COMPLIANCE WORLDWIDE INC.
TEST REPORT 200-15R1

In Accordance with the Requirements of

FCC PART 15.247, SUBPART C
INDUSTRY CANADA RSS 210, ISSUE 8

Low Power License-Exempt Radio Communication Devices
Intentional Radiators

Issued to

David Clark Company
360 Franklin Street
Worcester, MA 01604

for the

Bluetooth Headset
2.4 GHz Bluetooth Interface

FCC ID: Y3J-DCHBTXX
IC: 9409A-DCHBTXX

Report Issued on April 16, 2015
Revised Report Issued on June 23, 2015

Tested by

Brian F. Breault

Reviewed by

Larry K. Stillings

Table of Contents

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1. Scope

This test report certifies that the David Clark Company Bluetooth Headset 2.4 GHz Bluetooth Interface, as tested, meets the FCC Part 15.247**,** and Industry Canada RSS 210, Issue 8 requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

Revision R1 – Section 6.7.2.2 incorrectly read “Upper Band Edge - Modulated Carrier.” It has been corrected to read “Upper Band Edge – Frequency Hopping.”

2. Product Details

2.1. Manufacturer: David Clark Company

2.2. Model Number: Bluetooth Headset

2.3. Serial Number: None

2.4. Description: Headphone Bluetooth Interface

2.5. Power Source: 3.7 VDC Non User Replaceable Lithium-Polymer Battery

2.6. EMC Modifications: None

3. Product Configuration

3.1. Operational Characteristics & Software

CSR BlueTest3 was used as the control software for the Bluetooth transmitter.
Once the software and driver were installed, the transmitter could be configured to function in a number of ways.

Notes: The default transmitter power settings set by the client were maintained throughout the testing.

To facilitate setting the required transmitter test modes, the following device hardware setup was used: A USB cable from the laptop containing the test software to an SPI converter. The SPI converter, in turn, was attached to a custom headset test module. A custom built cable ran from the test module to the headset Bluetooth transmitter in the right ear cup. Once the settings were downloaded to the Bluetooth transmitter, the cable to the Bluetooth transmitter was removed. During the test, the headset was rotated through three orthogonal axes as required by ANSI C63.10, section 6.4.6 for a hand held or body worn device. The three positions were as follows:

X-Axis	Horizontal with headband facing to the left. Right headset ear cup facing down, microphone is facing the antenna at 0º turntable azimuth.
Y-Axis	Headset headband is facing up, microphone is facing the antenna at 0º turntable azimuth.
Z-Axis	Headset headband is facing 180º, microphone is facing toward the ceiling.

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3. Product Configuration (continued)

3.1. Operational Characteristics & Software (continued)

The following test modes were utilized to perform the testing:

TXSTART – The transmitter transmits a single carrier on a selected frequency from channel 0 to 78.

TXDATA 1 – Initiates a modulated output on the selected transmitter channel.

TXDATA 2 – Initiates the hopping sequence defined by the CFG HOPPING SEQ section.

CFG HOPPING SEQ – Selects the channel(s) to be included in a hopping sequence.

General Setup Parameters:

RF Test Mode:	CFG FREQ
TX/RX INT (µs):	6250
Loopback (µs):	1875
Report Int (s):	1
RF Test Mode:	CFG PKT
Packet Type:	30
Packet Size:	679
RF Test Mode:	CFG BIT ERR
Bit Count:	16000000
Reset:	FALSE
LO Freq (MHz):	2402.000 (e.g.)
Hi-Side:	FALSE
RX Atten:	0

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Frq (Hz)	Description/Function
David Clark	XXX	None	3.7 V	DC	Bluetooth Headset

3.3. EUT Cables/Transducers

Manufacturer	Model/Part #	Length (m)	Shield Y/N	Description/Function
David Clark	N/A	2	N	USB to DC power cable for charging the headset

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3. Product Configuration (continued)

3.4. Miscellaneous EUT Items

Manufacturer	Model/Part #	Qty	Description / Function
Phihong	PSMO3A-050Q-3	1	5 volt, 550 mA USB cable compatible charger

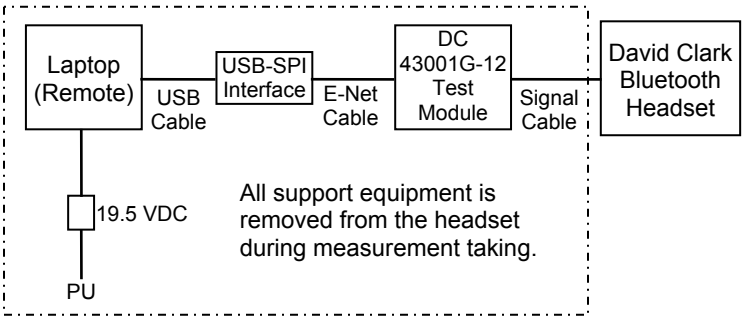
3.5. Support Equipment

Device	Manufacturer	Model	Serial No.	Comment
Laptop	Toshiba	Satelite A105	X6208961Q	For CSR BlueSuite
Headset Test Module	David Clark Co.	43001G-12	N/A	
USB-SPI Converter	CSR	1324	288782	Bluetooth to SPI USB converter

3.6. Support Equipment Cables

Part #	Shielded Y or N	Length	Description / Function
N/A	Y	1 m	Standard USB Cable
N/A	N	0.25 m	Ethernet cable used as a test module interface, not for Ethernet
HDR-170674-01	N	0.5 m	Custom 20 pin interface cable.

3.7. Block Diagram



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4. Measurements Parameters

4.1. Measurement Equipment and Software Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due	Interval
Spectrum Analyzer 20 Hz – 40 GHz [1]	Rohde & Schwarz	FSV40	100899	6/5/2015	2 Years
Spectrum Analyzer, 9 kHz to 40 GHz [2]	Rohde & Schwarz	FSVR40	100909	5/15/2015	2 Years
EMI Receiver	Hewlett Packard	8546A	3650A00360	6/4/2016	2 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B	3008A00329	6/5/2015	2 Years
Loop Antenna	EMCO	6512	9309-1139	9/23/2016	2 Years
Biconilog Antenna, 30 MHz to 2 GHz	Sunol Sciences Corp	JB1	25509	5/15/2015	2 Years
Horn Antenna, 960 MHz – 18 GHz	Electro-Metrics	RGA-50 / 60	2813	7/15/2015	2 Years
LISN 50 Ω 50 µH, 9 kHz to 30 MHz	EMCO	3825/2	9109-1860	6/2/2015	1 Year
Power Supply	Hewlett Packard	6296A	7M0599	8/26/2015	1 Year
Barometric Pressure/Humidity & Temp	Extech Instruments	SD700	Q590483	9/18/2015	2 Years
2.4 GHz Band Reject Filter	Micro-Tronics	BRM50702	282	2/26/2016	1 Year
Temperature Chamber	Associated Research	E-0029	N/A	N/A	---

[1] FSV40 Firmware revision: V2.30 SP1 Date installed: 10/22/2014 Previous V2.30, installed 7/23/2014.

[2] FSVR40 Firmware revision: V2.23, Date installed: 10/20/2014 Previous V1.63 SP1, installed 8/28/2013.

Manufacturer	Software Description	Title or Model #	Rev.	Report Sections
Compliance Worldwide	Test Report Generation Software	Test Report Generator	1.0	6.12. Conducted Emissions

4.2. Measurement & Equipment Setup

Test Dates:	March 30th 2015 – April 16th, 2015
Test Engineer:	Brian Breault
Normal Site Temperature (15 - 35°C):	21.6
Relative Humidity (20 - 75%RH):	35
Frequency Range:	30 kHz to 25 GHz
Measurement Distance:	3 Meters
EMI Receiver IF/Resolution Bandwidth:	100 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz
EMI Receiver Average/Video Bandwidth:	300 kHz - 30 MHz to 1 GHz 3 MHz - Above 1 GHz
Detector Function:	Peak, Quasi-Peak & Average

4.3. Measurement Procedure

Test measurements were made in accordance with FCC Part 15.247 and IC RSS-210 Annex II: Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

The test methods used to generate the data in this test report is in accordance with ANSI C63.10: 2009, American National Standard for Methods of Measurement of

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4. Measurements Parameters

4.3. Measurement Procedure (continued)

Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

5. Measurements Summary

Test Requirement	FCC Rule Requirement	IC Rule Requirement	Report Section	Result
Antenna requirement	15.203	RSS-GEN, ISSUE 4 7.1.2	6.1	Compliant
Number of hopping channels	15.247 (a) (1) (iii)	RSS-210 A8.1 (d)	6.2	Compliant
Minimum 20 dB bandwidth	15.247 (a) (1) (iii)	RSS-210 A8.1 (b)	6.3	Compliant
Hopping channel carrier frequency separation	15.247 (a) (1)	RSS-210 A8.1 (b)	6.4	Compliant
Average time of occupancy	15.247 (a) (1) (iii)	RSS-210 A8.1 (d)	6.5	Compliant
Maximum peak conducted output power	15.247 (b) (1)	RSS-210 A8.1 (b)	6.6	Compliant
Band edge	15.247 (d)	RSS-210 A8.5	6.7	Compliant
99% (occupied) bandwidth	N/A	RSS-GEN, ISSUE 4 4.6.1	6.8	Compliant
Spurious harmonic radiated emissions	ANSI C63.10 10.2.8.2	RSS-210 A8.9	6.9	Compliant
Spurious radiated emissions	15.209	RSS-GEN, ISSUE 4	6.10	Compliant
Unwanted Emissions in Non-Restricted Frequency Bands	15.247(d)	RSS-GEN, ISSUE 4	6.11	Compliant
Power line conducted emissions	15.207	RSS-GEN, ISSUE 4	6.12	Compliant
Public exposure to radio frequency energy levels	15.247 (1) 1.1307 (b)(1)	RSS-GEN, ISSUE 4 5.5 RSS-102, Issue 5	6.13	Compliant

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6. Measurement Data

6.1. Antenna Requirement (15.203, RSS-GEN, ISSUE 4 7.1.2)

Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

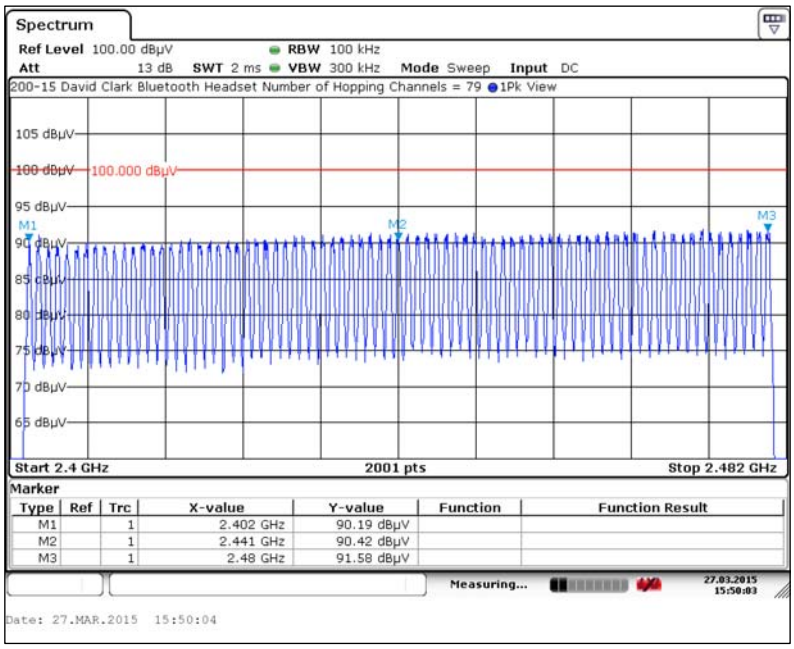
Status: The device under test utilized a Johanson Technology 2450AT45A100 internal chip antenna, inaccessible to the user.

6.2. Number of Hopping Channels (15.247 (a) (1) (iii), RSS-210 A8.1 (d))

Requirement: Systems Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

Status: The device under test utilizes 79 hopping channels from 2402 MHz to 2480 MHz.

