PCTEST ENGINEERING LABORATORY, INC.
6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. 410.290.6652 / Fax 410.290.6554
http://www.pctestlab.com

CERTIFICATE OF COMPLIANCE
FCC PART 15.247 Class II Permissive Change

Applicant Name:
Samsung Electronics, Co. Ltd.
18600 Broadwick St.
Rancho Dominguez, CA 90220 USA

Date of Testing:
November 9 - 10, 2006
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
0611070981

FCC ID:	**A3LWEP210**
APPLICANT:	**Samsung Electronics, Co. Ltd.**

Model(s):	WEP210
EUT Type:	Mono Bluetooth Headset
Max. RF Output Power:	0.725 mW (-1.396 dBm) Conducted
Frequency Range:	2402 – 2480MHz (Bluetooth for US)
FCC Classification:	FCC Part 15 Frequency Hopping Spread Spectrum Transceiver (DSS)
FCC Rule Part(s):	Part 15 Subpart C (15.247)

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.

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.

Grant Conditions: Listed output power is conducted.

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

Randy Ortanez
President

2041.01

© 2006 PCTEST Engineering Laboratory, Inc.

TABLE OF CONTENTS

FCC PART 15.247 MEASUREMENT REPORT……..……..3

1.0 INTRODUCTION....4

1.1 EVALUATION PROCEDURE....4

1.2 SCOPE....4

1.3 PCTEST TEST LOCATION....4

2.0 PRODUCT INFORMATION....5

2.1 EQUIPMENT DESCRIPTION....5

2.2 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS....5

3.0 DESCRIPTION OF TEST....6

3.1 CONDUCTED EMISSIONS....6

3.2 RADIATED EMISSIONS....7

4.0 ANTENNA REQUIREMENTS....8

5.0 TEST EQUIPMENT CALIBRATION DATA....9

6.0 TEST RESULTS....10

6.1 20DB BANDWIDTH MEASUREMENT....11

6.2 OUTPUT POWER MEASUREMENT....14

6.3 BAND EDGE COMPLIANCE....15

6.4 CARRIER FREQUENCY SEPARATION....16

6.5 TIME OF OCCUPANCY....17

6.6 NUMBER OF HOPPING CHANNELS....18

6.7 CONDUCTED SPURIOUS EMISSIONS....19

6.8 RADIATED HARMONIC MEASUREMENTS....22

6.9 RADIATED RESTRICTED BAND MEASUREMENTS....26

6.10 LINE-CONDUCTED TEST DATA....27

7.0 CONCLUSION....29

EXHIBIT A – LABELING REQUIREMENTS....30

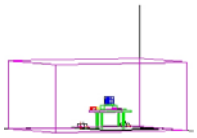
SAMPLE LABEL & LOCATION....30

EXHIBIT B – EUT INTERNAL PHOTOGRAPHS....31

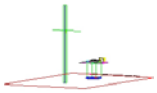
EXHIBIT C – EUT EXTERNAL PHOTOGRAPHS....32

EXHIBIT D – USER'S MANUAL....33

© 2006 PCTEST Engineering Laboratory, Inc.



MEASUREMENT REPORT



FCC Part 15.247

A. § 2.1033 General Information

APPLICANT:	Samsung Electronics, Co. Ltd.
APPLICANT ADDRESS:	18600 Broadwick St. Rancho Dominguez, CA 90220 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)
MODEL NAME:	WEP210
FCC ID:	A3LWEP210
Test Device Serial No.:	FD-223-B ☐ Production ☒ Pre-Production ☐ Engineering
FCC CLASSIFICATION:	FCC Part 15 Spread Spectrum Transceiver (DSS)
Method/System:	FHSS Sequence Spread Spectrum (FHSS)
DATE(S) OF TEST:	November 9 - 10, 2006
TEST REPORT S/N:	0611070981

A.1 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 (IC-2451).
- 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 (IC-2451) 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.

© 2006 PCTEST Engineering Laboratory, Inc.

1.0 INTRODUCTION

1.1 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 FCC Public Notice DA 00-705 dated March 30, 2000 entitled "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" were used in the measurement of the **Samsung Mono Bluetooth Headset FCC ID: A3LWEP210.**

Deviation from measurement procedure…….....None

1.2 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.

1.3 PCTEST Test Location

The map at the right shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity are, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (see Figure 1.3-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility 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 27, 2006 and Industry Canada.

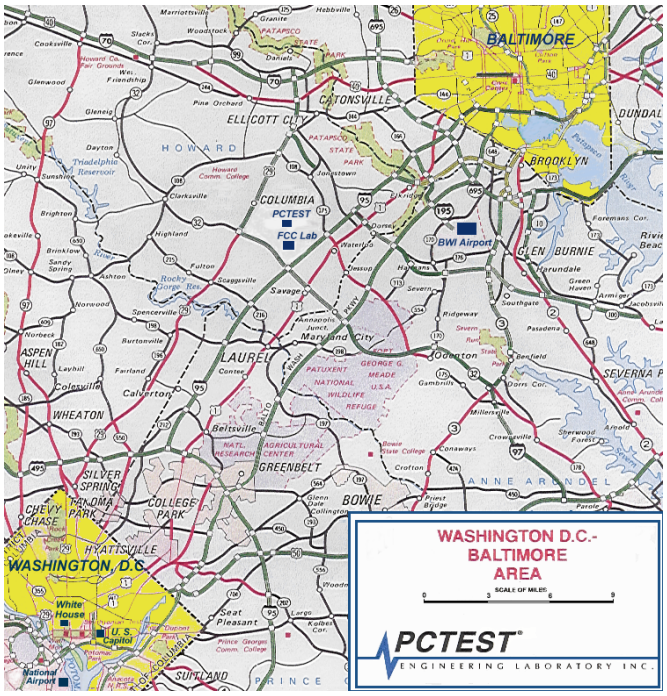


Figure 1.3-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

© 2006 PCTEST Engineering Laboratory, Inc.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Mono Bluetooth Headset FCC ID: A3LWEP210**.

- 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 were 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 it 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.

- The EUT consisted of the following components(s):

Manufacturer / Description	FCC ID	Serial Number
Samsung Mono Bluetooth Headset	A3LWEP210	FD-223-B

Table 2-1. EUT Equipment Description

2.2 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing.

- None

© 2006 PCTEST Engineering Laboratory, Inc.

3.0 DESCRIPTION OF TEST

3.1 Conducted Emissions

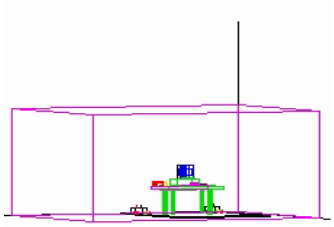


Figure 3.1-1. Shielded Enclosure Line-Conducted Test Facility

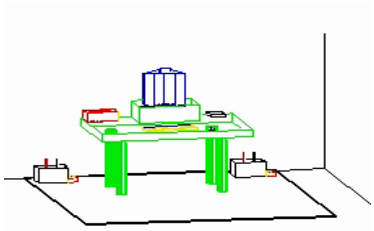


Figure 3.1-2. Line Conducted Emission Test Set-Up

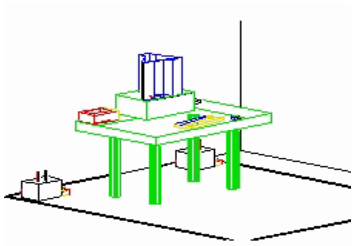


Figure 3.1-3. Wooden Table & Bonded LISNs

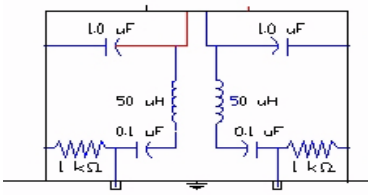


Figure 3.1-4. LISN Schematic Diagram

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure, manufactured by Ray Proof Series 81 (*see Figure 3.1-1*). 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 3.1-2*). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (*See Figure 3.1-3).* The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. 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 ½". 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 3.1-4*). All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion). 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 to determine the frequency producing the maximum EME from the EUT.

The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to CISPR quasi-peak and average mode. The bandwidth of the receiver was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying 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. Photographs of the worst-case emission can be seen in Exhibit B. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator.

© 2006 PCTEST Engineering Laboratory, Inc.

3.2 Radiated Emissions

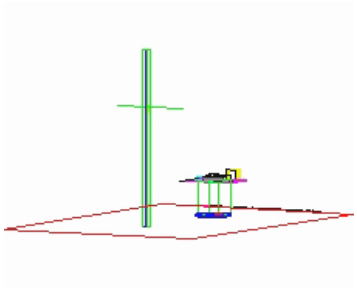


Figure 3.2-1. 3-Meter Test Site

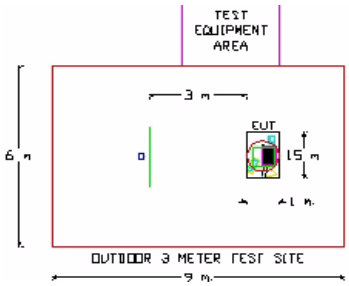


Figure 3.2-2. Dimensions of Outdoor Test Site

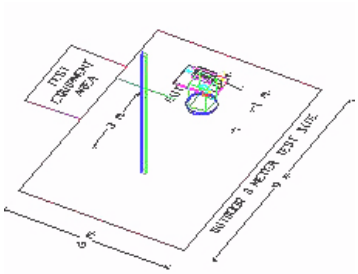


Figure 3.2-3. Turntable and System Setup

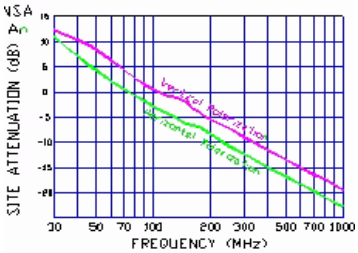


Figure 3.2-4. Normalized Site Attenuation Curves (H&V)

Preliminary measurements were made indoors at 1-meter using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, and turntable azimuth with respect to the antenna was noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using a bi-conical antenna and from 200 to 1000 MHz using a log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antennas (*see Figure 3.2-1*). The test equipment was placed on a wooden and plastic bench situated on a 1.5m x 2m area adjacent to the measurement area (*see Figure 3.2-2*). 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 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. Above 1GHz the detector function was set to CISPR average mode (RBW = 1MHz, VBW = 10Hz).

