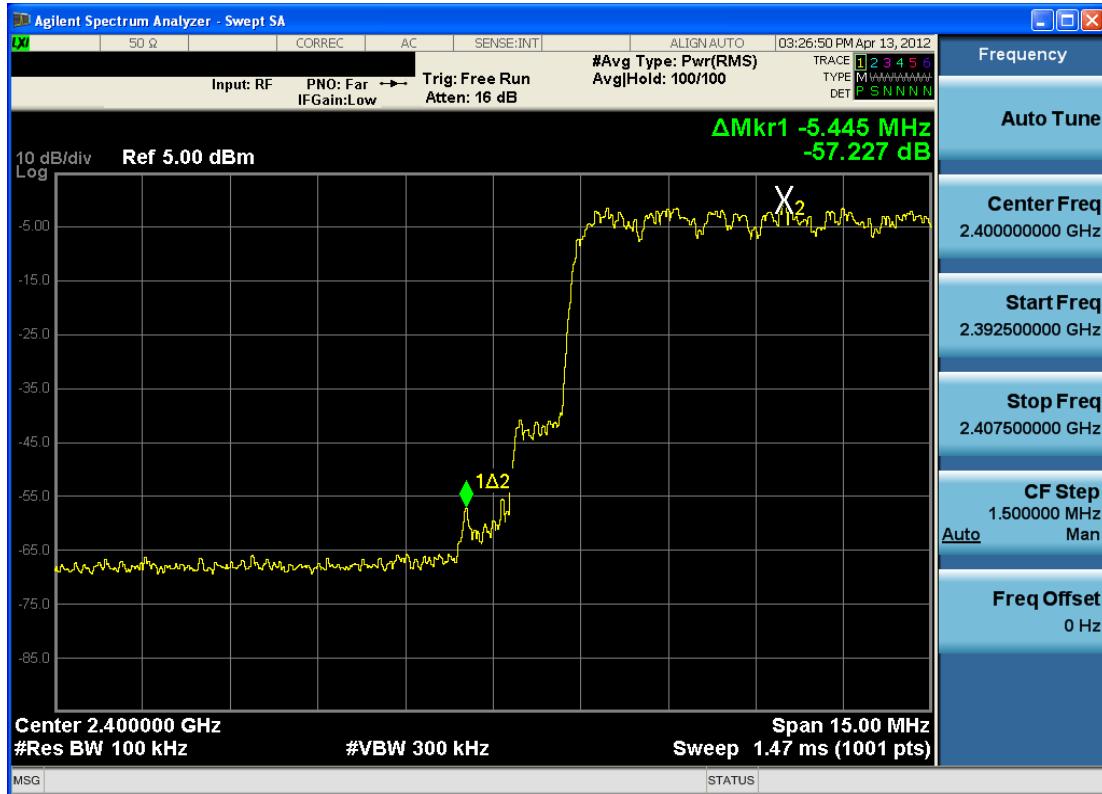


Plot 6-10. Band Edge Plot (Bluetooth with Hopping Disabled, 3Mbps – Ch. 0)

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)	Reviewed by: Quality Manager
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Plot 6-11. Band Edge Plot (Bluetooth with Hopping Disabled, 3Mbps – Ch. 78)



Plot 6-12. Band Edge Plot (Bluetooth with Hopping Enabled, 3Mbps – Ch. 0)

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Plot 6-13. Band Edge Plot (Bluetooth with Hopping Enabled, 3Mbps – Ch. 78)

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)	NEC	Reviewed by: Quality Manager
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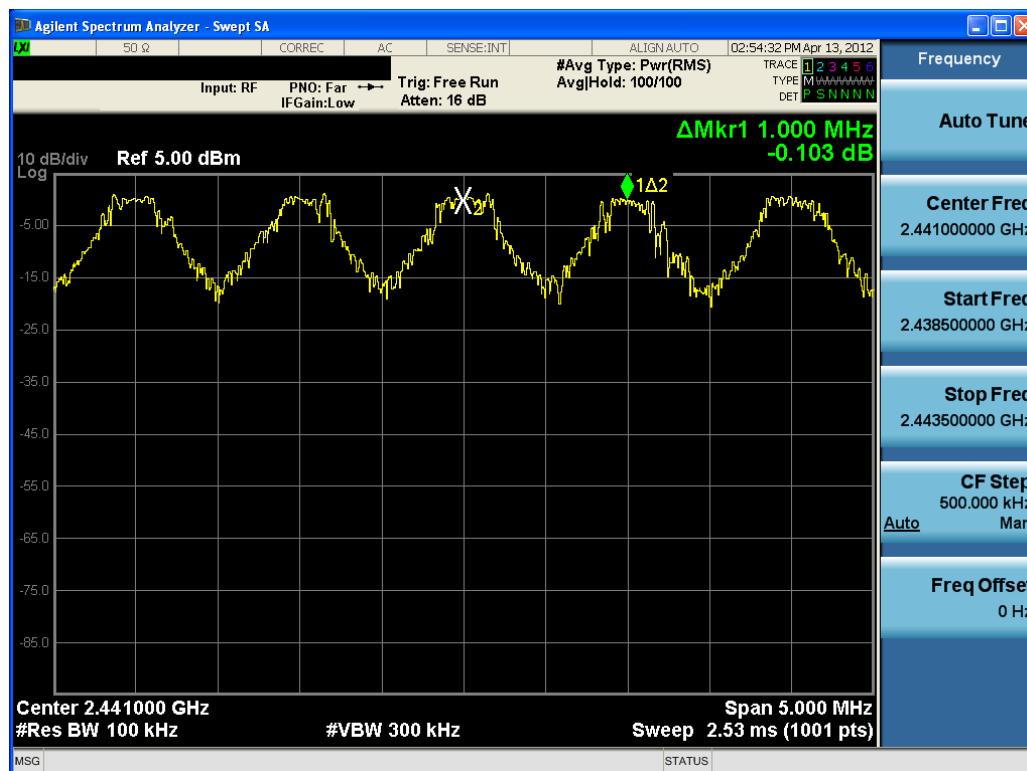
6.5 Carrier Frequency Separation