Result: Compliant



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6. Measurement Data (continued)

6.3. Minimum 20 dB Bandwidth (15.247 (a) (1), RSS-210 A8.1 (b))

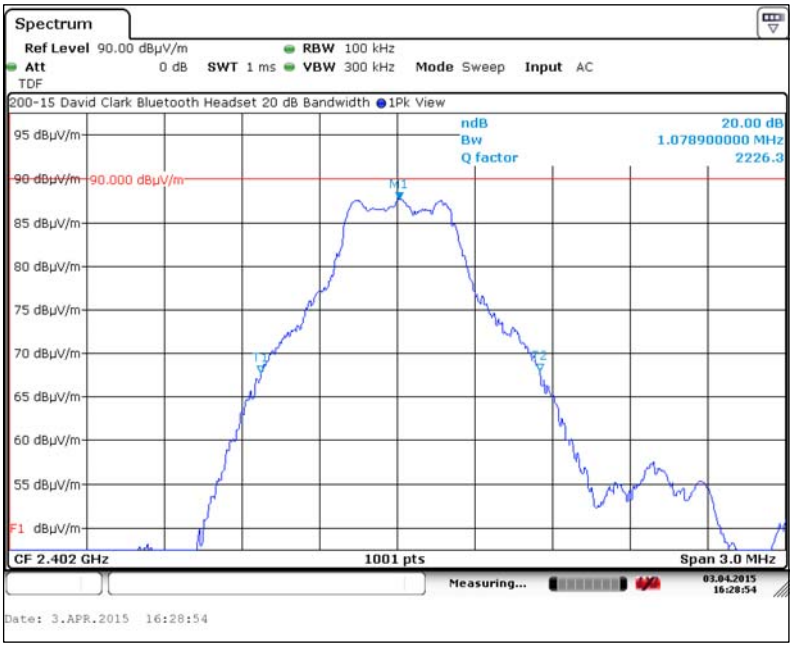
Requirement: Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Note: The ⅔ x 20 dB bandwidth of the hopping channel is the greater of the values. Frequency hopping channel separation data is detailed in section 6.4.

Resolution Bandwidth : 100 kHz
Video Bandwidth : 300 kHz

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	20 dB Bandwidth x ⅔ (kHz)	Result
Low	2402	1079	**719.33**	Compliant
Middle	2441	1089	**726.00**	Compliant
High	2480	1091	**727.33**	Compliant

6.3.1. 20 dB Bandwidth – Low Frequency (2402 MHz)



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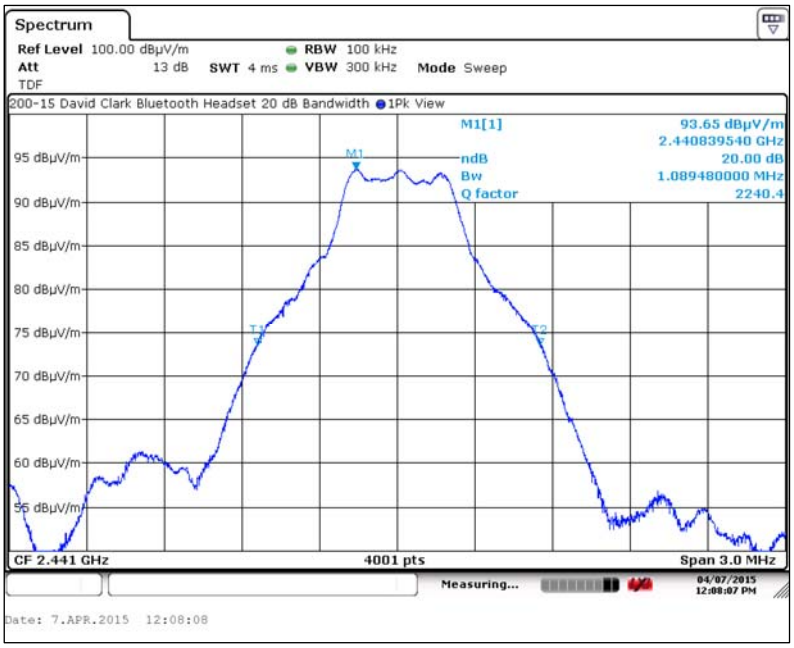
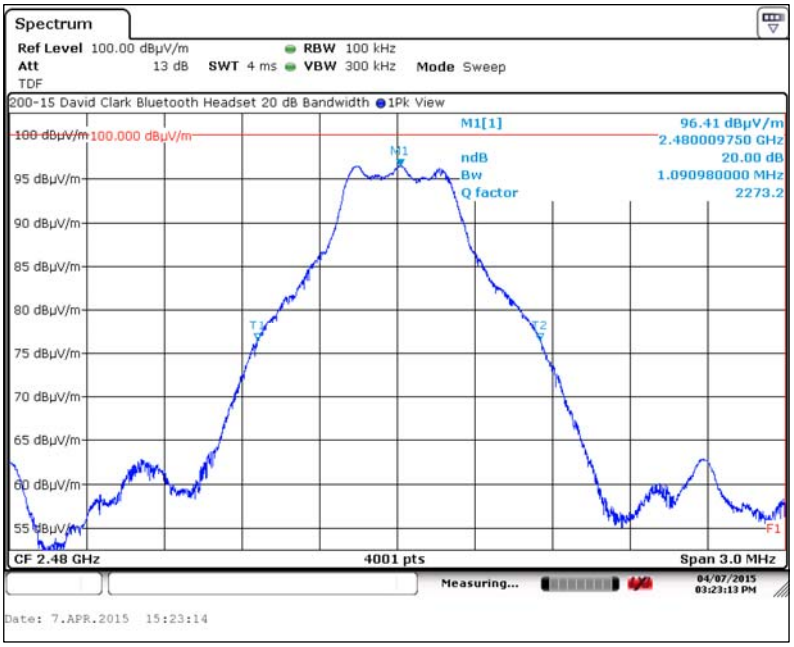
6. Measurement Data

6.3. Minimum 20 dB Bandwidth (15.247 (a) (1), RSS-210 A8.1 (b))

6.3.2. 20 dB Bandwidth – Middle Frequency (2441 MHz)



6.3.3. 20 dB Bandwidth – High Frequency (2480 MHz)



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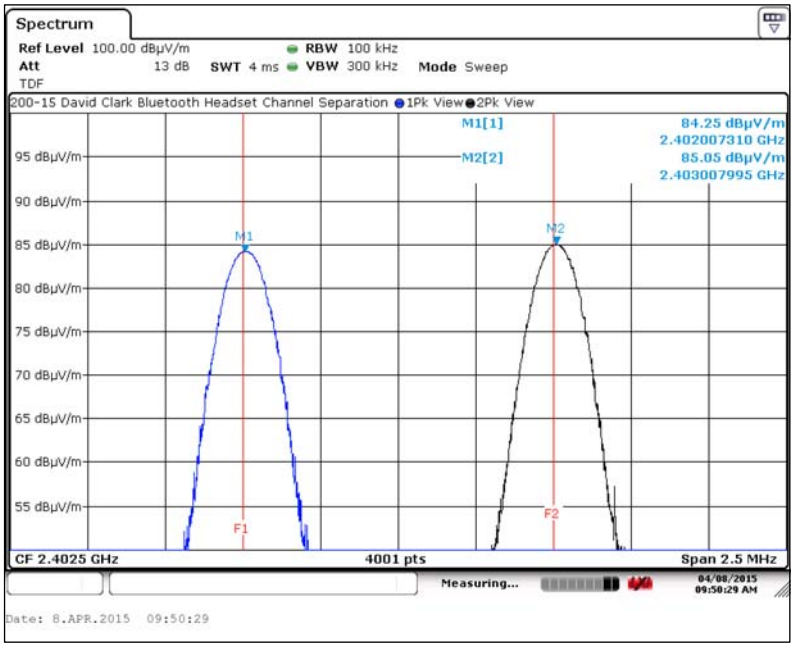
6. Measurement Data

6.4. Frequency Hopping Channel Separation (15.247 (a) (1), RSS-210 A8.1 (b))

Channel Pair	Channel Pair	Channel Separation (kHz)	Required Channel Separation (kHz)	Result
Low	2402	1000.6	>719.33 kHz	Compliant
	2403			
Middle	2440	1000.4	>726.00 kHz	Compliant
	2441			
High	2479	1001.6	>727.33 kHz	Compliant
	2480			

6.4.1. Channel Separation – Low Frequency (2402/2403 MHz)



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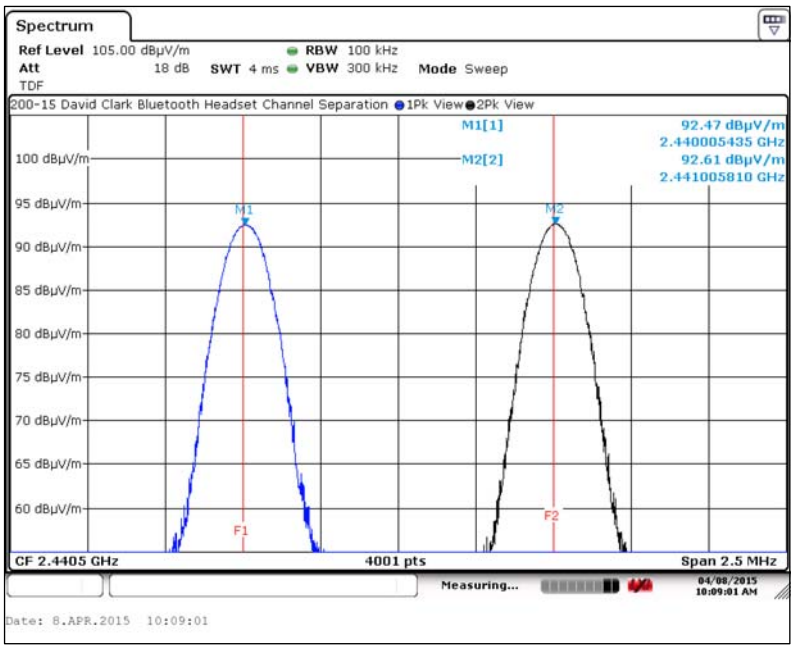
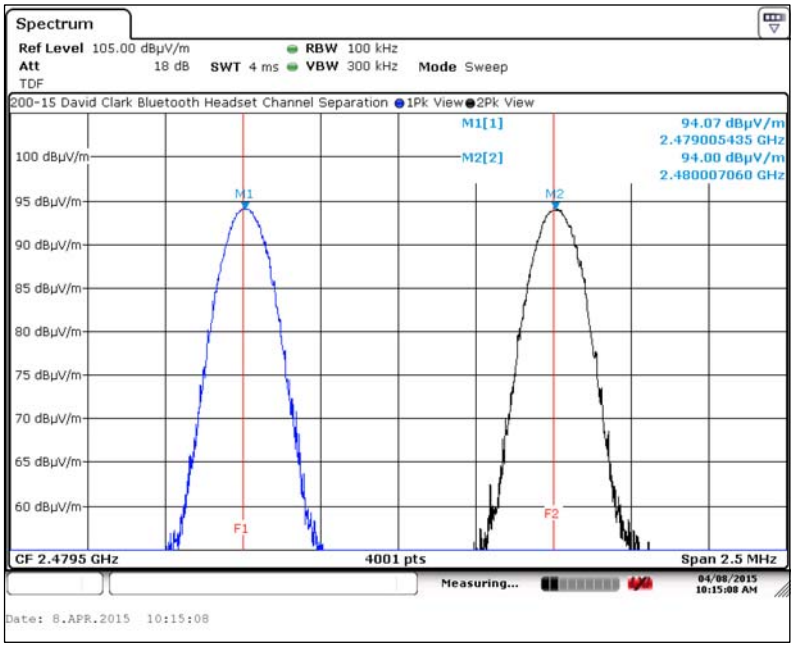
6. Measurement Data

6.4. Frequency Hopping Channel Separation (15.247 (a) (1), RSS-210 A8.1 (b))

6.4.2. Channel Separation – Middle Frequency (2440/2441 MHz)



6.4.3. Channel Separation – High Frequency (2479/2480 MHz)



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6. Measurement Data

6.5. Average Time of Occupancy (15.247 (a) (1) (iii), RSS-210 A8.1 (d))

Requirement: The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

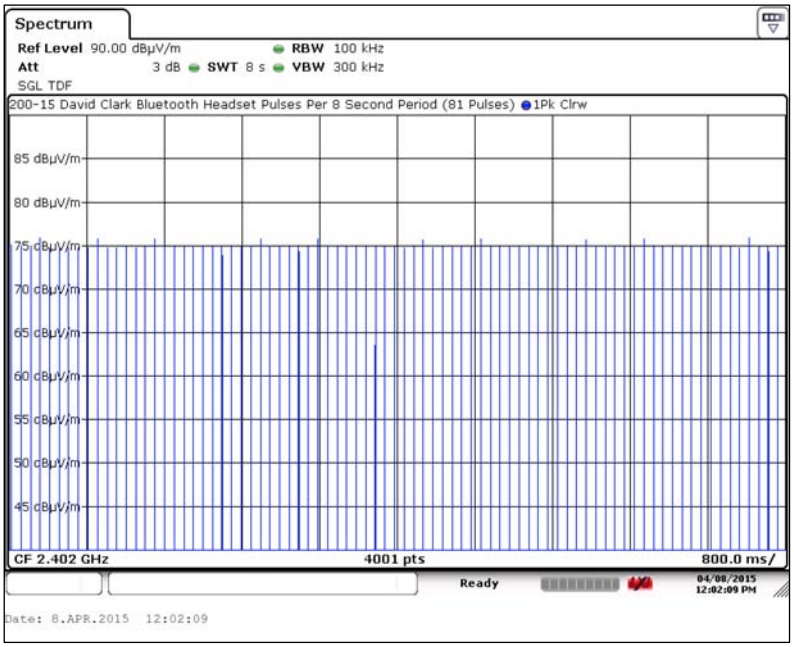
Test Note: A sweep time of 8 seconds was used to facilitate counting the pulses on a given frequency. This number was multiplied by 4 to determine the number of pulses in a 32 second interval.