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 3.2-3). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated 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 maximized by: varying 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; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Exhibit B. Each EME reported was calibrated using the Agilent E8257D (250kHz – 20GHz) PSG Signal Generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3.2-4.

© 2006 PCTEST Engineering Laboratory, Inc.

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 antenna of the Samsung Mono Bluetooth Headset are **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The **Samsung Mono Bluetooth Headset FCC ID: A3LWEP210** unit complies with the requirement of §15.203.

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

Table 4.1 Frequency/ Channel Operations

© 2006 PCTEST Engineering Laboratory, Inc.

5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model / Equipment	Calibration Date	Cal Inerval	Calibration Due	Serial No.
Agilent	E4404B/E4407B ESA Spectrum Analyzer	04/20/06	Annual	04/20/07	US39210313
Agilent	N4010A Wireless Connectivity Test Set	06/11/06	Annual	06/11/07	GB46170464
EMCO	Model 3115 (1-18GHz) Horn Antenna	08/24/06	Biennial	08/23/08	9203-2178
EMCO	Model 3115 (1-18GHz) Horn Antenna	08/25/06	Biennial	08/24/08	9704-5182
Gigatronics	8657A Universal Power Meter	04/07/06	Annual	04/07/07	8650319
Gigatronics	80701A (0.05-18GHz) Power Sensor	04/11/06	Annual	04/11/07	1833460
Rohde & Schwarz	NRVS Power Meter	06/01/05	Biennial	06/01/07	835360/079
Rohde & Schwarz	NRV-Z53 Power Sensor	06/01/05	Biennial	06/01/07	846076/007
Rohde & Schwarz	CMU200 Base Station Simulator	04/20/06	Annual	04/20/07	836371/079
Agilent	HP 8566B (100Hz–22GHz)	12/22/05	Annual	12/22/06	3638A08713
Agilent	HP 8591A (9kHz-1.8GHz)	09/20/06	Annual	09/20/07	3144A02458
Agilent	E4448A (3Hz-50GHz)	09/22/06	Annual	09/22/07	US42510244
Agilent	E8257D (250kHz-20GHz) Signal Generator	02/11/06	Annual	02/11/07	MY45470194
Agilent	E8257D (250kHz-20GHz) Signal Generator	03/30/06	Annual	03/30/07	MY44320964
Gigatronics	8651A (50MHz-18GHz)	07/28/06	Annual	07/28/07	1834052
Gigatronics	80701A (0.05-18GHz) Power Sensor	08/04/06	Annual	08/04/07	1835299
Ailtech/Eaton	NM 37/57A (30MHz-1GHz)	06/07/06	Annual	06/07/07	0805-03334
CCA-7	CISPR QP Adapter	12/19/05	Annual	12/19/06	0194-04082
Agilent	HP 85650A Quasi-Peak Adapter	12/22/05	Annual	12/22/06	2043A00301
Agilent	HP 8449B (1-26.5GHz) Pre-Amplifier	12/22/05	Annual	12/22/06	3008A00985
Agilent	HP 11713A Attenuation/Switch Driver	12/22/05	Annual	12/22/06	N/A
Agilent	HP 85685A (20Hz-2GHz) Preselector	12/22/05	Annual	12/22/06	N/A
Agilent	HP 8586 Opt. 462 Impulse Bandwidth	12/22/05	Annual	12/22/06	3701A22204
EMCO	3115 (1-18GHz) Horn Antenna	04/04/05	Biennial	04/04/07	9205-3874
Compliance Design	A100 Roberts Dipoles	08/31/05	Biennial	08/31/07	5118
EMCO	Dipole Pair	09/21/06	Biennial	09/20/08	23951
SOLAR	8012-50 LISN (2)	11/18/05	Biennial	11/18/07	0313233, 0310234
Agilent	HP 8495A (0-70dB) DC-4GHz Attenuator	N/A	Annual	N/A	N/A
-	263-10dB (DC-18GHz) 10 dB Attenuator	N/A	Annual	N/A	N/A
Pasternack	PE7000-6 6 dB Attenuator	N/A	Annual	N/A	N/A
Pasternack	PE2209-10 Bidirectional Coupler	N/A	Annual	N/A	N/A
-	No.165 (30MHz - 1000MHz) RG58 Coax Cable	N/A	Annual	N/A	N/A
-	No.166 (1000-26500MHz) Microwave RF Cable	N/A	Annual	N/A	N/A
-	No.167 (100kHz - 100MHz) RG58 Coax Cable	N/A	Annual	N/A	N/A

Table 5-1. Annual Test Equipment Calibration Schedule

© 2006 PCTEST Engineering Laboratory, Inc.

6.0 TEST RESULTS

Summary

The intentional radiator has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards. The radio was transmitting at full power on the specified channels and at a data rate(s) specified above. The channels tested are high, middle and low of the allocated bands. Final system data was gathered in a mode that tended to maximize emissions by varying the orientation of the EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization. This unit was tested with all possible pattern and packet type combinations and the worst case is reported with the unit transmitting with a DH5 packet type and a pattern type set to 10101010.

Method/System: Frequency Hopping Spread Spectrum (FHSS)

Number of Channels: 79

FCC Part Section(s)	RSS Section	Test Description	Test Limit	Test Condition	Test Result
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
15.247(b)(1)	RSS-210 [A8.4 (2)]	Transmitter Output Power	< 1 Watt if ≥ 75 non-overlapping channels used		PASS
15.247(a)(1)	RSS-210 [A8.1 (2)]	Channel Separation	> 2/3 of 20 dB BW for systems with Output Power < 125mW		PASS
15.247(a)(1)(iii)	RSS-210 [A8.1 (4)]	Number of Channels	> 15 Channels		PASS
15.247(a)(1)(iii)	RSS-210 [A8.1 (4)]	Time of Occupancy	< 0.4 sec in 30 sec period		PASS
15.247(d)	RSS-210 [A8.5]	Occupied BW / Out-of-Band Emissions (Band Edge at 20dB below)	Radiated <20dBc. Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	PASS
15.205 15.209	RSS-210 [A8.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	< FCC 15.209 limits or < RSS-210 table 3 limits Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS
15.207	RSS-Gen [7.2.2]	AC Conducted Emissions 150kHz – 30MHz	EN55022	Line Conducted	PASS
RECEIVER MODE (RX)					
15.207	RSS-Gen [7.2.2]	AC Conducted Emissions 150kHz – 30MHz	Class B = 250µV	Line Conducted	PASS
15.209	RSS-Gen [7.2.3.2]	General Field Strength Limits (Restricted Bands and Radiated Emissions Limits)	< FCC 15.209 limits or < RSS-Gen limits [Section 6; Table1]	Radiated (30MHz-1GHz) (1-25 GHz)	Pass
RF EXPOSURE (SAR OR MPE)					
2.1093/2.1091	RSS-102	SAR Test or MPE	1.6 W/kg (SAR Limit) 1 mW/cm² (MPE Limit)	3 Channels	PASS

Table 6-1. Summary of Test Results

© 2006 PCTEST Engineering Laboratory, Inc.

6.1 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.***

The spectrum analyzer is set to:

RBW =	30 kHz (5 dB/div)
VBW =	30 kHz
Span =	1.5 MHz
Ref. Level =	Please See Plots
Sweep =	2.04 ms

Frequency [MHz]	Channel No.	20dB Bandwidth Test Results	
		[kHz]	Pass/Fail
2402	0	1045	Pass
2441	39	1046	Pass
2480	78	1048	Pass