§15.247 (a)(1); RSS-210 (A8.1 (2))

Measurement is made with EUT operating in hopping mode. *The minimum permissible channel separation for this system is 2/3 the value of the 20dB BW.*

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Min. Channel Separation [MHz]
2402	1.0	0	0.618
2441	1.0	39	0.619
2480	1.0	78	0.620
2402	2.0	0	0.839
2441	2.0	39	0.781
2480	2.0	78	0.785
2402	3.0	0	0.781
2441	3.0	39	0.787
2480	3.0	78	0.786

Table 6-4. Minimum Channel Separation



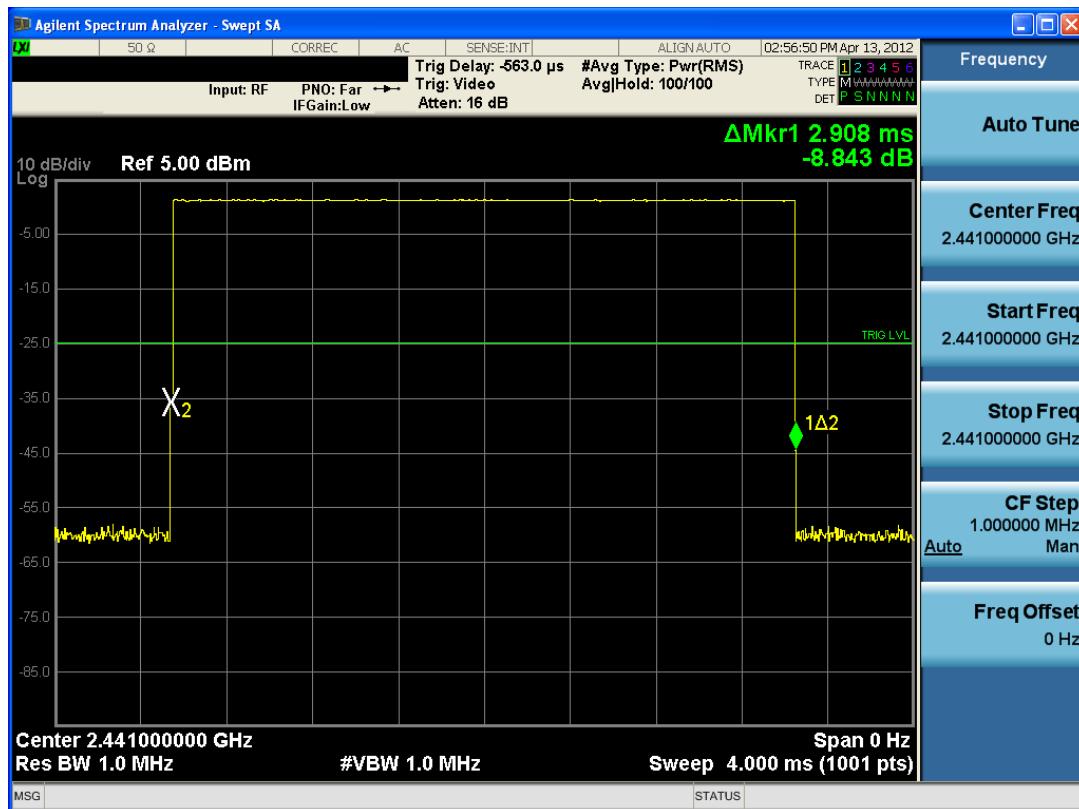
Plot 6-14. Channel Spacing Plot (Bluetooth)

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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6.6 Time of Occupancy

§15.247 (a)(1)(iii); RSS-210 (A8.1 (4))

Measurement is made while EUT is operating in hopping mode with the spectrum analyzer set to zero span. **The maximum permissible time of occupancy is 400 ms within a period of 400ms multiplied by the number of hopping channels employed.**



Plot 6-15. Time of Occupancy Plot (Bluetooth)

Time of Occupancy Calculation

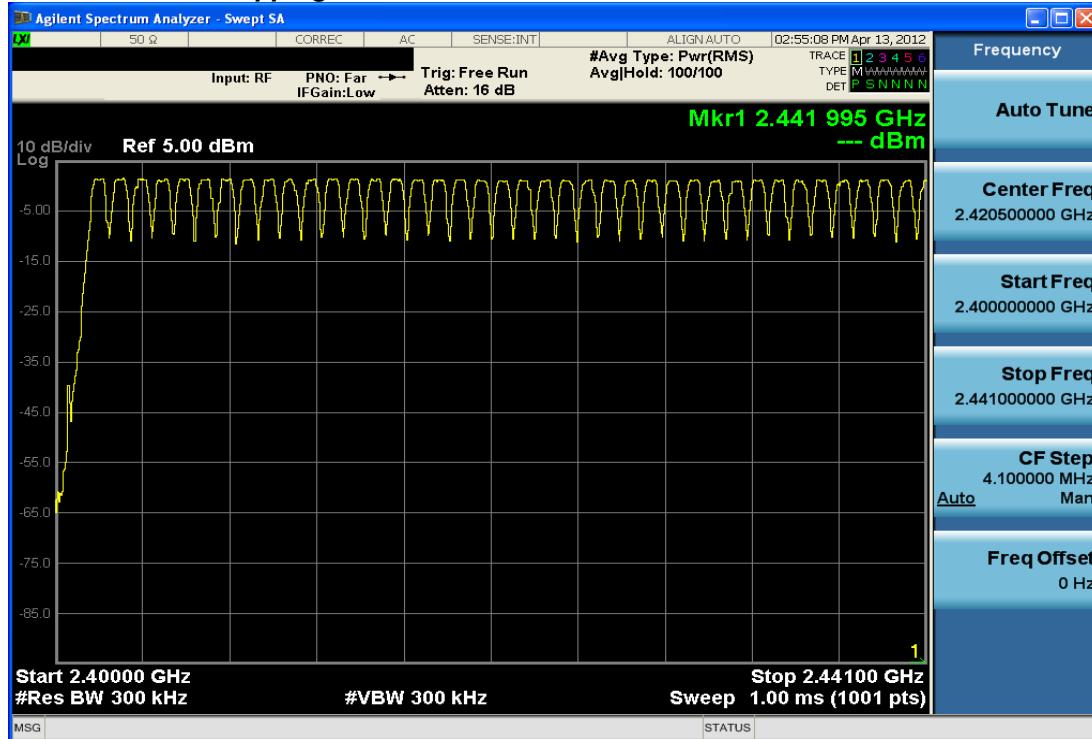
Typically, Bluetooth 1.x/EDR mode has a channel hopping rate of 1600 hops/s. With AFH, the number of channels is reduced to a minimum of 20 channels and the channel hopping rate is reduced by 50% to 800 hops/s with the use of one transmit and receive time slot.