79 Channels x 0.4 Seconds = 32 Seconds

Channel	Frequency (MHz)	Number of Pulses per 8s Period	Number of Pulses per 32s Period	Pulse Width (µS)	Dwell Time per Period (32 Seconds)	Allowable Dwell Time per Period	Result
Low	2402	81	324	416.75	0.1350	0.4	Compliant
Middle	2441	81	324	421.75	0.1366	0.4	Compliant
High	2480	81	324	419.25	0.1358	0.4	Compliant

6.5.1. Pulses per 8 Second Period

6.5.1.1. Pulses per 8 Second Period – Low Frequency (2402 MHz)



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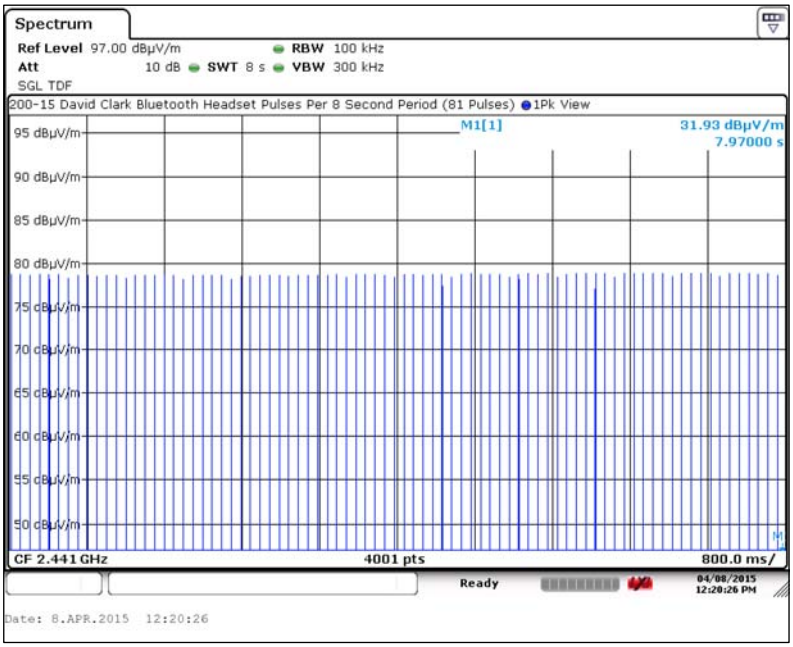
6. Measurement Data

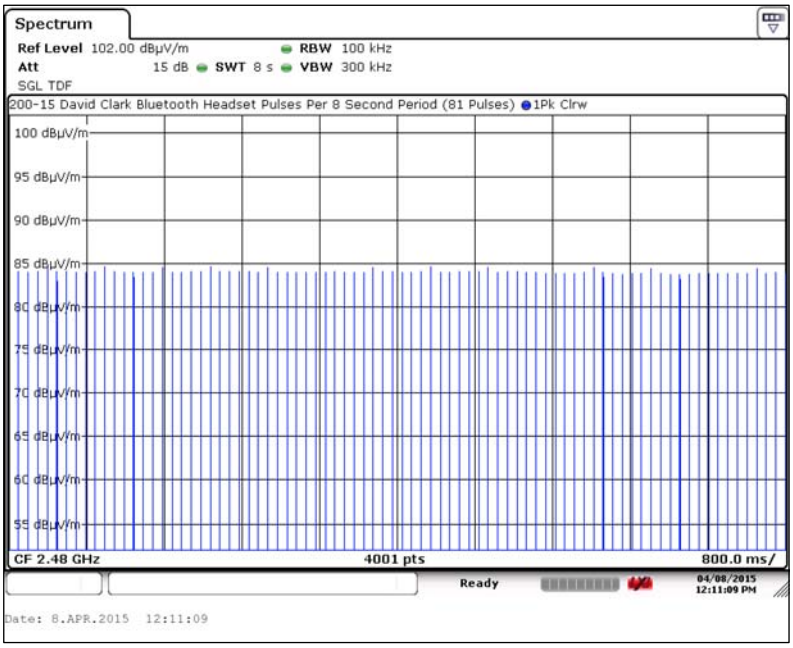
6.5. Average Time of Occupancy (15.247 (a) (1) (iii), RSS-210 A8.1 (d))

6.5.1. Pulses per 8 Second Period (continued)

6.5.1.2. Pulses per 8 Second Period – Middle Frequency (2441 MHz)



6.5.1.3. Pulses per 8 Second Period – High Frequency (2480 MHz)



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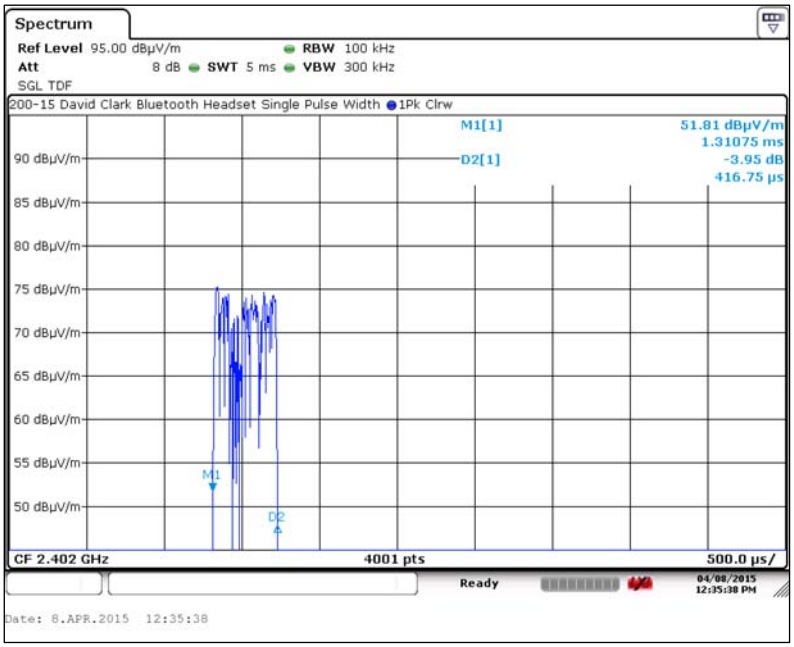
6. Measurement Data

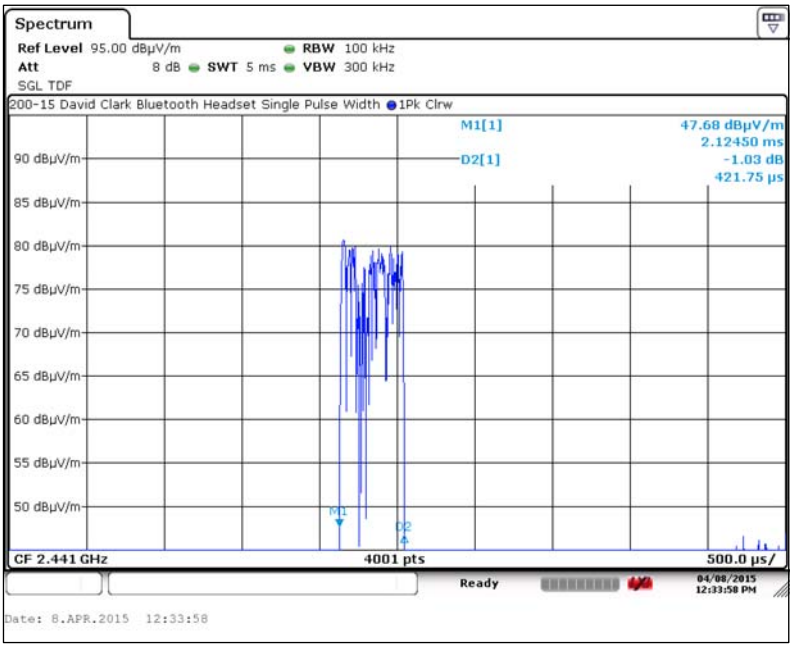
6.5. Average Time of Occupancy (15.247 (a) (1) (iii), RSS-210 A8.1 (d))

6.5.2. Transmitter Individual Pulse Width

6.5.2.1. Transmitter Individual Pulse Width – Low Frequency (2402 MHz)



6.5.2.2. Transmitter Individual Pulse Width – Middle Frequency (2441 MHz)



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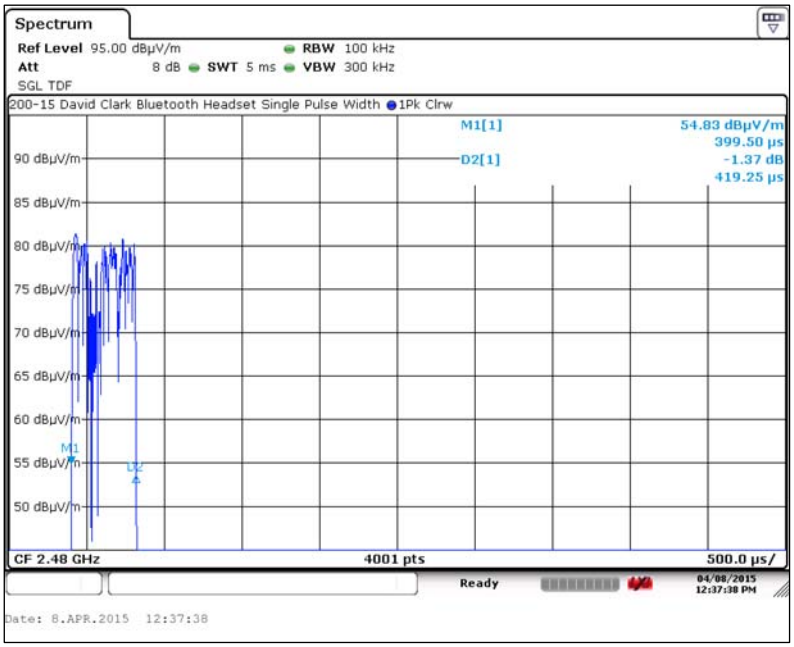
6. Measurement Data

6.5. Average Time of Occupancy (15.247 (a) (1) (iii), RSS-210 A8.1 (d))

6.5.2. Transmitter Individual Pulse Width (continued)

6.5.2.3. Transmitter Individual Pulse Width – High Frequency (2480 MHz)



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6. Measurement Data

6.6. Maximum Peak Conducted Output Power (15.247 (b) (1), RSS-210 A8.1 (b))

Requirement: The maximum peak conducted output power of the intentional radiator shall not exceed 1 watt for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels.

Test Note[1]: The device under test does not facilitate conducted power measurements. Radiated field strength measurements were made and converted to units of power using the following formula:

$$P = \frac{(E \times d)^2}{(30 \times G)}$$

P = the power in Watts (power has been converted to milliwatts in the table).
E = the measured maximum field in V/m
G = the numeric gain of the transmitting antenna over an isotropic radiator.
d = the distance in meters of the field strength measurement.

[1] Reference FCC OET 412172: Determining ERP and EIRP

Channel	Freq.	Peak Field Strength	Distance	Antenna Gain[1]		Measured Output Power	Output Power Limit	Result
	(MHz)	(dBµV/m)	(m)	(dBi)	(numeric)	(mW)	(mW)	
Low	2402	90.65	3.0	1.00	1.259	0.28	1000.0	Compliant
Middle	2441	93.69	3.0	1.00	1.259	0.56	1000.0	Compliant
High	2480	96.60	3.0	1.00	1.259	1.09	1000.0	Compliant

[1] Taken from the antenna manufacture's data guide.