Table 6-2. Conducted Bandwidth Measurements

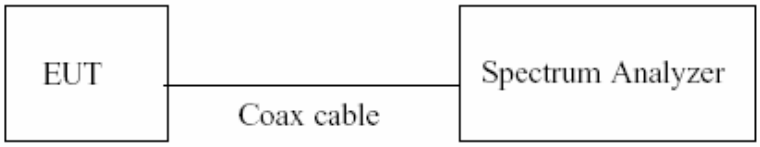
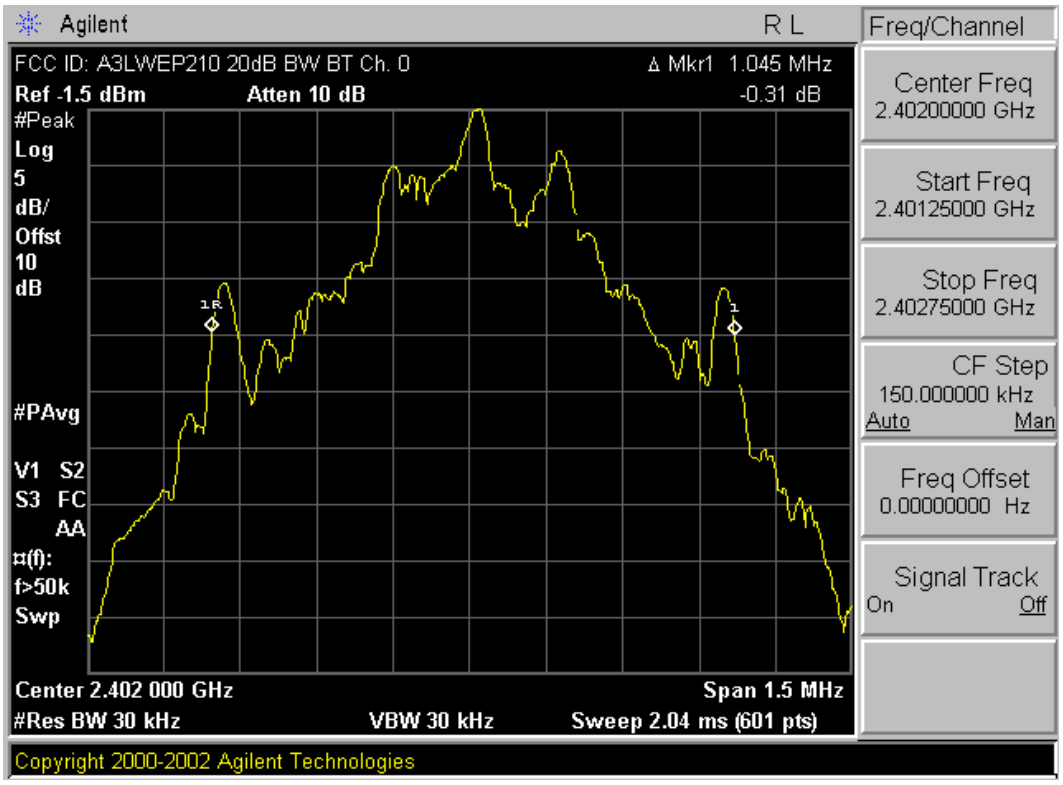
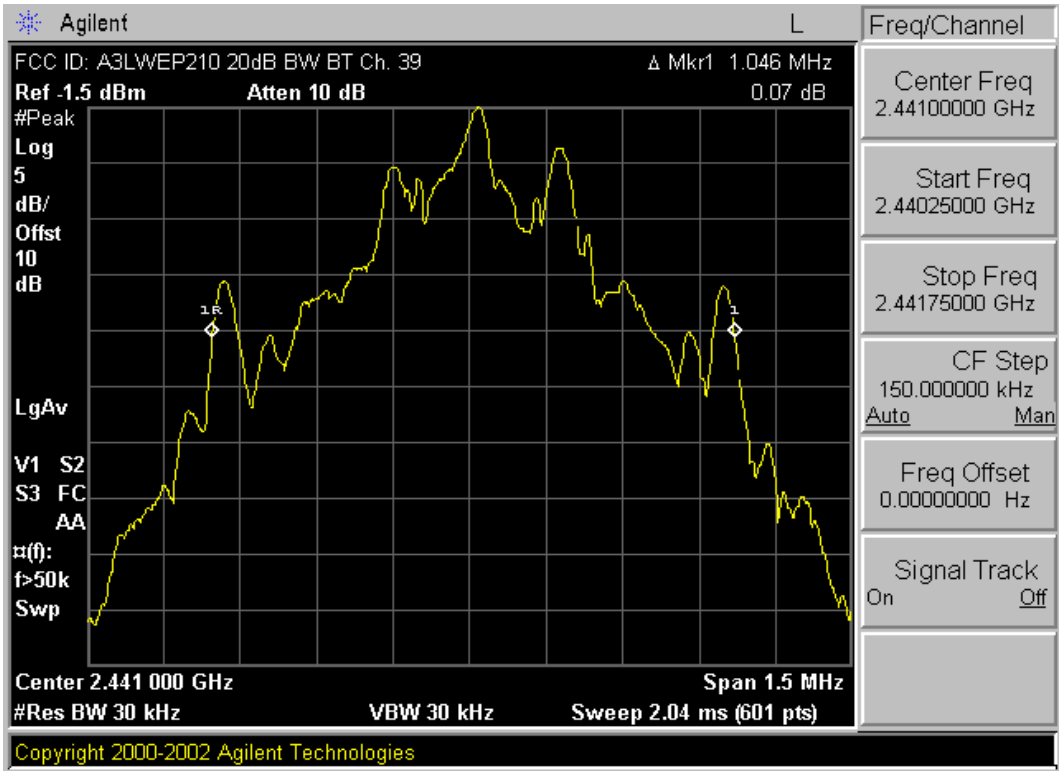


Figure 6-1. Test Instrument & Measurement Setup

© 2006 PCTEST Engineering Laboratory, Inc.

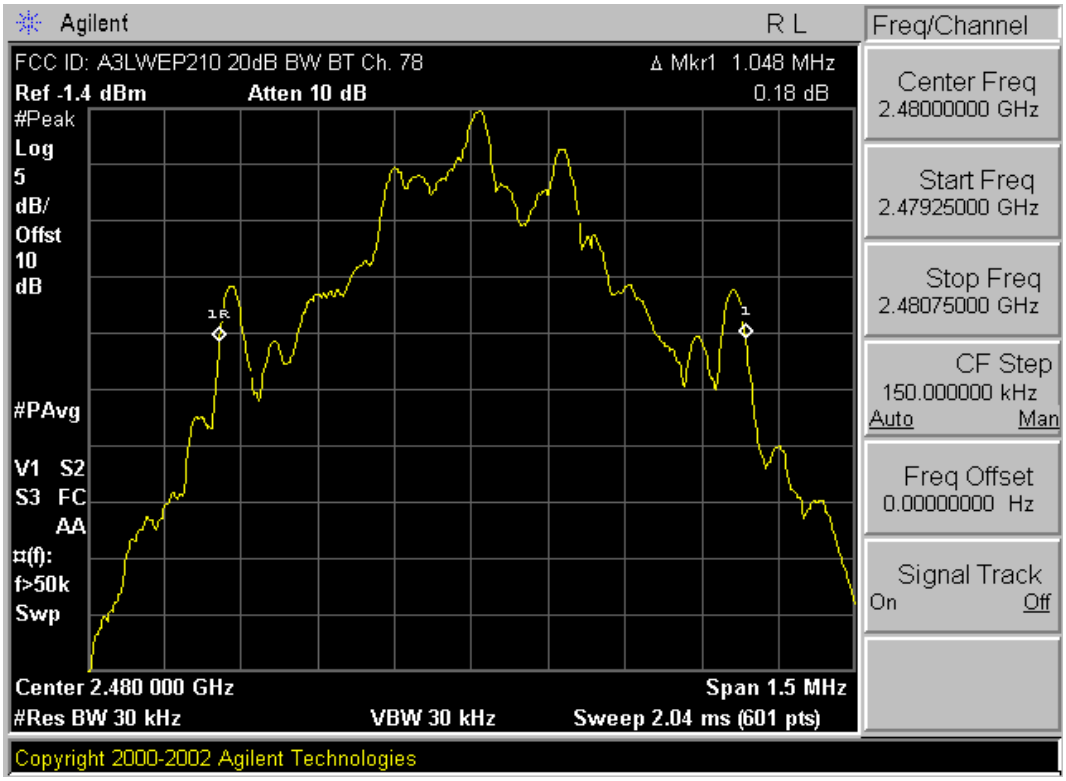


Plot 6-1. 20dB Bandwidth Plot (Bluetooth – Ch. 0)



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

© 2006 PCTEST Engineering Laboratory, Inc.



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

© 2006 PCTEST Engineering Laboratory, Inc.

6.2 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 maximum permissible output power is 1 Watt.***

Note:

This unit was tested with all possible pattern and packet type combinations and the worst case is reported with the unit transmitting with a DH5 packet type and a pattern type set to 10101010.

Frequency [MHz]	Channel No.	Conducted Power [DH1 Packet Type]		Conducted Power [DH3 Packet Type]		Conducted Power [DH5 Packet Type]	
		[dBm]	[mW]	[dBm]	[mW]	[dBm]	[mW]
2402	0	-1.845	0.654	-2.141	0.611	-1.396	0.725
2441	39	-2.031	0.626	-2.089	0.618	-1.506	0.707
2480	78	-1.987	0.633	-1.993	0.632	-1.434	0.719