- 400ms x 20 hopping channels = 8 sec (Time of Occupancy Limit)
- Worst case BT has 800 hops/second (for AFH)
- 800 hops/second / 20 channels = 40 hops/second (# of hops/second on one channel)
- 40 hops/second/channel x 8 seconds = 320 hops (# hops over a 8 second period)
- 320 hops x 2.895 ms/channel = 926.4 ms (worst case dwell time for one channel)

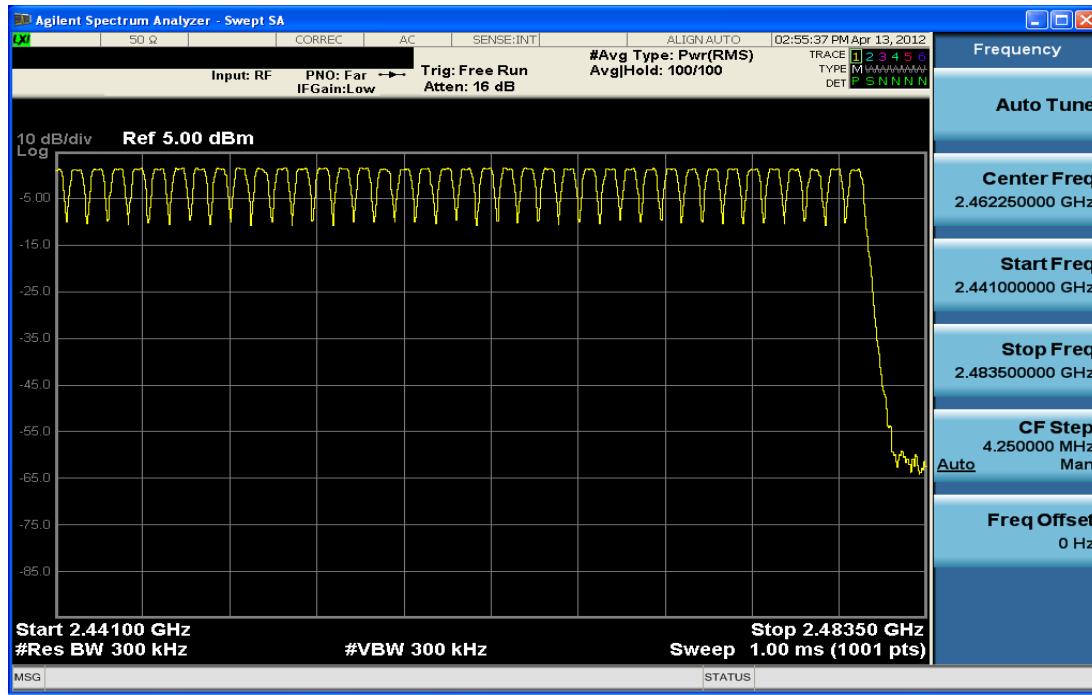
FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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6.7 Number of Hopping Channels §15.247 (a)(1)(iii); RSS-210 (A8.1 (4))

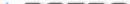
Measurement is made while EUT is operating in hopping mode. ***This frequency hopping system must employ a minimum of 15 hopping channels.***



Plot 6-16. Low End Spectrum Channel Hopping Plot (Bluetooth)



Plot 6-17. High End Spectrum Channel Hopping Plot (Bluetooth)