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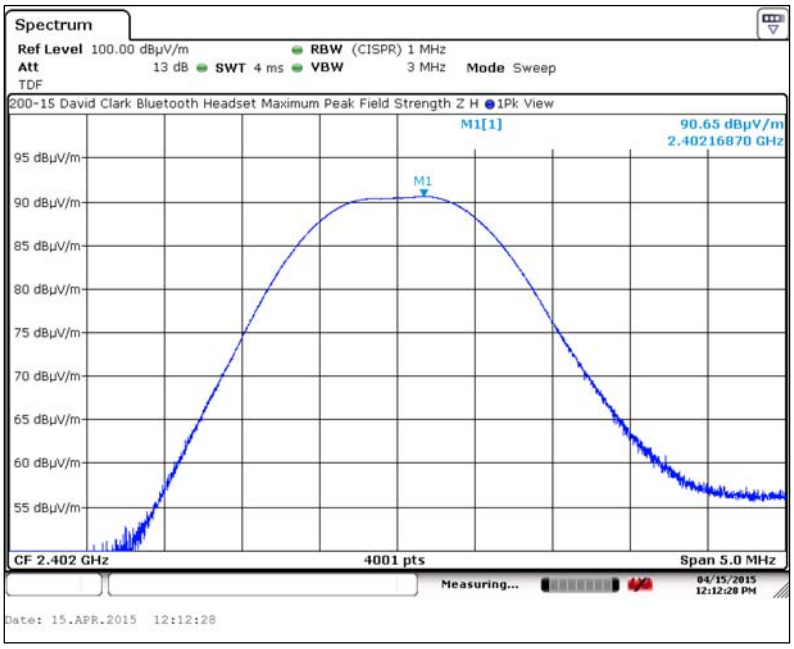
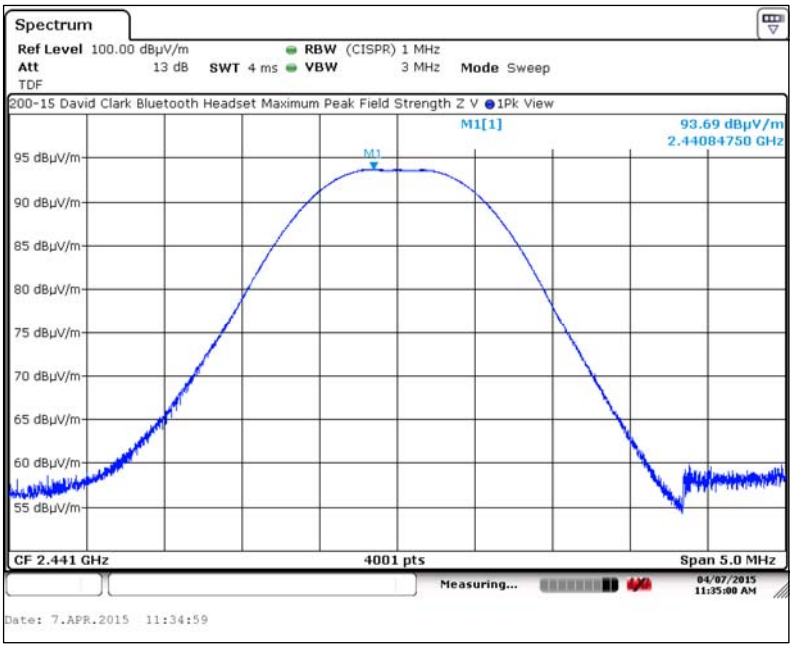
6. Measurement Data

6.6. Maximum Peak Conducted Output Power (15.247 (b) (1), RSS-210 A8.1

6.6.1. Field Strength – Low Frequency (2402 MHz)



6.6.2. Field Strength – Middle Frequency (2441 MHz)



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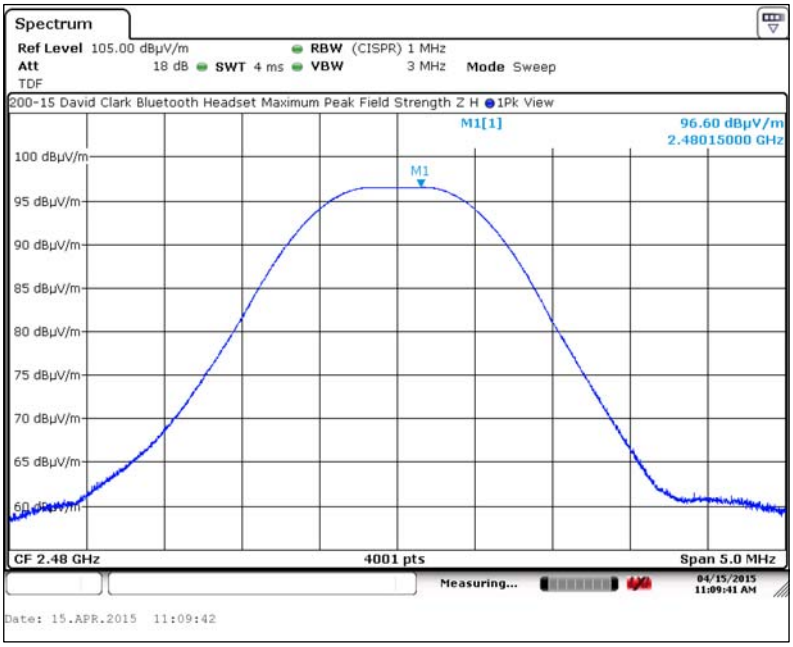
6. Measurement Data

6.6. Maximum Peak Conducted Output Power (15.247 (b) (1), RSS-210 A8.1 (b))

6.6.3. Field Strength – High Frequency (2480 MHz)



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6. Measurement Data

6.7. Band Edge (15.247 (d), RSS-210 A8.5)

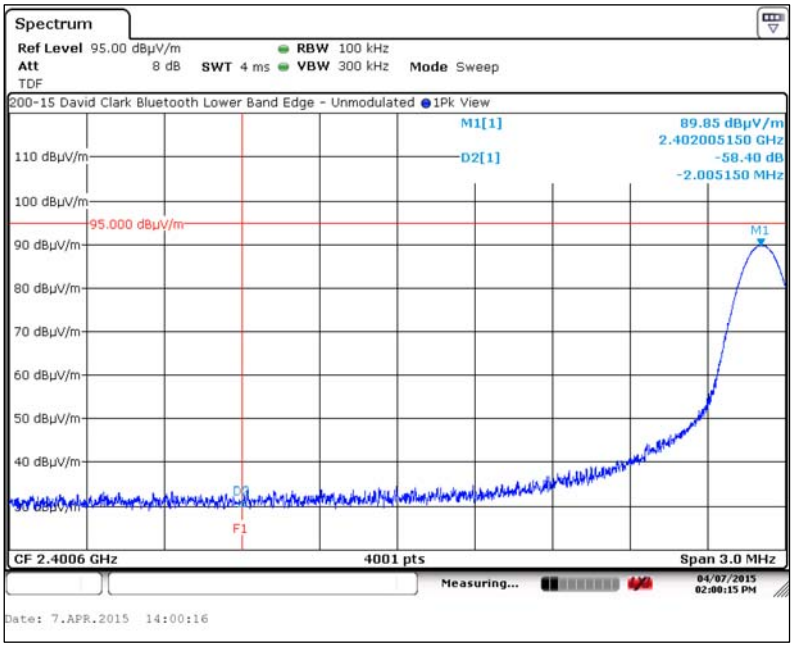
Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Resolution Bandwidth : 100 kHz
Video Bandwidth : 300 kHz

6.7.1. Lower Band Edge

6.7.1.1. Unmodulated Carrier

Lowest Channel	Field Strength (dBµV/m)		Band Edge Frequency	Field Strength (dBµV/m)		Required Offset (dB)	Actual Offset (dB)	Result
(MHz)	Peak	Average	(MHz)	Peak	Average			
2402.	89.85	---	2400	31.45	---	>20 dB	58.40	Compliant



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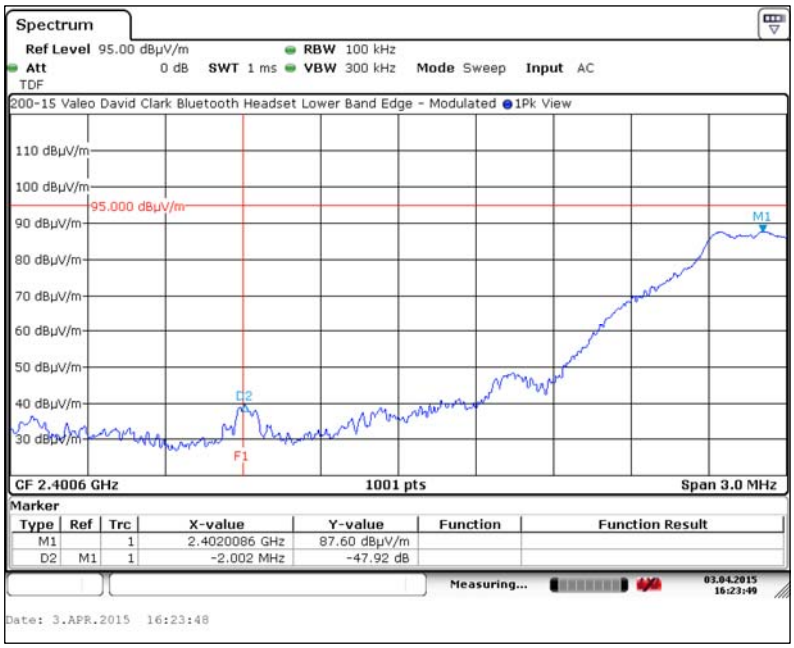
6. Measurement Data (continued)

6.7. Band Edge (15.247 (d), RSS-210 A8.5)

6.7.1. Lower Band Edge

6.7.1.2. Frequency Hopping

Lowest Channel	Field Strength (dBm)		Band Edge Frequency	Field Strength (dBm)		Required Offset (dB)	Actual Offset (dB)	Result
(MHz)	Peak	Average	(MHz)	Peak	Average			
2402.	87.6	---	2400	39.68	---	>20 dB	47.92	Compliant



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6. Measurement Data

6.7. Band Edge (15.247 (d), RSS-210 A8.5)

6.7.2. Upper Band Edge

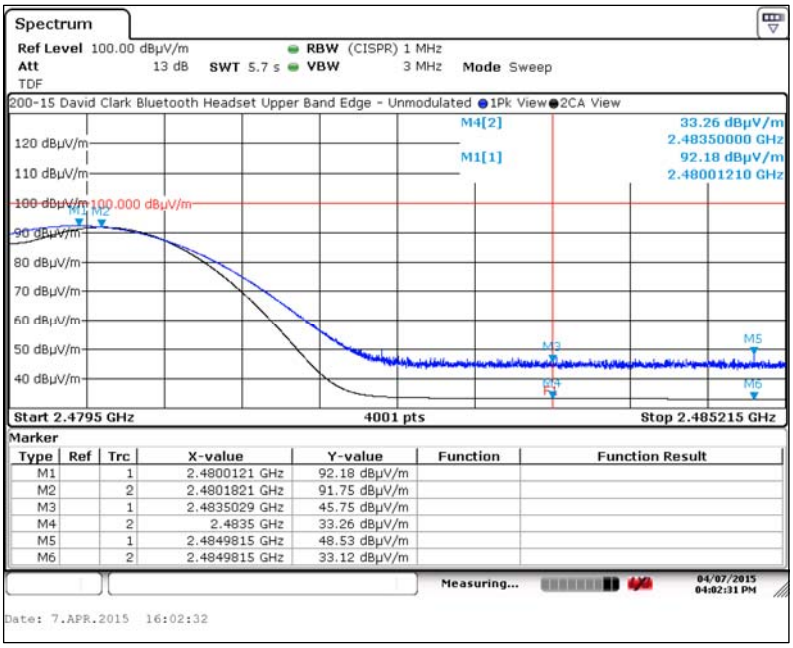
6.7.2.1. Unmodulated Carrier

Band Edge

Highest Channel	Field Strength (dBµV/m)		Upper Band Edge	Field Strength (dBµV/m)		Limit (dBµV/m)		Margin (dB)		Result
(MHz)	Peak	Average	(MHz)	Peak	Average	Peak	Average	Peak	Average	
2480	92.18	91.75	2483.5	45.75	33.26	74	54	-28.25	-20.74	Compliant

Worst-case Out of Band

Frequency (MHz)	Field Strength (dBµV/m)		15.209 Limit (dBµV/m)		Margin (dB)		Result
	Peak	Average	Peak	Average	Peak	Average	
2483.625	48.53	33.12	74	54	-25.47	-20.88	Compliant



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6. Measurement Data

6.7. Band Edge (15.247 (d), RSS-210 A8.5)

6.7.2. Upper Band Edge

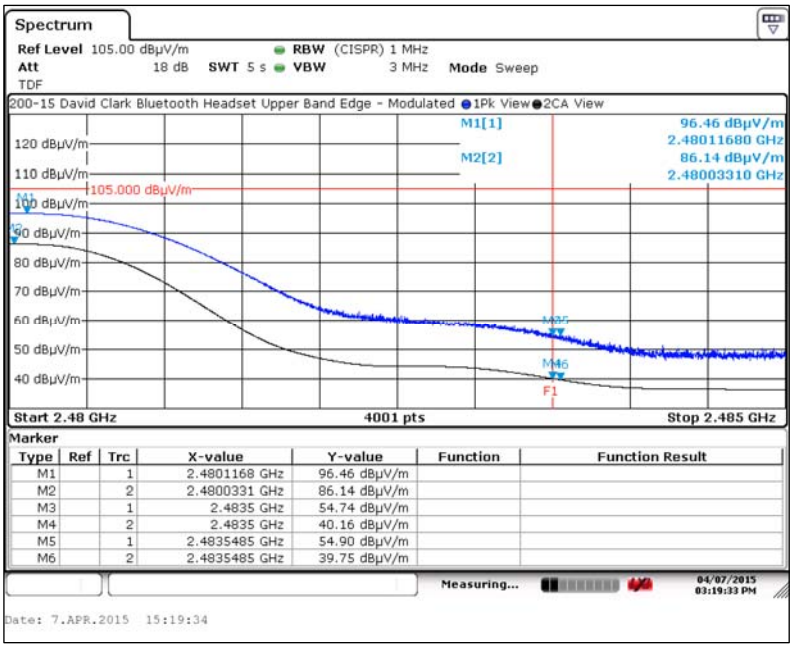
6.7.2.2. Frequency Hopping

Band Edge

Highest Channel	Field Strength (dBµV/m)		Upper Band Edge	Field Strength (dBµV/m)		Limit (dBµV/m)		Margin (dB)		Result
(MHz)	Peak	Average	(MHz)	Peak	Average	Peak	Average	Peak	Average	
2480	96.46	86.14	2483.5	54.74	40.16	74	54	-19.26	-13.84	Compliant