Table 6-3. Output Power Measurements

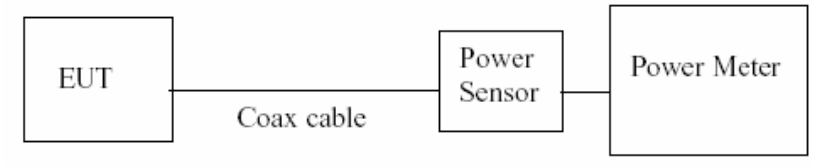


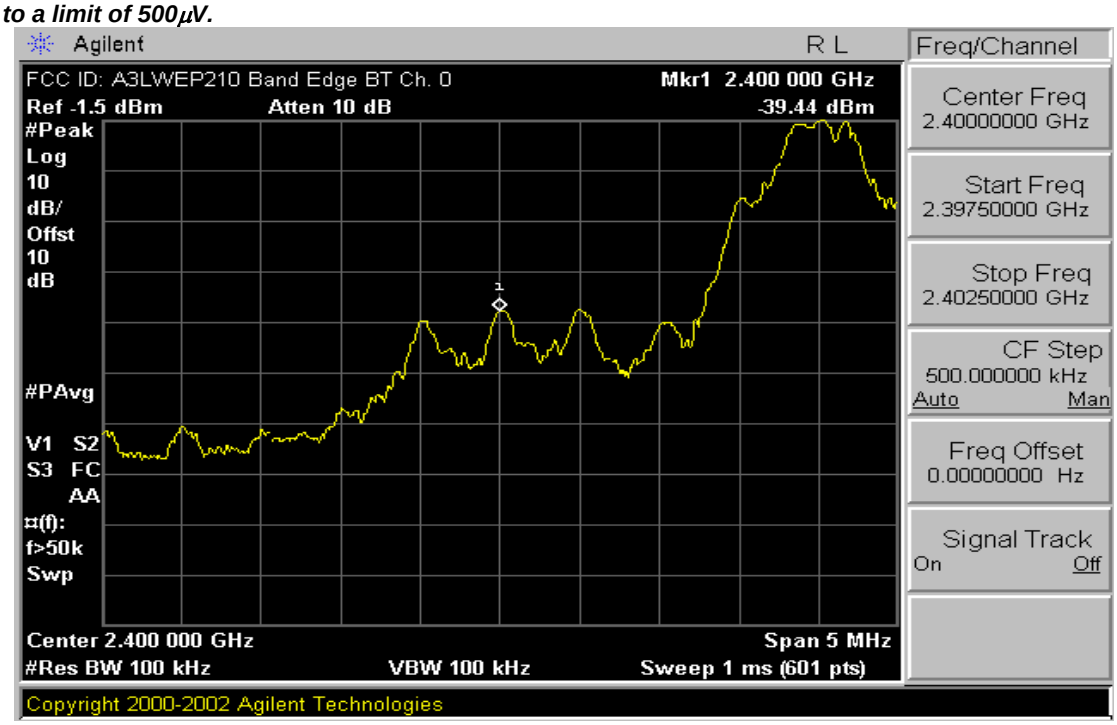
Figure 6-2. Test Instrument & Measurement Setup

© 2006 PCTEST Engineering Laboratory, Inc.

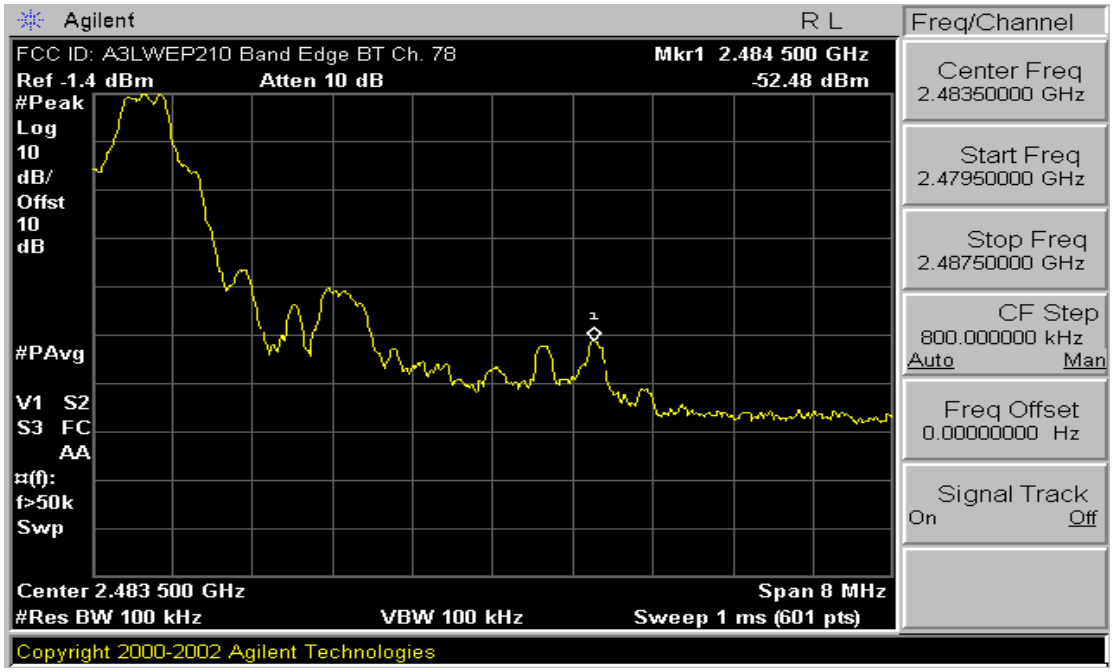
6.3 Band Edge Compliance

§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 limit of 500μV.***



Plot 6-4. Band Edge Plot (Bluetooth – Ch. 0)



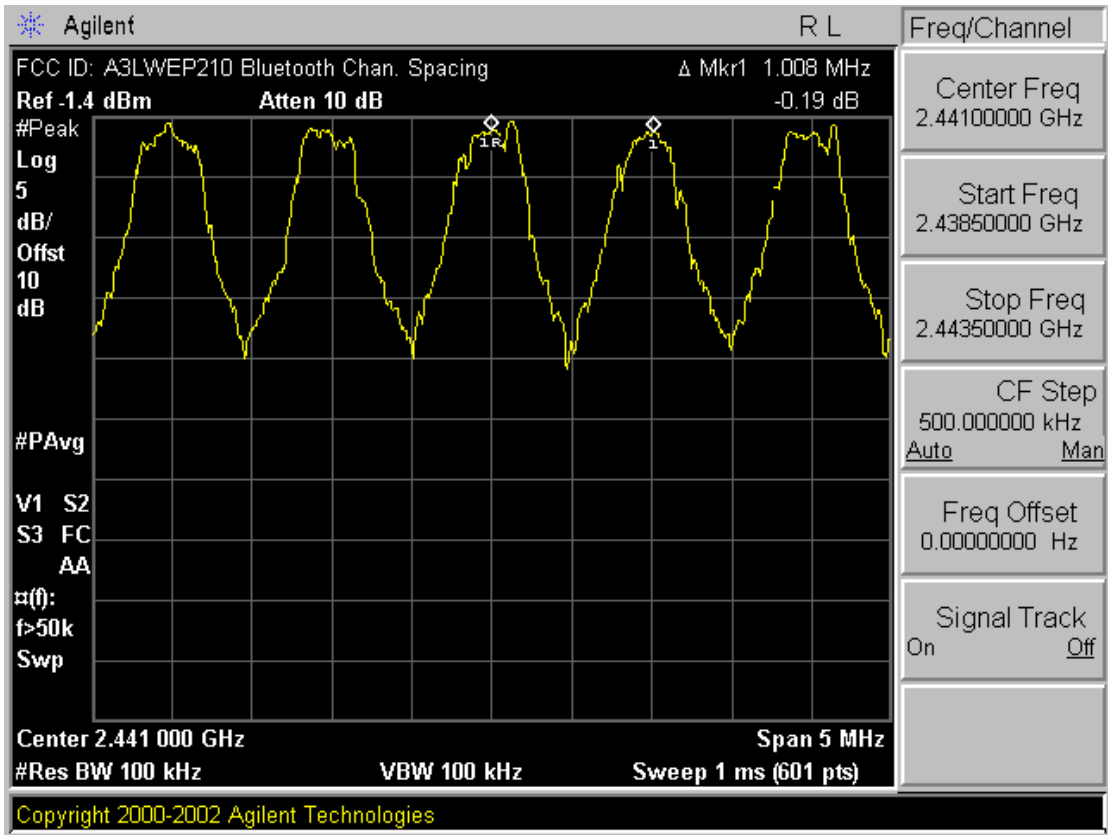
Plot 6-5. Band Edge Plot (Bluetooth – Ch. 78)

© 2006 PCTEST Engineering Laboratory, Inc.

6.4 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, which is equal to (2/3) x [1048 kHz] = 0.697 MHz.***



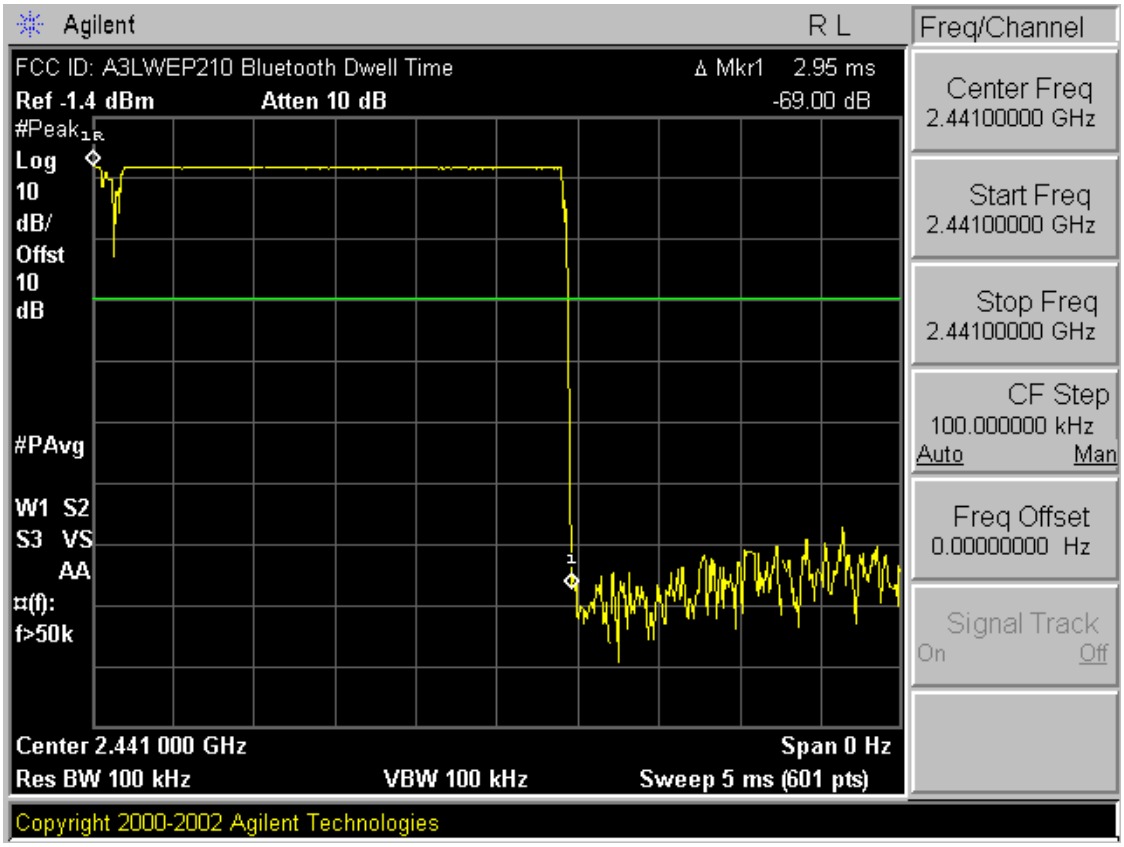
Plot 6-6. Channel Spacing Plot (Bluetooth)

© 2006 PCTEST Engineering Laboratory, Inc.