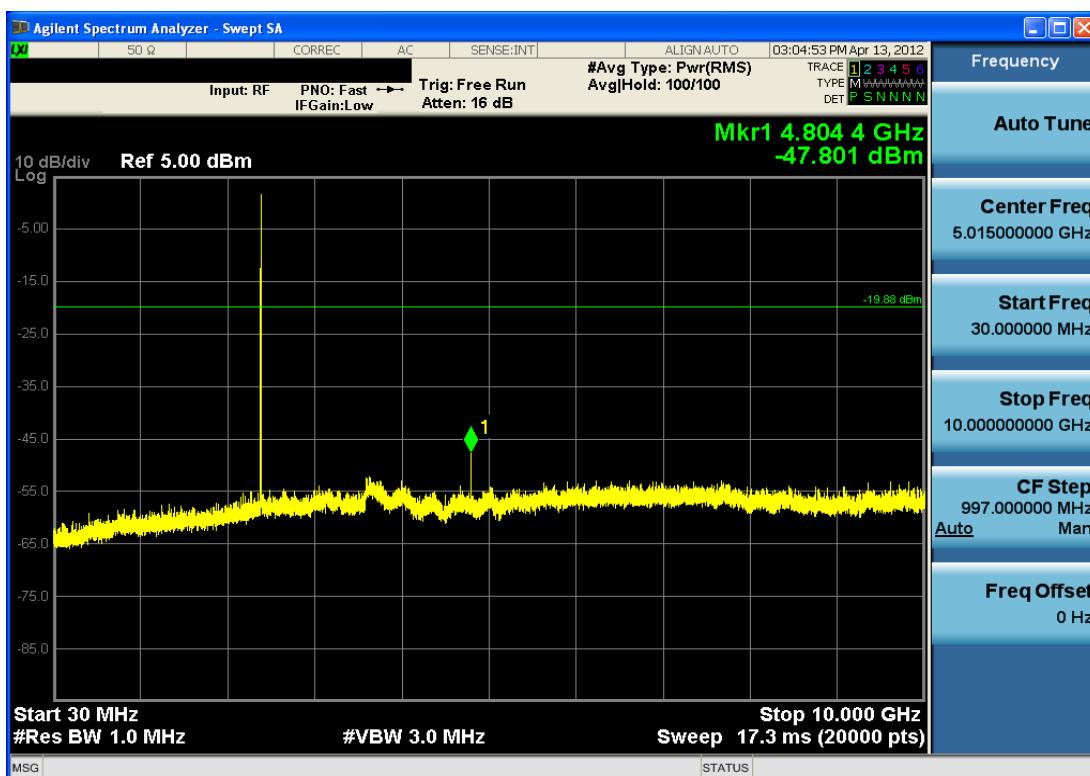
FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1204040422.A98	Test Dates: April 13 - 17, 2012	EUT Type: Portable Tablet Computer		Page 23 of 35

6.8 Conducted Spurious Emissions

§15.247 (d)

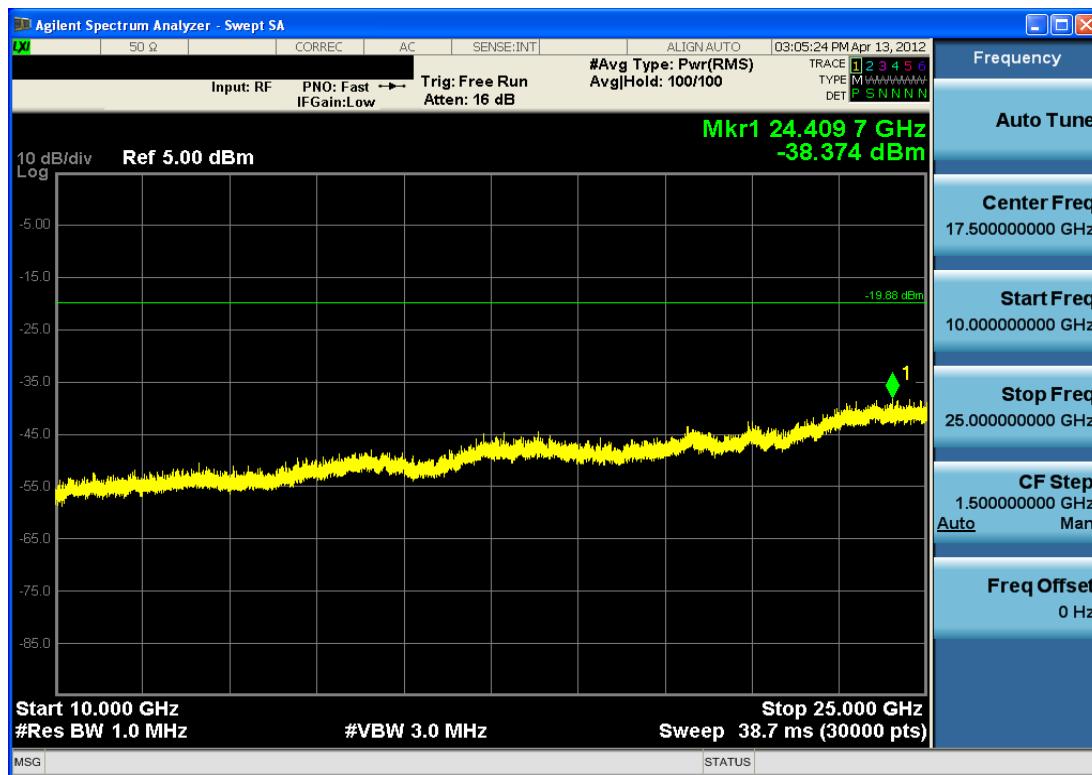
Out of band conducted spurious emissions were investigated for all data rates and the worst case emissions were found with the EUT transmitting at 3Mbps. Plots of the worst case emissions are shown below.

The display line shown in the following plots denotes the limit at 20dB below the fundamental emission level measured in a 100kHz bandwidth. However, since the traces in the following plots are measured with a 1MHz RBW, the display line may not necessarily appear to be 20dB below the level of the fundamental in a 1MHz bandwidth.