Worst-case Out of Band

Freq. (MHz)	Field Strength (dBµV/m)		15.209 Limit (dBµV/m)		Margin (dB)		Result
	Peak	Average	Peak	Average	Peak	Average	
2483.655	54.9	39.75	74	54	-19.1	-14.25	Compliant



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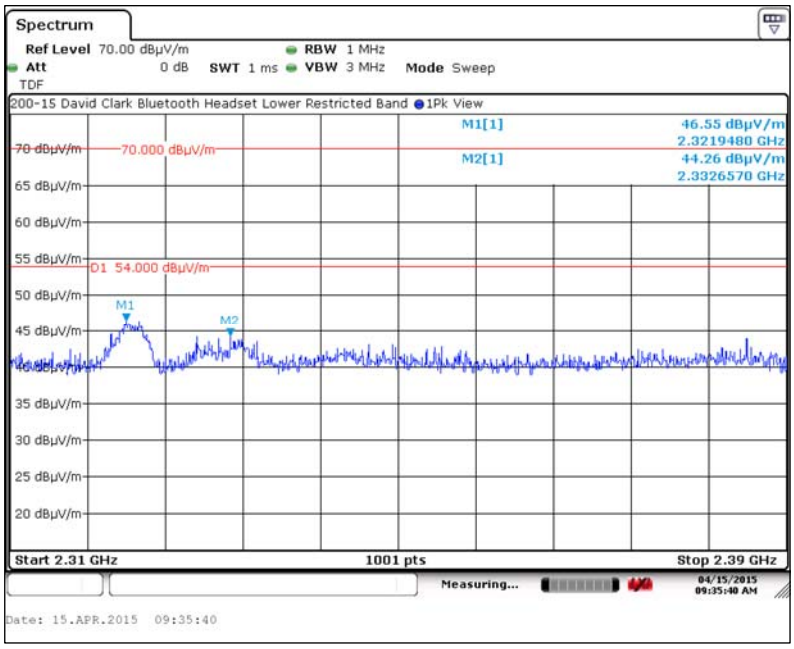
6. Measurement Data

6.7. Band Edge (15.247 (d), RSS-210 A8.5)

6.7.3. Lower Restricted Band (2310 MHz to 2390 MHz)



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6. Measurement Data (continued)

6.8. 99% (Occupied) Bandwidth (RSS-GEN, ISSUE 4 4.6.1)

Requirement: For devices operating above 900 MHz, the 99% bandwidth shall be no wider than 0.5% of the center frequency.

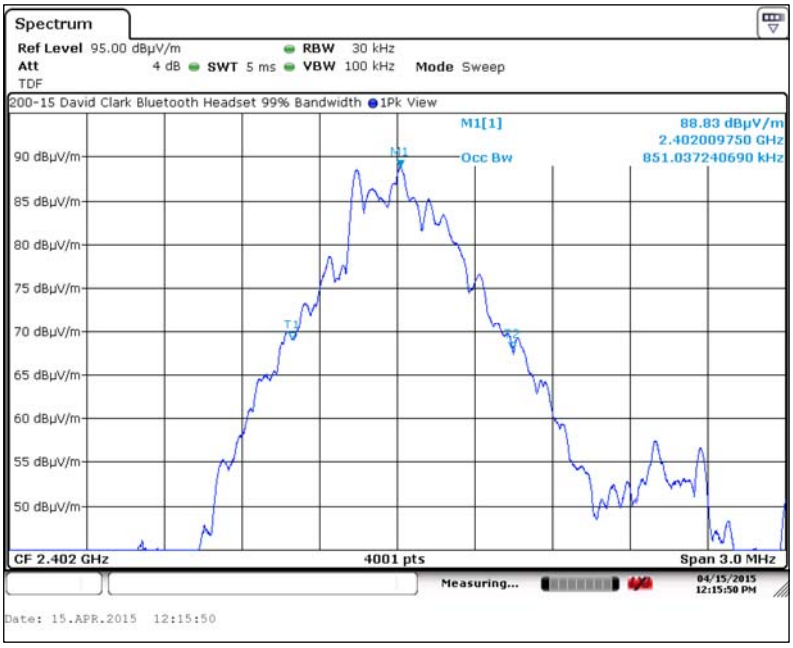
The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.

Resolution Bandwidth : 100 kHz
Video Bandwidth : 300 kHz

6.8.1. Measurement Results

Channel	Channel Frequency (MHz)	99% Power Bandwidth (MHz)
Low	2402	0.851
Middle	2441	0.844
High	2480	0.848

6.8.1.1. 99% Power Bandwidth – Low Frequency (2402 MHz)



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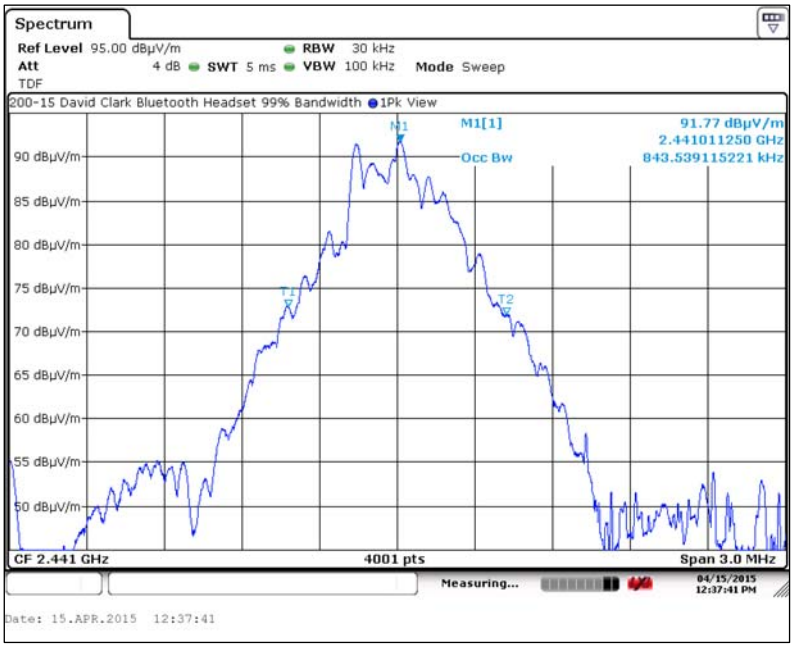
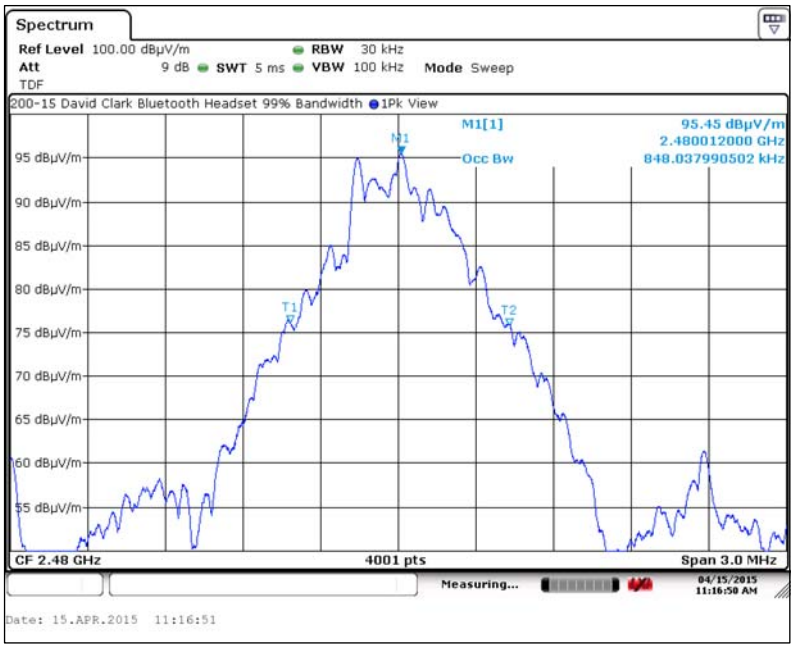
6. Measurement Data (continued)

6.8. 99% Bandwidth (RSS 210)

6.8.1.2. 99% Power Bandwidth – Middle Frequency (2441 MHz)



6.8.1.3. 99% Power Bandwidth – High Frequency (2480 MHz)



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6. Measurement Data (continued)

6.9. Combined Spurious Harmonic Radiated Emissions (ANSI C63.4 Section 10.2.8.2, RSS-210 A8.9)

Test Note: The following table represents the worst case measurement of each harmonic emission, taking into account the ANSI C63.4 requirement of rotating the DUT through three orthogonal axes.

Resolution Bandwidth : 1 MHz
Video Bandwidth : 3 MHz

Frequency (MHz)	Field Strength (dBµV/m)[1]		Limit (dBµV/m)		Margin (dB)		Pol (H/V)	Results
	Peak	Avg	Peak	Avg	Peak	Avg		
4804.000	53.55	40.48	74.00	54.00	-20.45	-13.52	V	Compliant
4882.000	54.82	42.60	74.00	54.00	-19.18	-11.40	H	Compliant
4960.000	52.47	40.92	74.00	54.00	-21.53	-13.08	H	Compliant
7323.000	58.91	44.88	74.00	54.00	-15.09	-9.12	V	Compliant
7440.000	59.29	45.15	74.00	54.00	-14.71	-8.85	V	Compliant
12010.000	61.16	47.36	74.00	54.00	-12.84	-6.64	H	Compliant
12205.000	61.12	47.52	74.00	54.00	-12.88	-6.48	V	Compliant
12400.000	60.99	47.23	74.00	54.00	-13.01	-6.77	H	Compliant
19216.000	59.90	46.73	74.00	54.00	-14.10	-7.27	V	Compliant
19528.000	59.44	45.97	74.00	54.00	-14.56	-8.03	V	Compliant
19840.000	60.15	46.86	74.00	54.00	-13.85	-7.14	V	Compliant
22320.000	62.19	48.52	74.00	54.00	-11.81	-5.48	H	Compliant

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6. Measurement Data (continued)

6.10. Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

Regulatory Limit: FCC Part 15.209

Frequency Range (MHz)	Distance (Meters)	Limit (dBµV/m)[1]
0.009 to 0.490	3	128.5 to 93.8
0.490 to 1.705	3	73.8 to 63.0
1.705 to 30	3	69.5
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
>960	3	54.0

[1] Measurements in the 9 to 90 kHz, 110 to 490 kHz and above 1000 MHz ranges employ an average detector. Otherwise a quasi-peak detector is used.

Test Procedure

Test measurements were made in accordance with ANSI C63.10-2009, American National Standard for Testing Unlicensed Wireless Devices.

Test Notes:

The frequency span that includes the Bluetooth transmitters was omitted from the spurious emissions scan.

Appendix A contains the screen captures taken for the spurious emissions test.

Conclusion:

The device under test met the spurious emissions requirements.

Frequency (MHz)	Appendix A Reference[1]	Amplitude (QP or Avg)[2] (dBµV/m)	Limit (QP or Avg) (dBµV/m)	Margin (dB)	Product Orthogonal Position[3] (X/Y/Z)	Antenna Polarity (H/V)	Result
7342.400	5.1 M2	---	---	---	---	---	Note 4
4840.600	5.3 M1	---	---	---	---	---	Note 4
7421.300	5.3 M2	---	---	---	---	---	Note 4
9889.190	5.3 M3	43.65	54.00	-10.35	Y-Axis	V	Compliant
4915.800	5.5 M1	---	---	---	---	---	Note 4
7334.850	5.5 M2	---	---	---	---	---	Note 4
4386.900	5.6 M1	34.84	54.00	-19.16	5.6 M1	V	Compliant
7440.000	5.6 M1	---	---	---	---	---	Note 4

[1] Screen captures reference and spectrum analyzer marker number.

[2] Reference the FCC Part 15.209 table for the detector used in a particular frequency range

[3] Reference Section 3,1 of this test report.

[4] This is a harmonic emission and falls within a restricted band of operation.

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6. Measurement Data (continued)

6.11. Unwanted Emissions in Non-Restricted Frequency Bands (15.247(d))

Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Procedure: For the lower band edge, this test was performed in accordance with the procedure detailed in FCC OET publication number 558074, Section 11, Emissions in Non-Restricted Frequency.