6.5 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 the minimum time period required to hop through all channels.***



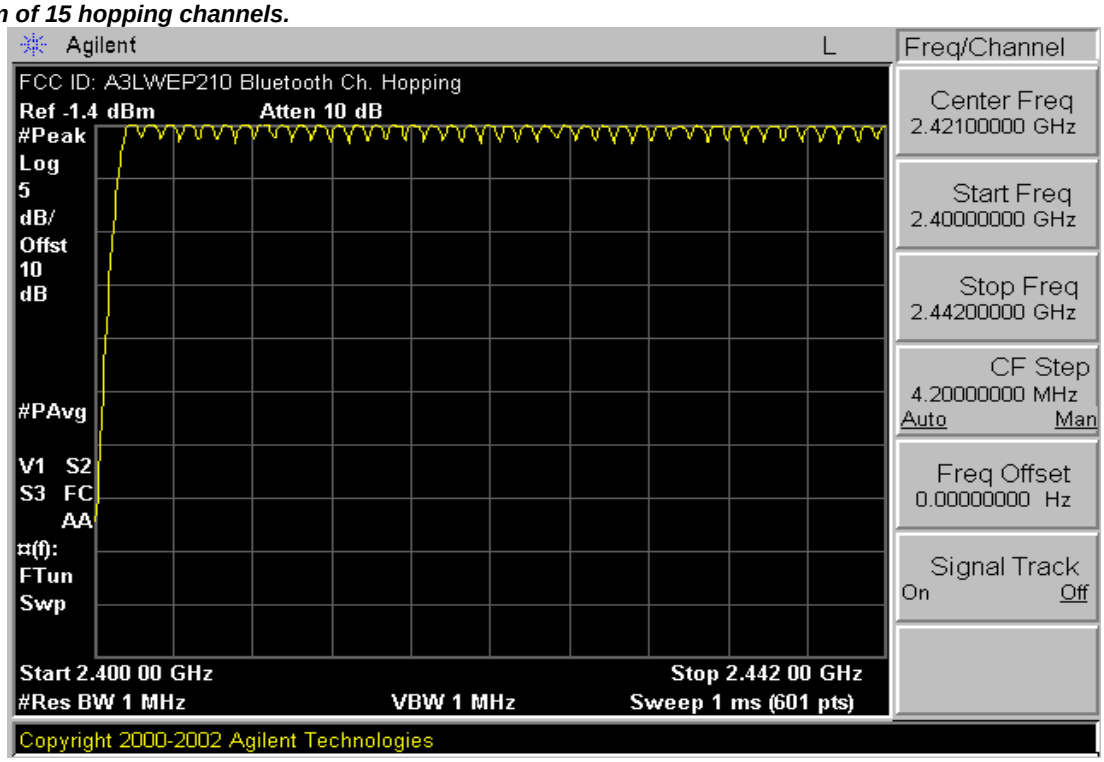
Plot 6-7. Time of Occupancy Plot (Bluetooth)

© 2006 PCTEST Engineering Laboratory, Inc.

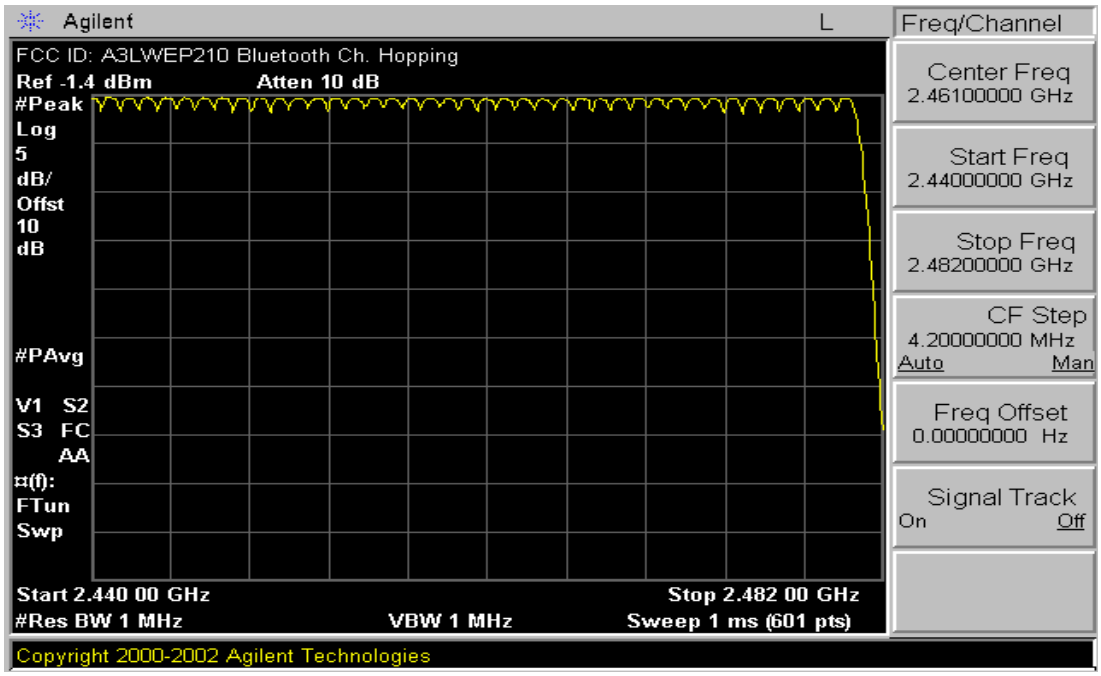
6.6 Number of Hopping Channels

§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.***



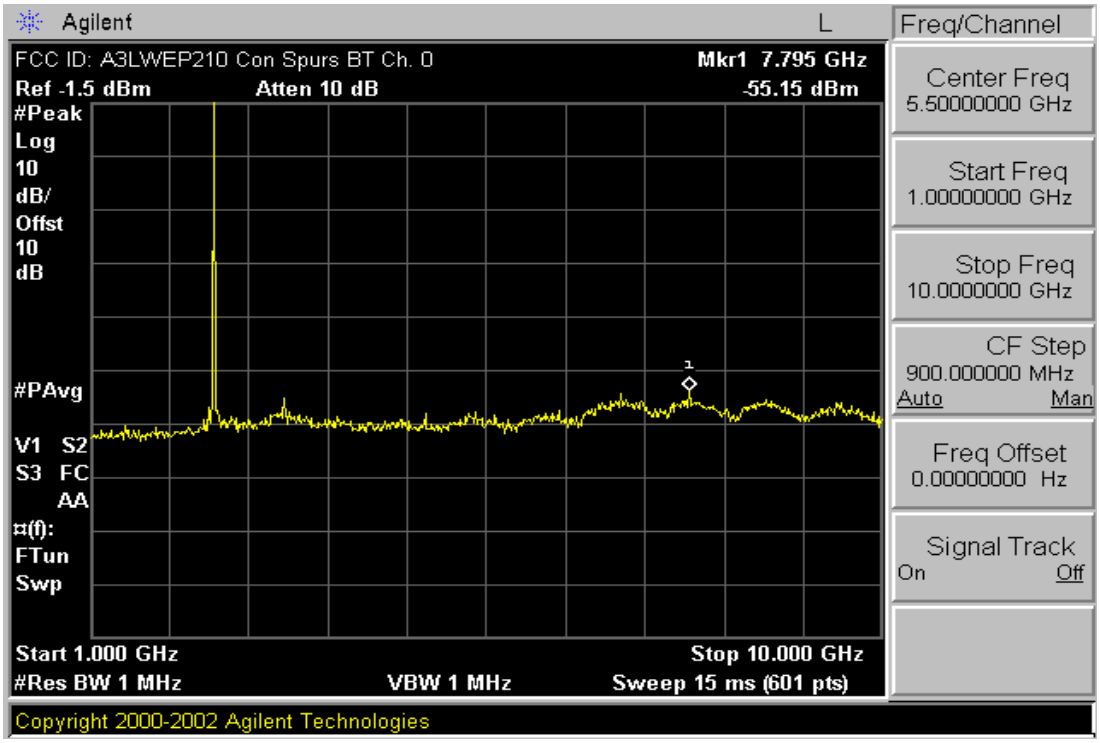
Plot 6-8. Low End Spectrum Channel Hopping Plot (Bluetooth)