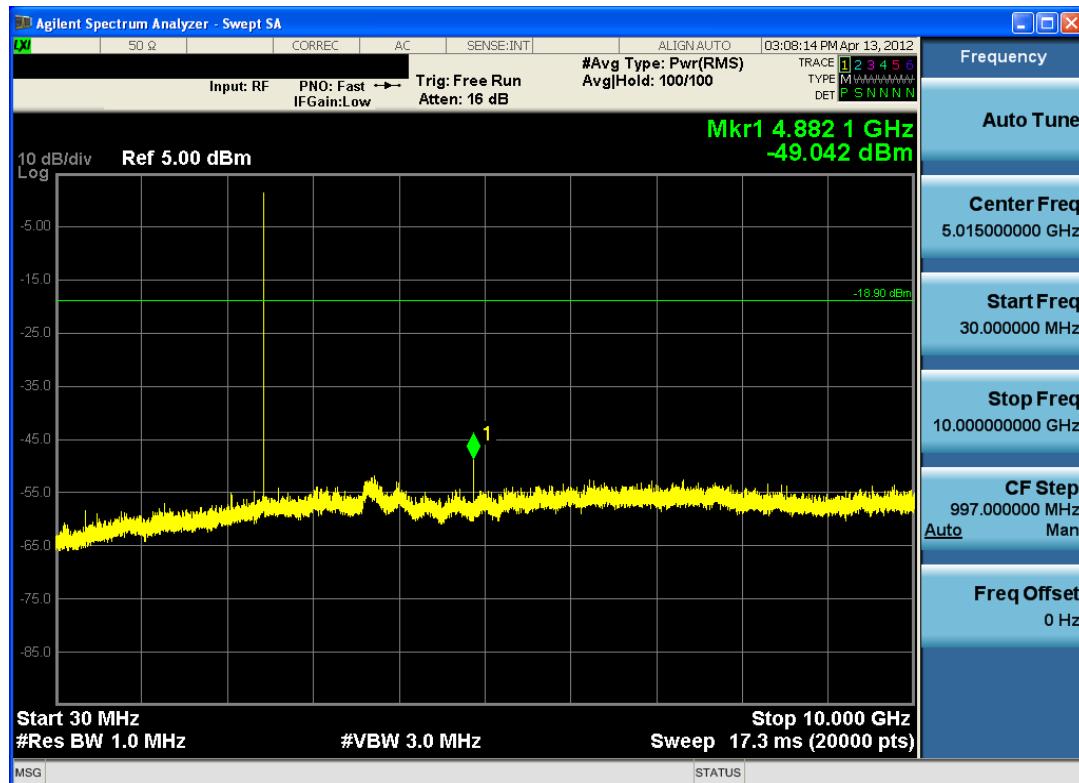


Plot 6-18. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 0)

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)	Reviewed by: Quality Manager
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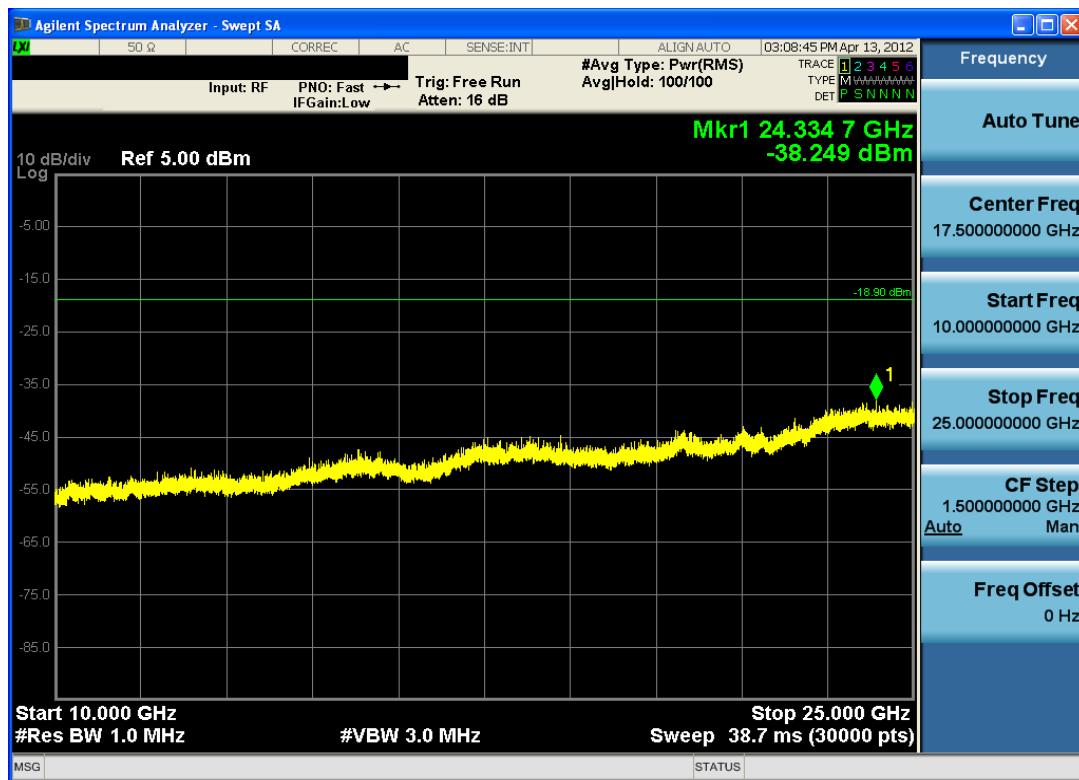


Plot 6-19. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 0)