Test Results: Compliant.

All emissions in the non-restricted frequency bands were at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power based on an RF radiated measurement.

Refer to Appendix B for the detailed screen captures for this test.

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6. Measurement Data (continued)

6.12. Power Line Conducted Emissions (Part 15.207)

Requirement: For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

Test Note: The DUT is powered by a 3.7 volt Lithium-Polymer battery. The power line conducted emissions test was performed on the Phihong model PSM03A-050Q-3 5 volt, 550 milliamp power supply supplied with the DUT to charge the headset battery. The test was performed while the power supply was charging the headset. The AC power line emissions from this device are reported in the following tables and graphs.

Test Procedure: Test measurements were made in accordance with CISPR 22, Section 9: Method of measurement of conducted disturbance at mains terminals and telecommunication ports and ANSI C63.10-2009, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices, Section 6.2.

Test Results: The DUT meets the FCC Part 15.207 requirements for conducted emissions.

Regulatory Limit: FCC Part 15.207

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56[1]	56 to 46[1]
0.50 to 5.0	56	46
0.50 to 30	60	50
[1] The limit decreases linearly with the logarithm of the frequency.		

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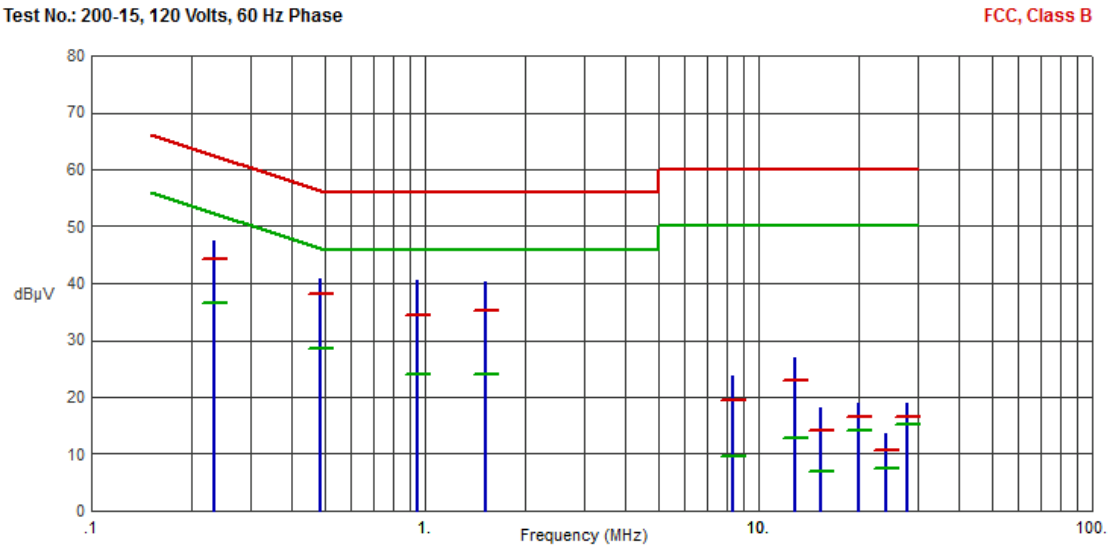
6. Measurement Data (continued)

6.12. Power Line Conducted Emissions (continued)

6.12.1. 120 Volts, 60 Hz Phase



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.2337	47.39	44.30	62.32	-18.02	36.56	52.32	-15.76	
.4850	40.80	38.08	56.25	-18.17	28.52	46.25	-17.73	
.9488	40.43	34.37	56.00	-21.63	23.95	46.00	-22.05	
1.5133	40.20	35.07	56.00	-20.93	23.92	46.00	-22.08	
8.3814	23.81	19.47	60.00	-40.53	9.53	50.00	-40.47	
12.8043	27.01	22.88	60.00	-37.12	12.70	50.00	-37.30	
15.3688	18.20	14.20	60.00	-45.80	6.83	50.00	-43.17	
20.0000	18.96	16.59	60.00	-43.41	14.24	50.00	-35.76	
23.9995	13.64	10.70	60.00	-49.30	7.53	50.00	-42.47	
28.0003	18.81	16.61	60.00	-43.39	15.30	50.00	-34.70	

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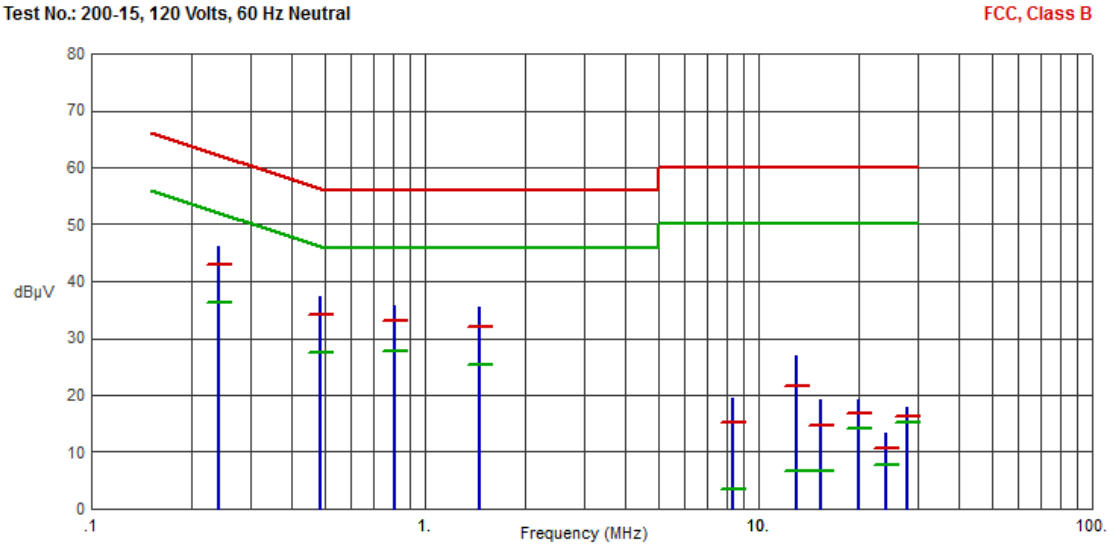
6. Measurement Data (continued)

6.12. Power Line Conducted Emissions (continued)

6.12.2. 120 Volts, 60 Hz Neutral



Frequency (MHz)	Pk Amp (dBµV)	QP Amp (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Avg Amp (dBµV)	Avg Limit (dBµV)	Avg Margin (dB)	Comments
.2400	46.19	42.96	62.10	-19.14	36.27	52.10	-15.83	
.4857	37.32	34.13	56.24	-22.11	27.39	46.24	-18.85	
.8142	35.70	33.09	56.00	-22.91	27.64	46.00	-18.36	
1.4537	35.59	32.00	56.00	-24.00	25.36	46.00	-20.64	
8.3664	19.45	15.33	60.00	-44.67	3.56	50.00	-46.44	
12.9563	26.90	21.72	60.00	-38.28	6.61	50.00	-43.39	
15.3572	19.12	14.65	60.00	-45.35	6.74	50.00	-43.26	
20.0000	19.25	16.80	60.00	-43.20	14.22	50.00	-35.78	
24.0005	13.33	10.73	60.00	-49.27	7.68	50.00	-42.32	
27.9998	17.77	16.19	60.00	-43.81	15.19	50.00	-34.81	

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6. Measurement Data (continued)

6.13. Public Exposure to Radio Frequency Energy Levels (15.247(i) (1.1307 (b)(1)) RSS-GEN, ISSUE 4 5.5, RSS 102)

6.12.1. 15.247(i) (1.1307 (b)(1) Requirements

Requirement: Portable devices are subject to radio frequency radiation exposure requirements.

For a 1-g SAR, the test exclusion result must be ≤ 3.0.

Test Notes: The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by the following formula:

$$\text{SAR Test Exclusion} = \frac{P_{MAX}}{d_{MIN}} \times \sqrt{f_{(GHz)}} \quad (1)$$

P_{MAX}	mW	Maximum power of channel, including tune-up tolerance
d_{MIN}	mm	Minimum test separation distance, mm (≤ 50 mm)
$f_{(GHz)}$	GHz	$f_{(GHz)}$ is the RF channel transmit frequency in GHz (>100 MHz and <6 GHz)

(1) FCC OET 447498 - Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

Result: The device under test meets the exclusion requirement detailed in FCC OET 447498.

Input:	P_{MAX}[1] (mW)	0.28	0.56	1.09
	d_{MIN} (mm)	5.00	5.00	5.00
	$f_{(GHz)}$	2.402	2.441	2.480
Test Exclusion:		**0.37**	**0.09**	**0.17**
Limit Exemption:		**3.00**	**3.00**	**3.00**

[1] Taken from column 7 of the table in Section 6.6 of this test.

6.12.2. RSS-102 Issue 5 Requirements

Requirement: SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1. Portable devices are subject to radio frequency radiation exposure requirements.

Test Notes: The limit was taken from Table 1 of RSS-102 Issue 5.

Frequency (MHz)	Separation Distance (mm)	Maximum Power (mW)	RSS-102 Limit (mW)	Result
2402.00	≤5	0.28	4.26	Compliant
2441.00	≤5	0.56	4.05	Compliant
2480.00	≤5	1.09	3.94	Compliant

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7. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC), Industry Canada, and Voluntary Control Council Interference (VCCI) standards. A description of the test sites is on file with the FCC (registration number 96392), Industry Canada (file number IC 3023A-1), and VCCI (Member number 3168), Registration numbers C-3673, G-167, R-3305 & T-1809.

Compliance Worldwide is also designated as a Phase 1 CAB under APEC-MRA (US0132) for Australia/New Zealand AS/NZS CISPR 22, Chinese-Taipei (Taiwan) BSMI CNS 13438 and Korea (RRA) KN 22.

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.

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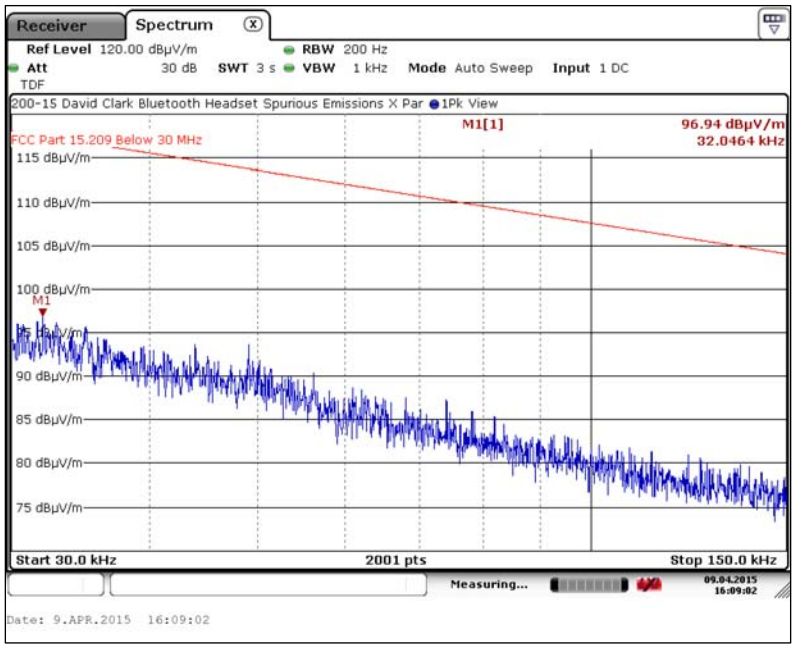
Appendix A

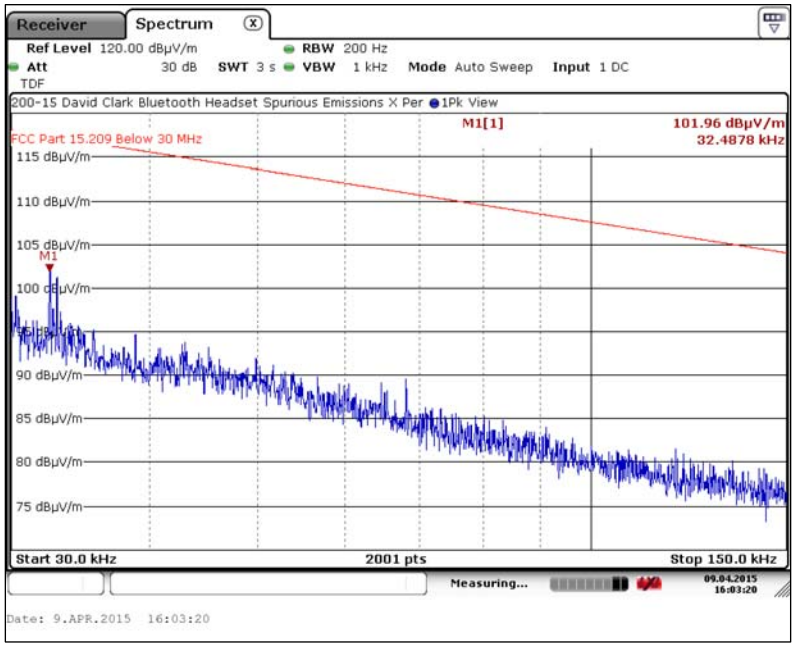
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