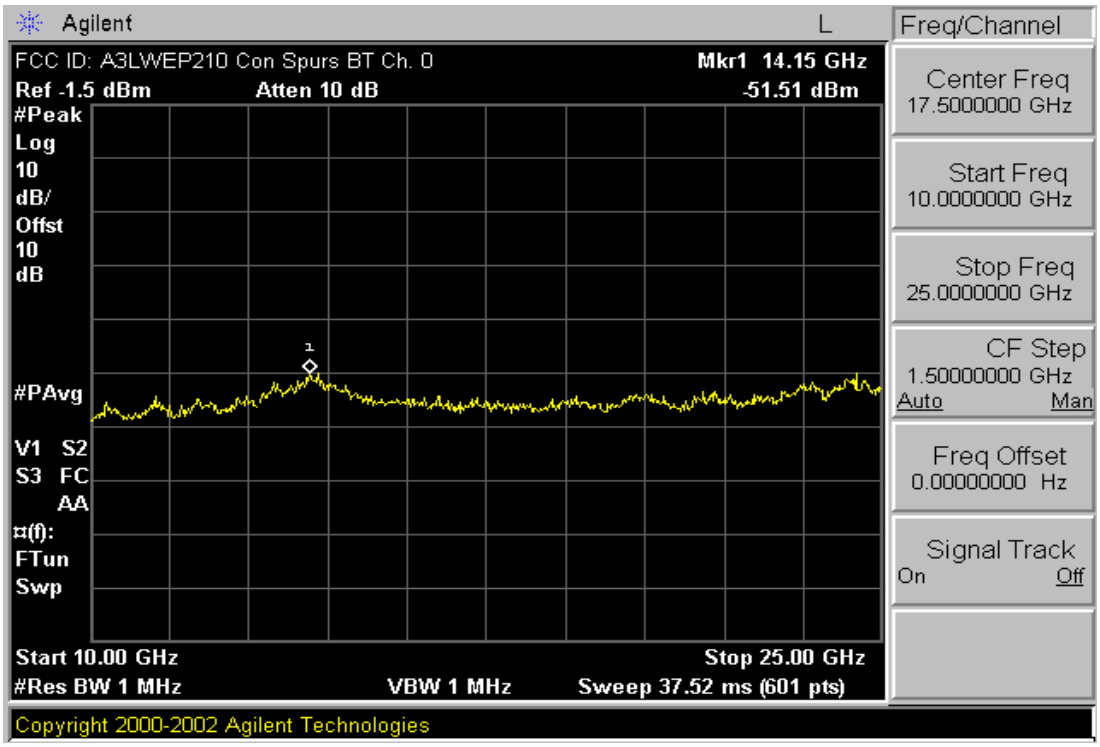
Plot 6-9. High End Spectrum Channel Hopping Plot (Bluetooth)

© 2006 PCTEST Engineering Laboratory, Inc.

6.7 Conducted Spurious Emissions

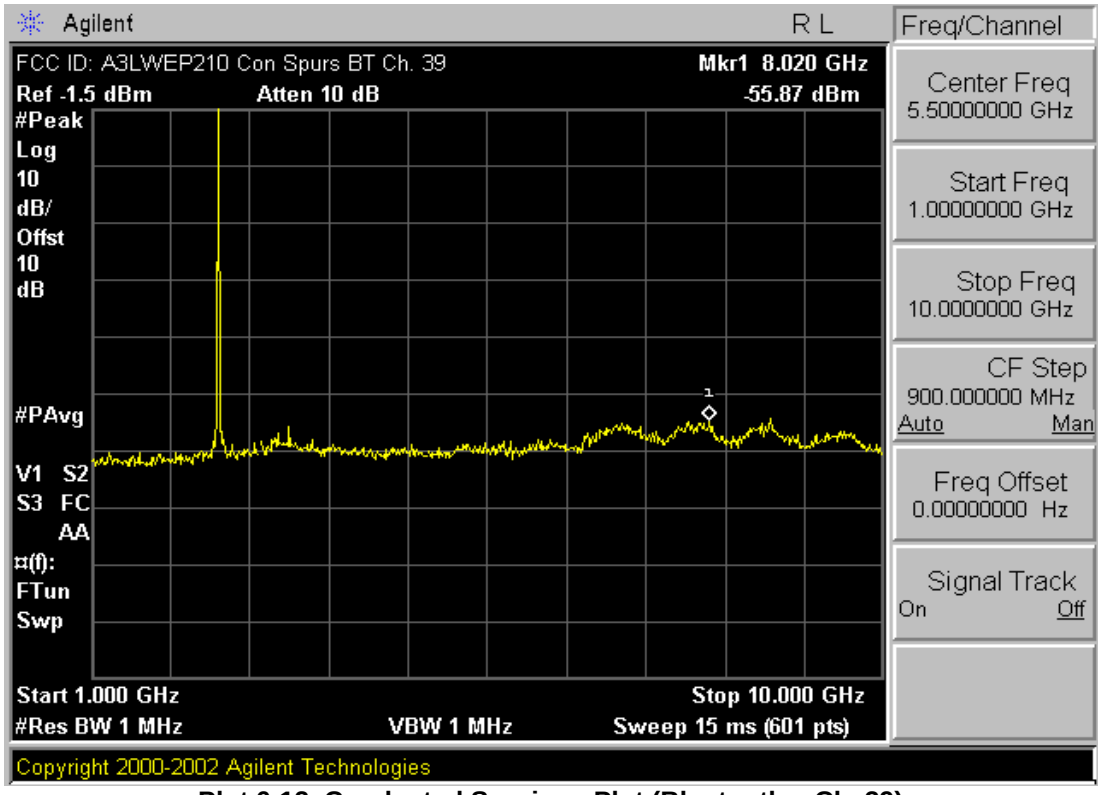


Plot 6-10. Conducted Spurious Plot (Bluetooth – Ch. 0)

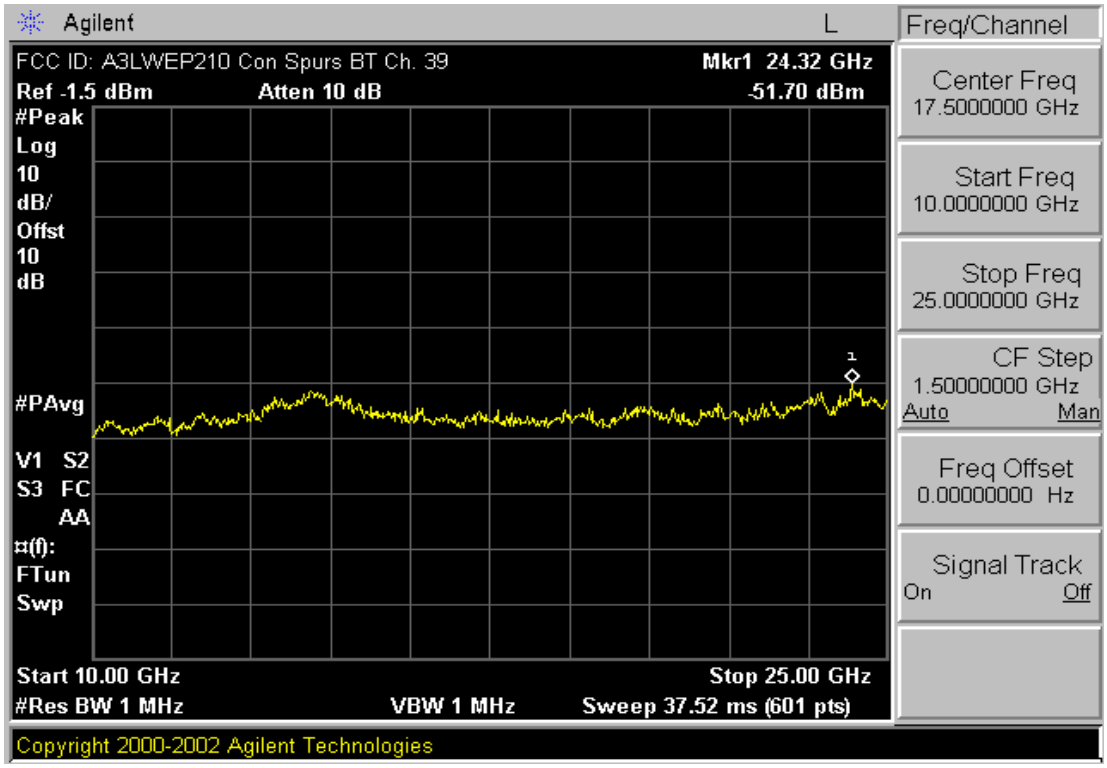


Plot 6-11. Conducted Spurious Plot (Bluetooth – Ch. 0)

© 2006 PCTEST Engineering Laboratory, Inc.