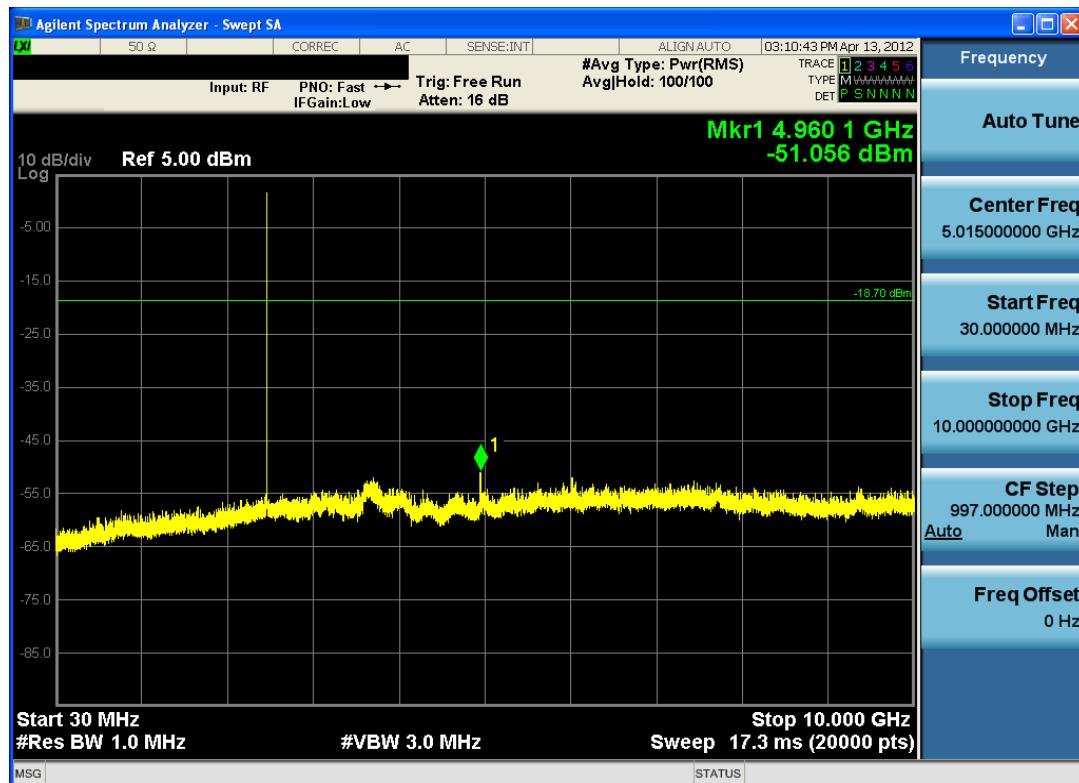


Plot 6-20. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 39)

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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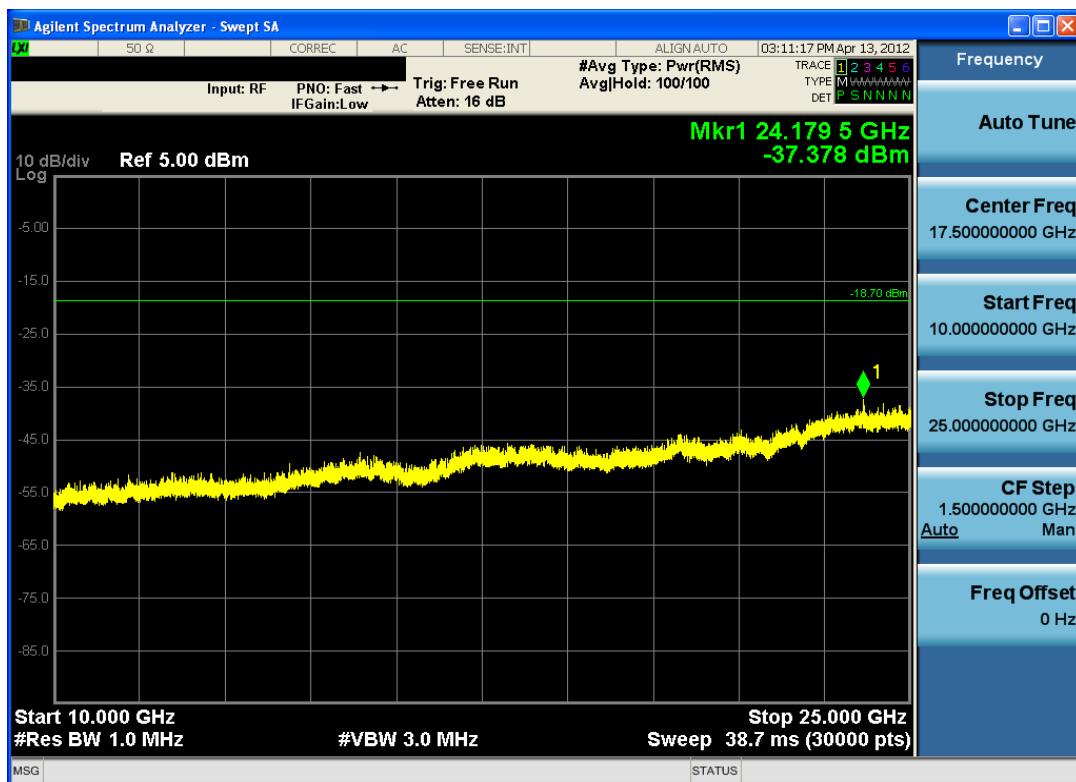


Plot 6-21. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 39)



Plot 6-22. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 78)

FCC ID: A98-FBC3105	 FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)			Reviewed by: Quality Manager
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Plot 6-23. Conducted Spurious Plot (Bluetooth, 3Mbps – Ch. 78)

FCC ID: A98-FBC3105		FCC Pt. 15.247 BLUETOOTH TEST REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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6.9 Radiated Spurious Emission Measurements

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

The EUT was tested from 9kHz and up to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average measurement was used, using RBW = 1MHz, VBW = 1kHz $\geq 1/\tau$ Hz, where τ is the Bluetooth pulse width in seconds, and linearly polarized horn antennas. All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 6-5 per Section 15.209. No significant radiated emissions were found in the 2310 - 2390MHz restricted band.