1. Measurement Results – 30 kHz to 150 kHz

1.1. Parallel Antenna, X-Axis



1.2. Perpendicular Antenna, X-Axis



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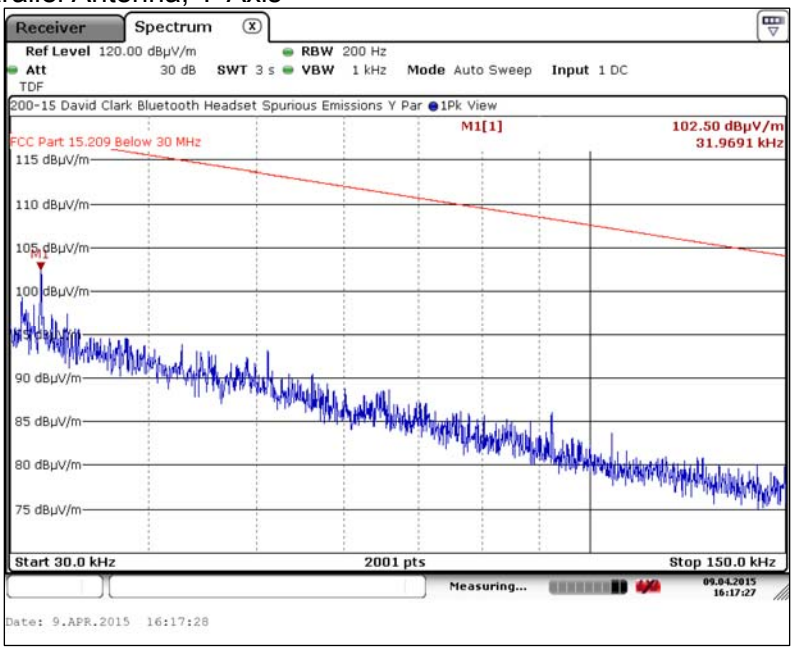
Appendix A (continued)

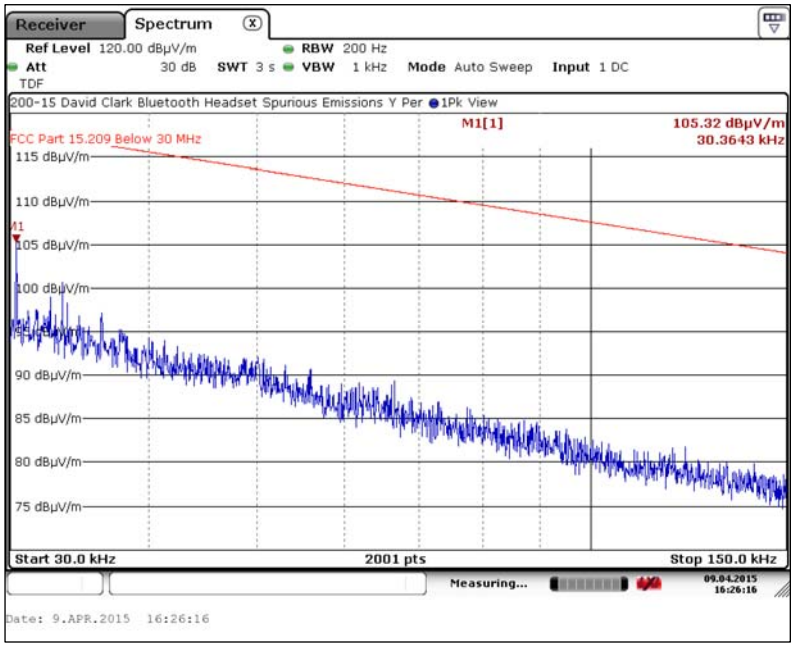
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

1. Measurement Results – 30 kHz to 150 kHz (continued)

1.3. Parallel Antenna, Y-Axis



1.4. Perpendicular Antenna, Y-Axis



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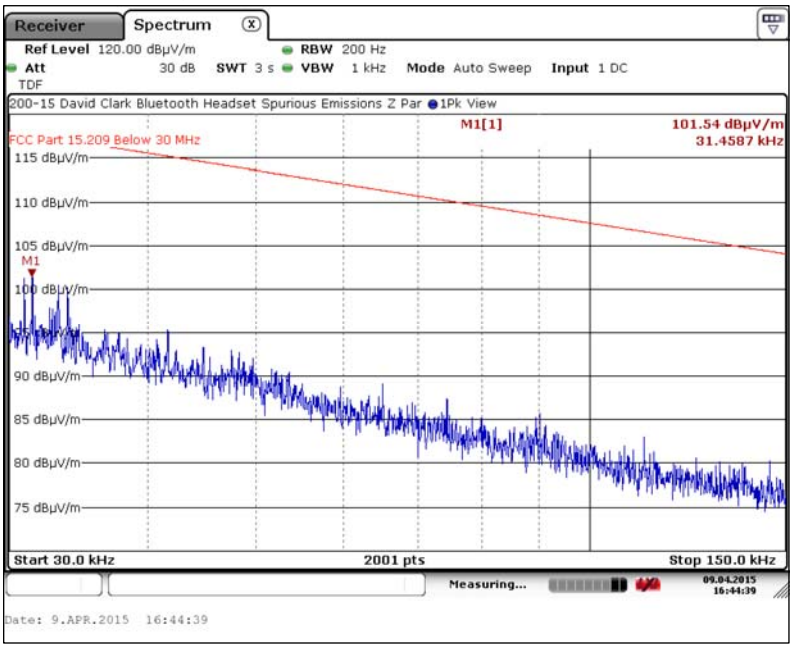
Appendix A (continued)

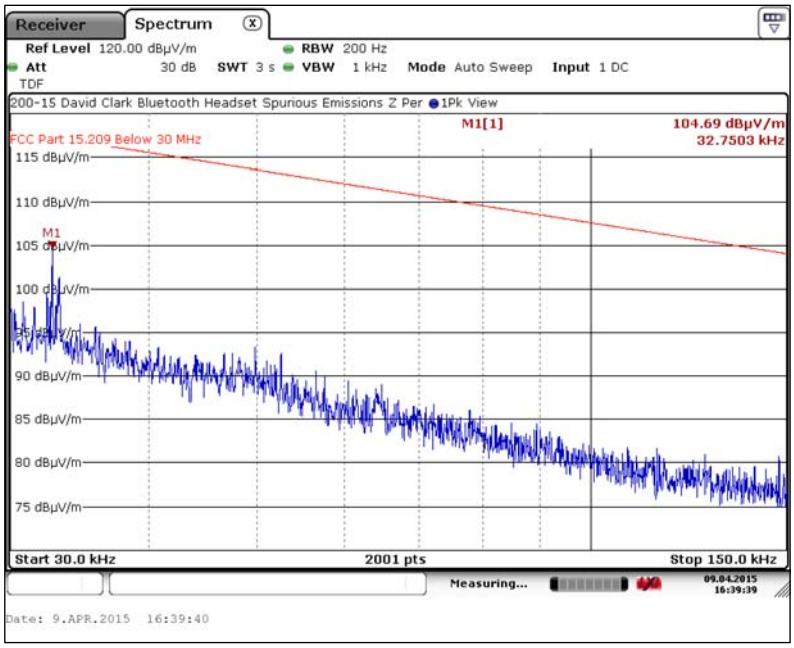
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

Measurement Results – 30 kHz to 150 kHz (continued)

1.5. Parallel Antenna, Z-Axis



1.6. Perpendicular Antenna, Z-Axis



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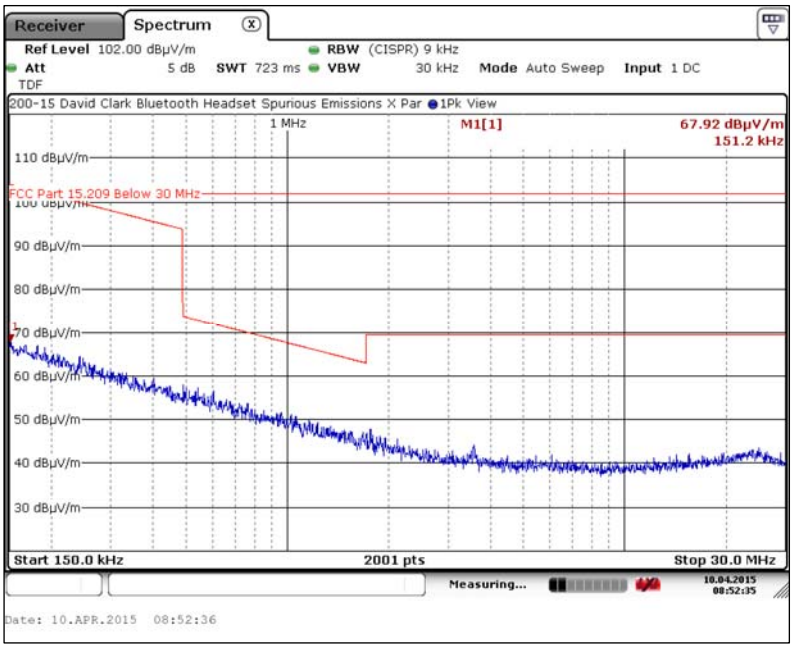
Appendix A (continued)

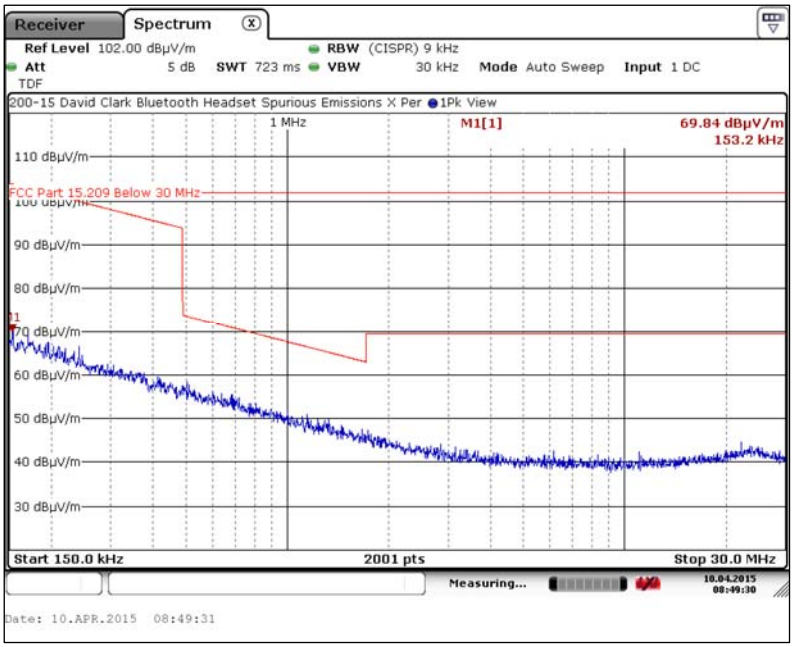
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

2. Measurement Results – 150 kHz to 30 MHz

2.1. Parallel Antenna, X-Axis



2.2. Perpendicular Antenna, X-Axis



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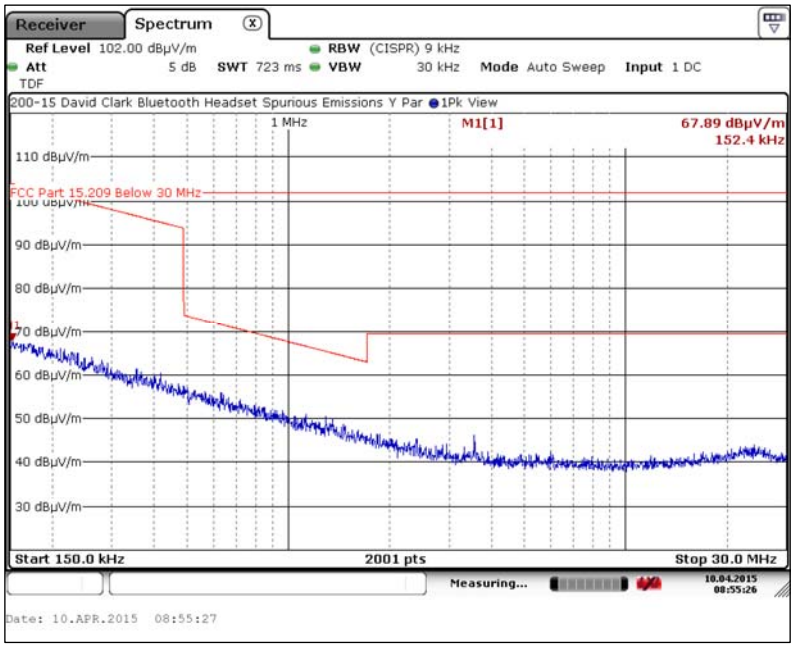
Appendix A (continued)