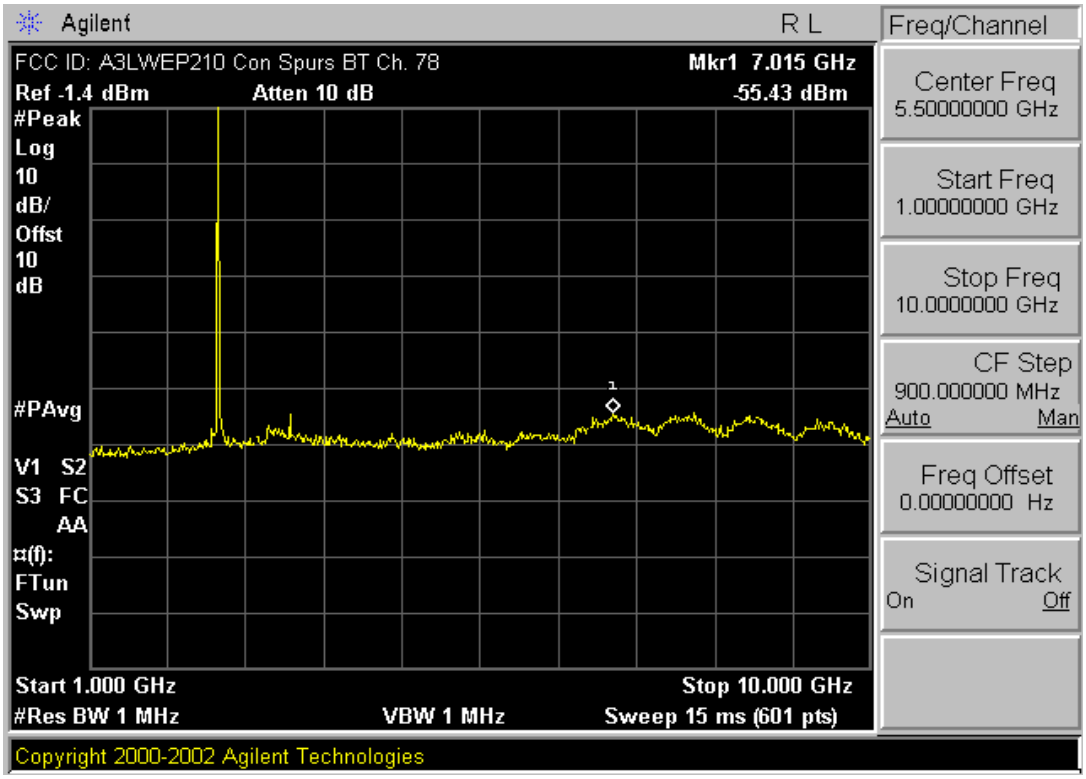


Plot 6-12. Conducted Spurious Plot (Bluetooth – Ch. 39)

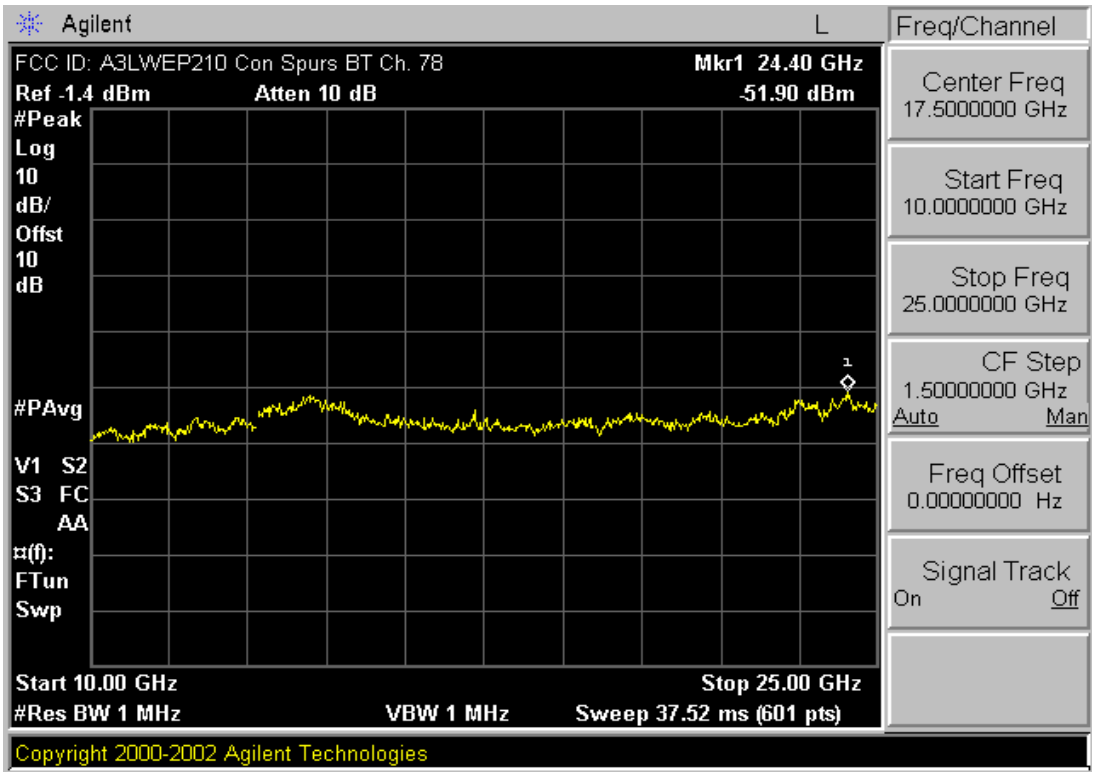


Plot 6-13. Conducted Spurious Plot (Bluetooth – Ch. 39)

© 2006 PCTEST Engineering Laboratory, Inc.



Plot 6-14. Conducted Spurious Plot (Bluetooth – Ch. 78)



Plot 6-15. Conducted Spurious Plot (Bluetooth – Ch. 78)

© 2006 PCTEST Engineering Laboratory, Inc.

6.8 Radiated Harmonic Measurements

§15.247 (d) / §15.205 & §15.209; 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 = 10Hz and linearly polarized horn antennas. All harmonics/spurs are at least 20dB below the highest emission in the authorized band using RBW = 100kHz. In addition, peak measurements were taken to ensure that the peak levels are not more than 20dB above the average limit. All out of band emissions, other than those created by the spreading sequence, data sequence, and the carrier modulation must not exceed the limits show in Table 6-4 per Section 15.209.

Frequency	Field Strength [μV/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 6-4. Radiated Limits

© 2006 PCTEST Engineering Laboratory, Inc.

Radiated Harmonic Measurements (Cont'd)

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

Mode: Bluetooth

Measurement Distance: 3 Meters

Operating Frequency: 2402MHz

Channel: 0

	Frequency [MHz]	Level [dBm]	AFCL [dB]	Pol. [H/V]	Field Strength [dBμV/m]	Field Strength [μV/m]	Margin [dB]
*	4804.00	-115.01	38.8	V	30.80	34.67	-23.20
	7206.00	-116.58	42.4	V	32.83	43.80	-36.17
	9608.00	-135.00	45.2	V	17.20	7.24	-51.80
*	12010.00	-135.00	46.6	V	18.63	8.54	-35.37

Table 6-5. Harmonic Measurements

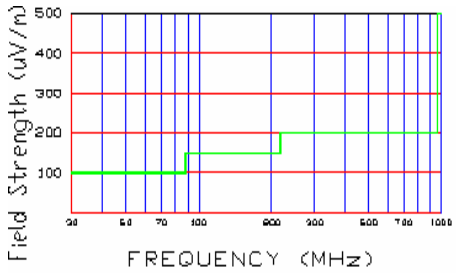


Figure 6-3. Radiated limits at 3 meters.

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table 6-4. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1MHz VBW = 10Hz

4. The peak emissions above 1GHz are not more than 20dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 dBm are below the analyzer floor level.

9. Above 1GHz, the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

© 2006 PCTEST Engineering Laboratory, Inc.

Radiated Harmonic Measurements (Cont'd)

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

Mode: Bluetooth

Measurement Distance: 3 Meters

Operating Frequency: 2441MHz

Channel: 39

	Frequency [MHz]	Level [dBm]	AFCL [dB]	Pol. [H/V]	Field Strength [dBμV/m]	Field Strength [μV/m]	Margin [dB]
*	4882.00	-114.56	38.95	V	31.39	37.11	-22.61
*	7323.00	-117.38	42.67	V	32.29	41.16	-21.71
	9764.00	-135.00	45.36	V	17.36	7.38	-53.51
*	12205.00	-135.00	46.68	V	18.68	8.59	-35.32

Table 6-6. Harmonic Measurements

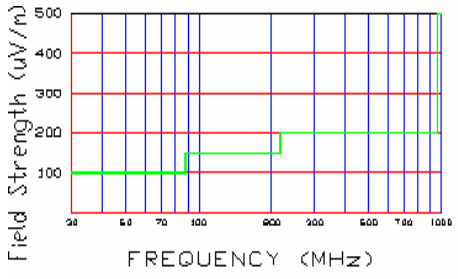


Figure 6-4. Radiated limits at 3 meters.

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table 6-4. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1MHz VBW = 10Hz

4. The peak emissions above 1GHz are not more than 20dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 dBm are below the analyzer floor level.

9. Above 1GHz, the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

© 2006 PCTEST Engineering Laboratory, Inc.

Radiated Harmonic Measurements (Cont'd)

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

Mode: Bluetooth

Measurement Distance: 3 Meters

Operating Frequency: 2480MHz

Channel: 78

	Frequency [MHz]	Level [dBm]	AFCL [dB]	Pol. [H/V]	Field Strength [dBμV/m]	Field Strength [μV/m]	Margin [dB]
*	4960.00	-114.45	39.19	V	31.74	38.64	-22.26
*	7440.00	-115.63	43.01	V	34.38	52.36	-19.62
	9920.00	-135.00	45.67	V	17.67	7.65	-53.56
	12400.00	-135.00	46.61	V	18.61	8.52	-35.39

Table 6-7. Harmonic Measurements

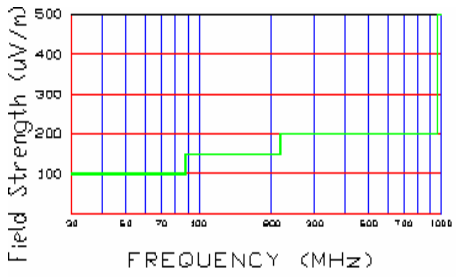


Figure 6-5. Radiated limits at 3 meters.

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table 6-4. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1MHz VBW = 10Hz

4. The peak emissions above 1GHz are not more than 20dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage and/or a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 dBm are below the analyzer floor level.