Frequency	Field Strength [μ V/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 6-5. Radiated Limits

Sample Calculation

- Field Strength Level [$\text{dB}_{\mu\text{V/m}}$] = Analyzer Level [dBm] + 107 + AFCL [dB/m] + Duty Cycle Correction [dB]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB]
- Margin [dB] = Field Strength Level [$\text{dB}_{\mu\text{V/m}}$] – Limit [$\text{dB}_{\mu\text{V/m}}$]
- Duty Cycle Correction Factor Calculation:
 - Time to cycle through all channels = $\Delta t = \tau$ [ms] \times 79 channels, where τ = pulse width
 - $100\text{ms} / \Delta t$ [ms] = $H \rightarrow$ Round up to next highest integer, to account for worst case, H'
 - Worst Case Dwell Time = τ [ms] \times H'
 - Duty Cycle Correction = $20\log(\text{Worst Case Dwell Time}/100\text{ms})$ [dB]

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Radiated Spurious Emission Measurements (Cont'd)

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

Worst Case Mode: Bluetooth

Worst Case Data Rate: 3Mbps

Measurement Distance: 3 Meters

Operating Frequency: 2402MHz

Channel: 0

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Field Strength [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
4804.00	-101.48	Avg	H	42.12	47.64	53.98	-6.34
4804.00	-94.54	Peak	H	42.12	54.58	73.98	-19.40
12010.00	-135.00	Avg	H	58.35	30.35	53.98	-23.63
12010.00	-125.00	Peak	H	58.35	40.35	73.98	-33.63

Table 6-6. Radiated Measurements

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.
2. Average measurements > 1GHz using RBW = 1MHz and VBW = 1kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = 1MHz, VBW = 3MHz.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
7. Above 960MHz the limit is 500 μ V/m (54dB μ /m) at 3 meters radiated.

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Radiated Spurious Emission Measurements (Cont'd)

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

Worst Case Mode: Bluetooth

Worst Case Data Rate: 3Mbps

Measurement Distance: 3 Meters

Operating Frequency: 2441MHz

Channel: 39

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Field Strength [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
4882.00	-108.12	Avg	H	42.22	41.10	53.98	-12.88
4882.00	-96.36	Peak	H	42.22	52.86	73.98	-21.12
7323.00	-135.00	Avg	H	48.80	20.80	53.98	-33.17
7323.00	-125.00	Peak	H	48.80	30.80	73.98	-43.17
12205.00	-135.00	Avg	H	58.81	30.81	53.98	-23.17
12205.00	-125.00	Peak	H	58.81	40.81	73.98	-33.17

Table 6-7. Radiated Measurements

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.
2. Average measurements > 1GHz using RBW = 1MHz and VBW = 1kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = 1MHz, VBW = 3MHz.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
7. Above 960MHz the limit is 500 μ V/m (54dB μ /m) at 3 meters radiated.

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Radiated Spurious Emission Measurements (Cont'd)

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

Worst Case Mode: Bluetooth

Worst Case Data Rate: 3Mbps

Operating Frequency: 2480MHz

Measurement Distance: 3 Meters

Channel: 78

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Field Strength [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
4960.00	-108.23	Avg	H	42.39	41.16	53.98	-12.82
4960.00	-96.35	Peak	H	42.39	53.04	73.98	-20.94
7440.00	-135.00	Avg	H	48.90	20.90	53.98	-33.08
7440.00	-125.00	Peak	H	48.90	30.90	73.98	-43.08
12400.00	-135.00	Avg	H	58.72	30.72	53.98	-23.26
12400.00	-125.00	Peak	H	58.72	40.72	73.98	-33.26

Table 6-8. Radiated Measurements

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.
2. Average measurements > 1GHz using RBW = 1MHz and VBW = 1kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = 1MHz, VBW = 3MHz.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
7. Above 960MHz the limit is 500 μ V/m (54dB μ /m) at 3 meters radiated.

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6.10 Radiated Restricted Band Edge Measurements

§15.205 & §15.209, §15.247 (d); RSS-210 (A8.5)

Worst Case Mode: Bluetooth
 Worst Case Data Rate: 3Mbps
 Measurement Distance: 3 Meters
 Operating Frequency: 2480MHz
 Channel: 78

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol [H/V]	AFCL [dB]	Field Strength [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
2483.52	-107.19	Avg	H	36.32	36.13	53.98	-17.85
2483.52	-95.27	Peak	H	36.32	48.05	73.98	-25.93
2484.75	-107.19	Avg	H	36.33	36.14	53.98	-17.84
2484.75	-95.74	Peak	H	36.33	47.59	73.98	-26.39
2486.92	-106.97	Avg	H	36.34	36.36	53.98	-17.62
2486.92	-95.33	Peak	H	36.34	48.00	73.98	-25.98

Table 6-9. Radiated Restricted Band Edge Measurements at 3-meters

NOTES:

1. All emissions shown lie in the restricted bands specified in §15.205 and are below the limit shown in Table 6-5.
2. Average measurements > 1GHz using RBW = 1MHz and VBW = 1kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds. Peak measurements > 1GHz using RBW = 1MHz, VBW = 3MHz.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.
5. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.
6. Levels at - 135 dBm represent the analyzer noise floor and signify that no emission was detected.
7. Above 960MHz the limit is 500 μ V/m (54dB μ /m) at 3 meters radiated.