9. Above 1GHz, the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

© 2006 PCTEST Engineering Laboratory, Inc.

6.9 Radiated Restricted Band Measurements

§15.205 / §15.209; RSS-210 (A8.5)

- Special attention is made for the EUT's harmonic and spurious radiated emission in the restricted bands of operations.

Mode: Bluetooth

Measurement Distance: 3 Meters

Operating Frequency: 2480MHz

Channel: 78

Frequency [MHz]	Level [dBm]	AFCL [dB]	Pol. [H/V]	Field Strength [dBμV/m]	Field Strength [μV/m]	Margin [dB]
2483.95	-113.63	30.81	V	24.18	16.18	-29.80
2485.96	-115.33	30.82	V	22.49	13.32	-31.49
2489.08	-115.43	30.83	V	22.40	13.18	-31.58
2491.45	-115.33	30.83	V	22.50	13.34	-31.48
2494.82	-115.38	30.85	V	22.47	13.29	-31.51
2495.59	-115.33	30.86	V	22.53	13.38	-31.45

Table 6-8. Radiated Restricted Band Measurements at 3-meters

NOTES:

1. The antenna is manipulated through typical positions, polarity and length during the testing.
2. The EUT is supplied with the minimal AC voltage or/and a new/fully re-charged battery.
3. The spectrum is measured from 9kHz up to the 10th harmonic and the worst-case emissions are reported.
4. Above 1 GHz the limit is 500μV/m.
5. < -135 dBm is below the analyzer measurement floor level.
6. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

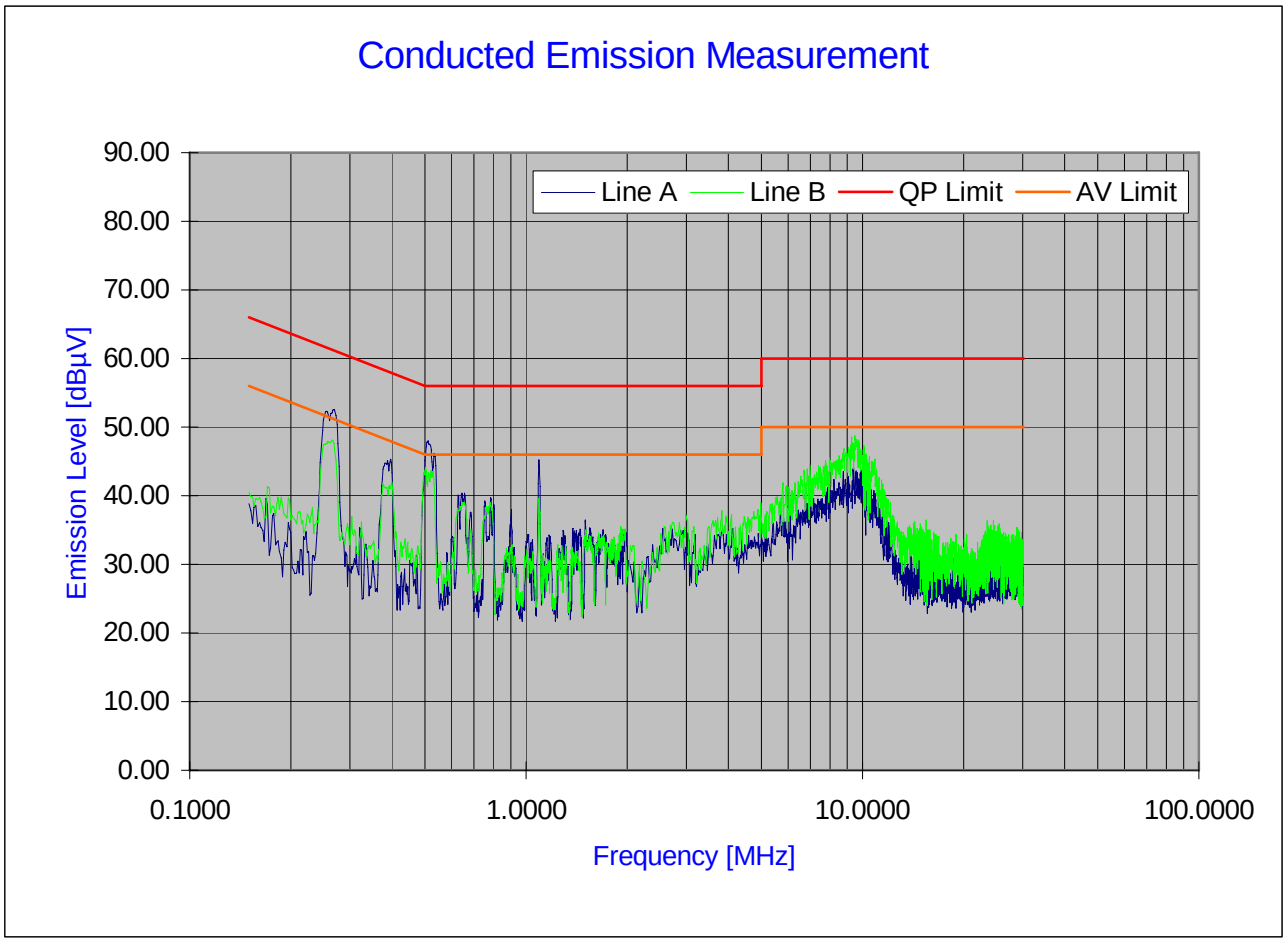
© 2006 PCTEST Engineering Laboratory, Inc.

6.10 Line-Conducted Test Data
§15.207; RSS-Gen (7.2.2)

PCTEST Engineering Laboratory Inc.

Company : Samsung Electronics
Model Number : WEP210
FCC ID Code : A3LWEP210
Standard : FCC Part 15B class B

Power Source : AC120V/60Hz
Tested Date : 11/09/2006
Note : Tested with Bluetooth ON



Plot 6-16. Line Conducted Plot with Bluetooth

Notes:

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are Specified in EN55022.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot are made using a peak detector.
5. Deviations to the Specifications: None.

© 2006 PCTEST Engineering Laboratory, Inc.

Line-Conducted Test Data (Cont'd)

§15.207; RSS-Gen (7.2.2)

No.	Line	Frequency [MHz]	Factor [dB]	QP [dBµV]	Limit [dBµV]	Margin [dB]	Average [dBµV]	Limit [dBµV]	Margin [dB]
1	A	0.258	7.72	48.85	61.49	-12.64	31.71	51.49	-19.78
2	A	0.392	7.50	40.81	58.02	-17.21	25.02	48.02	-23.00
3	A	0.503	7.43	43.82	56.00	-12.18	28.66	46.00	-17.34
4	A	0.516	7.42	42.89	56.00	-13.11	26.90	46.00	-19.10
5	A	0.639	7.39	34.62	56.00	-21.38	22.78	46.00	-23.22
6	A	0.642	7.39	34.67	56.00	-21.33	22.81	46.00	-23.19
7	A	0.644	7.39	34.69	56.00	-21.31	23.04	46.00	-22.96
8	A	0.790	7.36	34.98	56.00	-21.02	23.50	46.00	-22.50
9	A	1.093	7.31	38.78	56.00	-17.22	32.16	46.00	-13.84
10	A	9.464	7.59	39.46	60.00	-20.54	25.63	50.00	-24.37
11	B	0.257	7.73	45.64	61.53	-15.89	37.25	51.53	-14.28
12	B	0.381	7.50	38.06	58.25	-20.19	26.71	48.25	-21.54
13	B	0.506	7.43	40.93	56.00	-15.07	24.71	46.00	-21.29
14	B	6.946	7.55	40.81	60.00	-19.19	24.37	50.00	-25.63
15	B	8.780	7.58	44.07	60.00	-15.93	29.82	50.00	-20.18
16	B	9.240	7.59	44.35	60.00	-15.65	28.38	50.00	-21.62
17	B	9.438	7.59	44.53	60.00	-15.47	29.26	50.00	-20.74
18	B	10.099	7.61	43.01	60.00	-16.99	31.20	50.00	-18.80
19	B	10.221	7.61	42.84	60.00	-17.16	30.85	50.00	-19.15
20	B	10.874	7.66	41.31	60.00	-18.69	24.77	50.00	-25.23

Table 6-9. Line Conducted Data with Bluetooth

Notes:

1. All Modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device(s) from 150kHz to 30MHz are Specified in EN55022.
3. Line A = Phase; Line B = Neutral
4. Traces shown in plot are made using a peak detector.
5. Deviations to the Specifications: None.

© 2006 PCTEST Engineering Laboratory, Inc.

7.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Mono Bluetooth Headset FCC ID: A3LWEP210** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules. Measurement uncertainty was not taken into account in this determination.

© 2006 PCTEST Engineering Laboratory, Inc.

Sample Label & Location

New Labeling Requirements:

Per 15.19; Docket 95-19

The sample label shown below 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, FCC ID, and the FCC logo must be displayed on the device per Section 15.19(b)(2).

Note: The FCC ID shown will be readily visible at the time of purchase.

FCC ID: A3LWEP210

Figure A-1. FCC ID Label

Figure A-2. FCC ID Label Location

© 2006 PCTEST Engineering Laboratory, Inc.

EXHIBIT B – EUT INTERNAL PHOTOGRAPHS

© 2006 PCTEST Engineering Laboratory, Inc.

EXHIBIT C – EUT EXTERNAL PHOTOGRAPHS

© 2006 PCTEST Engineering Laboratory, Inc.

EXHIBIT D – USER'S MANUAL

© 2006 PCTEST Engineering Laboratory, Inc.