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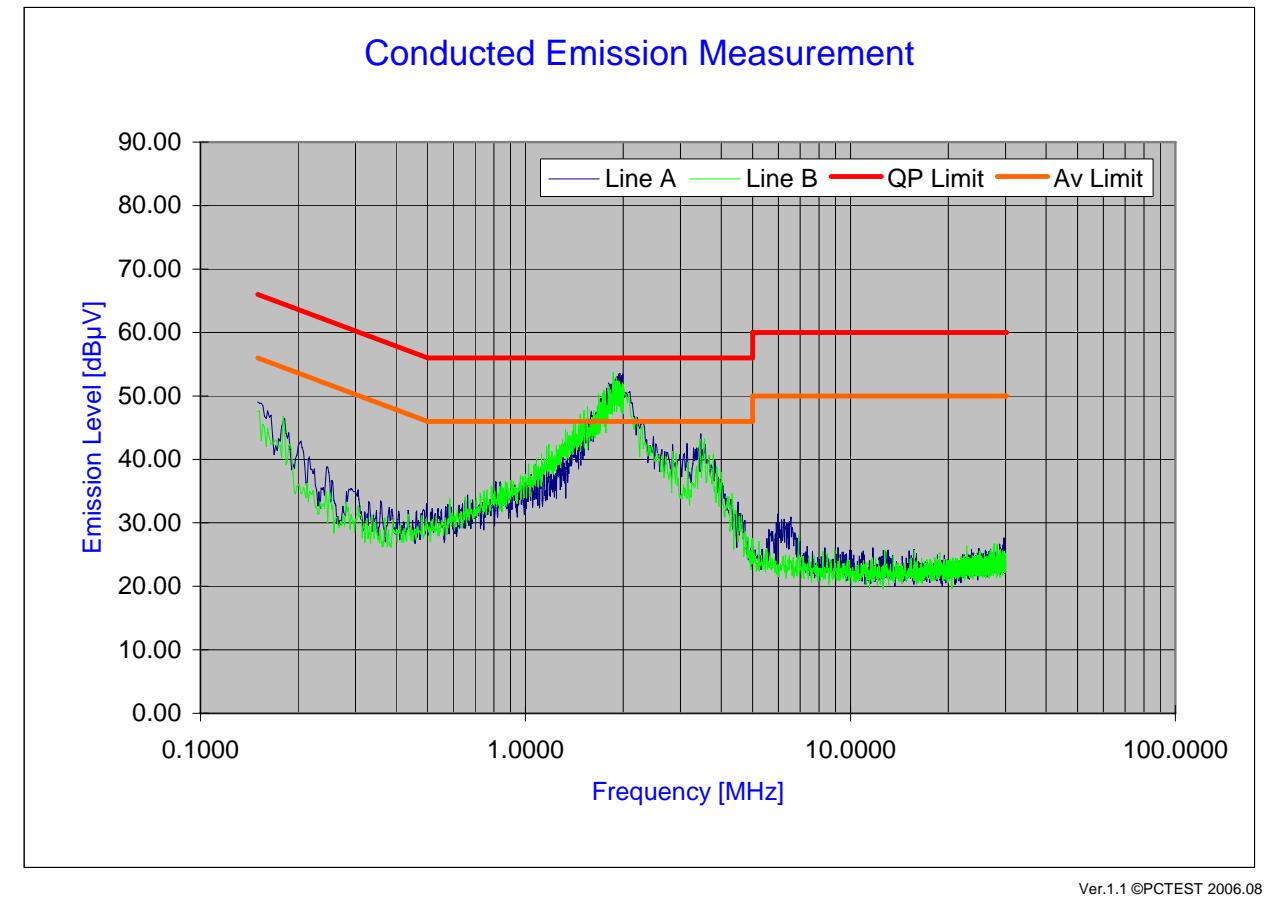
6.11 Line-Conducted Test Data

§15.207; RSS-Gen (7.2.2)

PCTEST Engineering Laboratory Inc.

Company : NEC Corporation of America
 Model Number : KMP7R4D1-1A
 FCC ID Code : A98-FBC3105
 Standard : FCC Part 15C, 15.207

Power Source : AC120V/60Hz
 Tested Date : 04/16/2012
 Note : Tested with Bluetooth ON



Ver.1.1 ©PCTEST 2006.08

Plot 6-24. Line Conducted Plot with Bluetooth

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported with 3Mbps data rate on channel 39. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot are made using a peak detector.
5. Deviations to the Specifications: None.

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Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen (7.2.2)

No.	Line	Frequency [MHz]	Factor [dB]	QP [dB μ V]	Limit [dB μ V]	Margin [dB]	Average [dB μ V]	Limit [dB μ V]	Margin [dB]
1	A	1.596	7.11	36.60	56.00	-19.40	27.82	46.00	-18.18
2	A	1.650	7.12	37.57	56.00	-18.43	29.72	46.00	-16.28
3	A	1.671	7.12	38.40	56.00	-17.60	30.21	46.00	-15.79
4	A	1.725	7.13	38.73	56.00	-17.27	30.70	46.00	-15.30
5	A	1.755	7.13	39.97	56.00	-16.03	30.83	46.00	-15.17
6	A	1.765	7.13	39.26	56.00	-16.74	31.33	46.00	-14.67
7	A	1.894	7.14	41.67	56.00	-14.33	33.11	46.00	-12.89
8	A	1.909	7.14	42.44	56.00	-13.56	33.24	46.00	-12.76
9	A	1.948	7.15	42.05	56.00	-13.95	33.19	46.00	-12.81
10	A	1.950	7.15	42.27	56.00	-13.73	33.10	46.00	-12.90
11	B	1.802	7.13	40.09	56.00	-15.91	31.67	46.00	-14.33
12	B	1.865	7.14	41.05	56.00	-14.95	33.21	46.00	-12.79
13	B	1.875	7.14	41.45	56.00	-14.55	32.93	46.00	-13.07
14	B	1.885	7.14	41.62	56.00	-14.38	32.83	46.00	-13.17
15	B	1.909	7.14	41.94	56.00	-14.06	33.35	46.00	-12.65
16	B	1.923	7.14	42.84	56.00	-13.16	33.45	46.00	-12.55
17	B	1.941	7.15	42.03	56.00	-13.97	33.42	46.00	-12.58
18	B	1.951	7.15	43.02	56.00	-12.98	33.37	46.00	-12.63
19	B	1.957	7.15	41.66	56.00	-14.34	33.38	46.00	-12.62
20	B	1.979	7.15	41.85	56.00	-14.15	33.34	46.00	-12.66

Table 6-10. Line Conducted Data with Bluetooth

Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported with 3Mbps data rate on channel 39. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Line A = Phase; Line B = Neutral
4. Factor (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dB μ V) = QP/AV Analyzer/Receiver Level (dB μ V) + Factor (dB)
6. Margin (dB) = QP/AV Level (dB μ V) – Limit (dB μ V)
7. Traces shown in plot are made using a peak detector.
8. Deviations to the Specifications: None.

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7.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **NEC Portable Tablet Computer** **FCC ID: A98-FBC3105** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules and RSS-210 of the Industry Canada Rules.

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