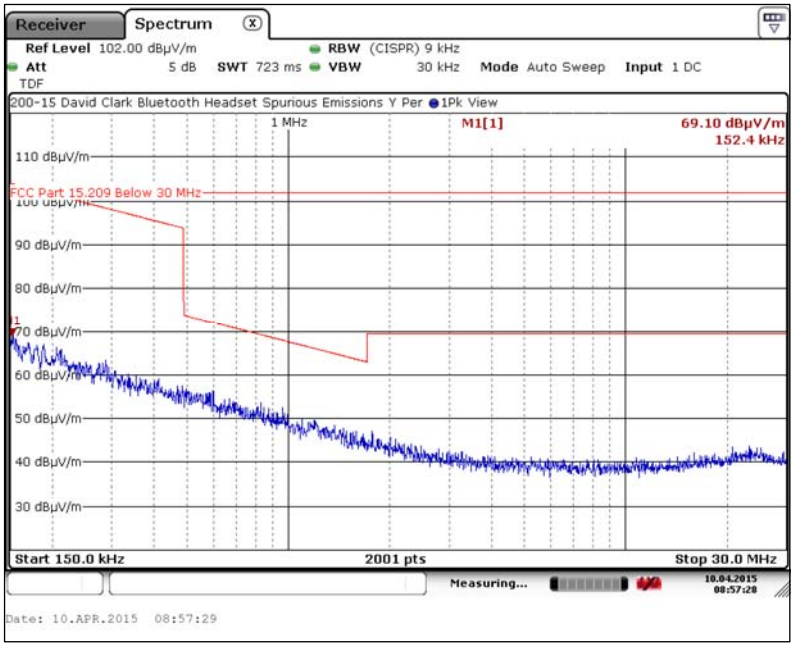
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

2. Measurement Results – 150 kHz to 30 MHz (continued)

2.3. Parallel Antenna, Y-Axis



2.4 Perpendicular Antenna, Y-Axis



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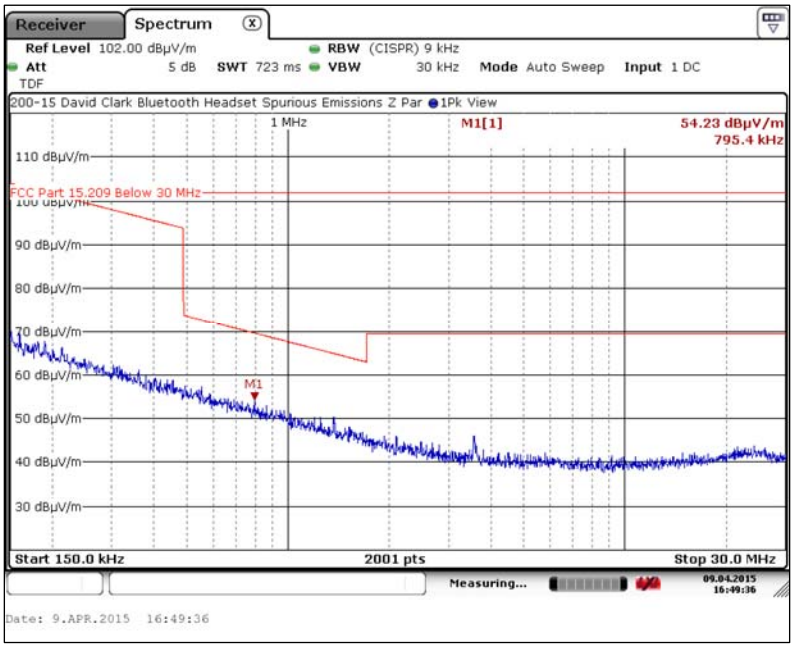
Appendix A (continued)

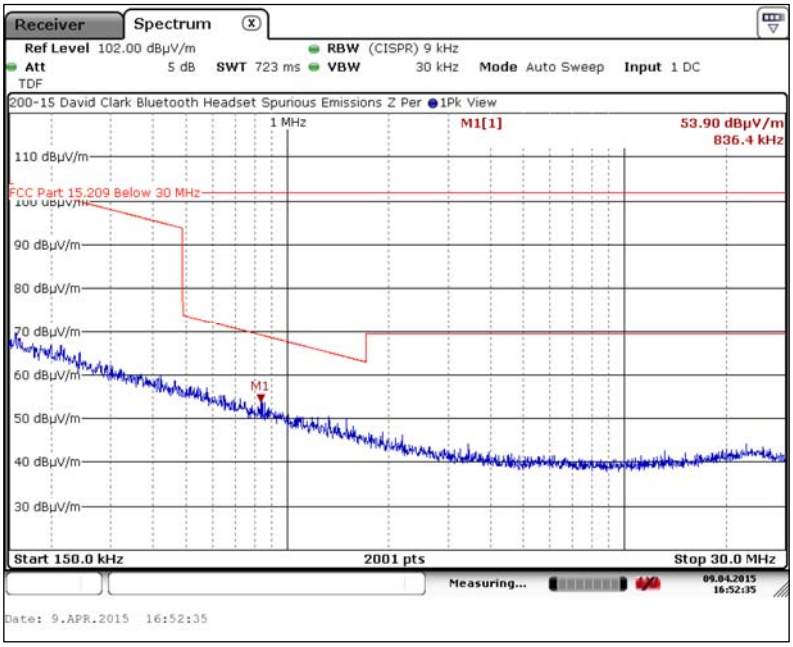
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

2. Measurement Results – 150 kHz to 30 MHz (continued)

2.5. Parallel Antenna, Z-Axis



2.6. Perpendicular Antenna, Z-Axis



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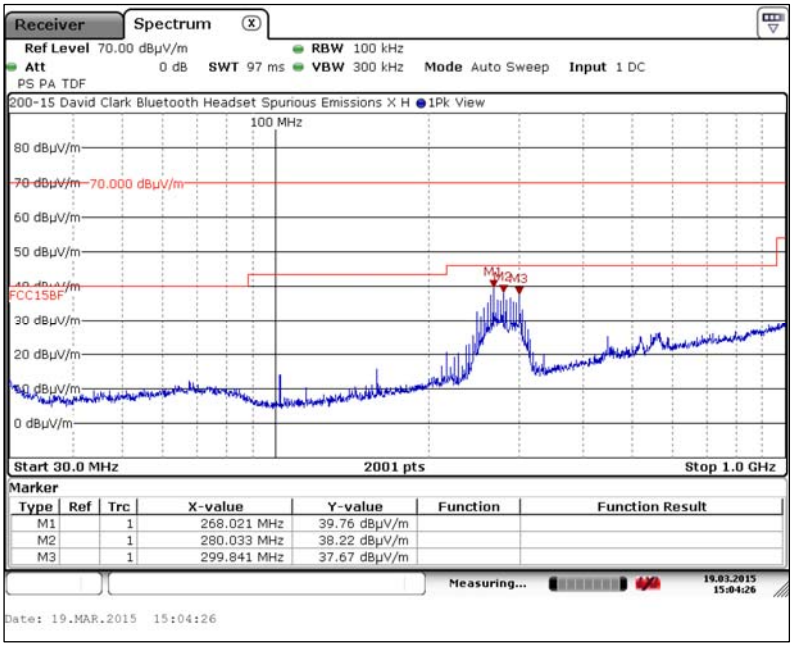
Appendix A (continued)

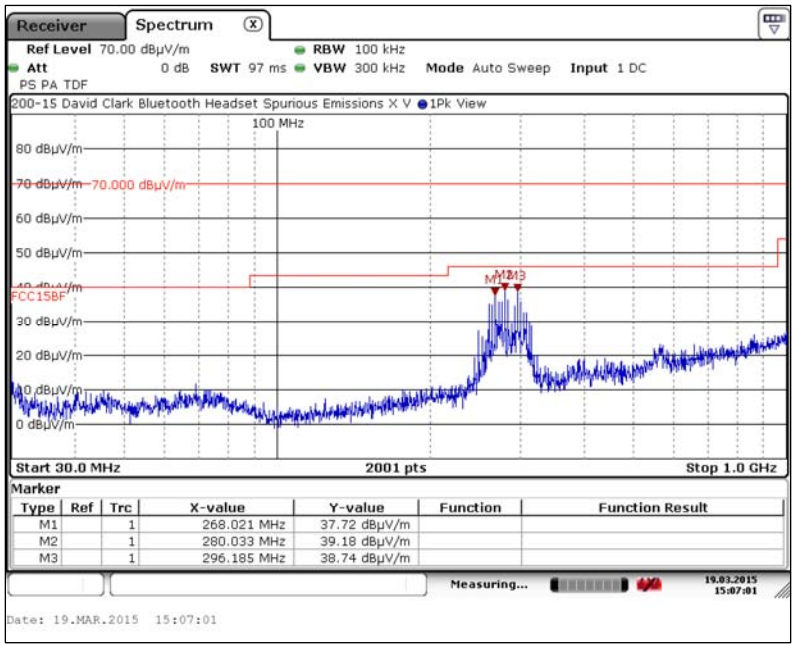
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

3. Measurement Results – 30 MHz to 1 GHz

3.1. Horizontal Antenna, X-Axis



3.2. Vertical Antenna, X-Axis



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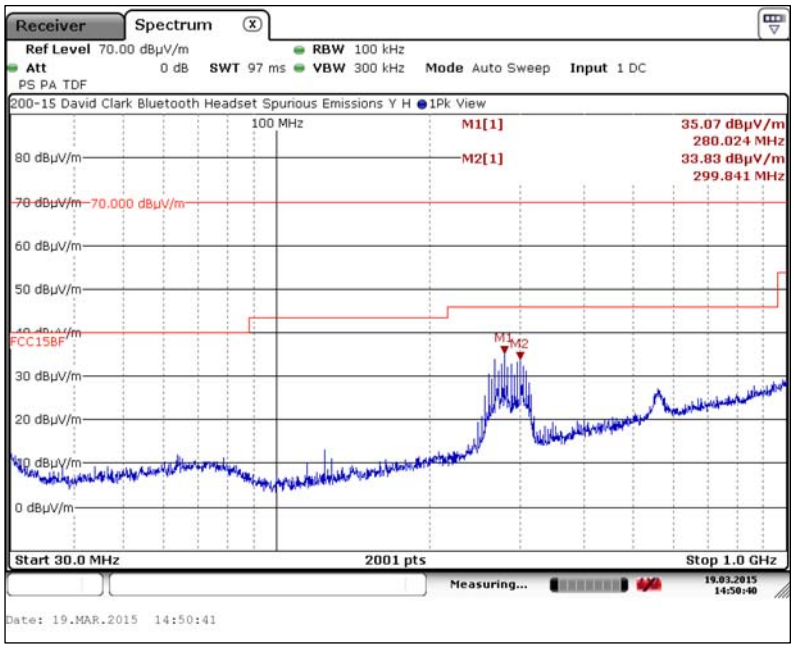
Appendix A (continued)

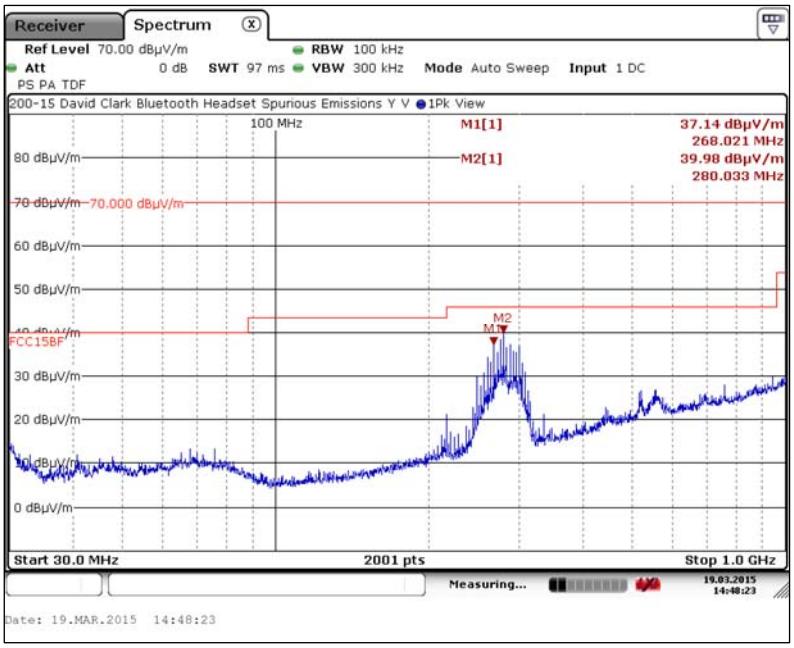
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

3. Measurement Results – 30 MHz to 1 GHz (continued)

3.3. Horizontal Antenna, Y-Axis



3.4. Vertical Antenna, Y-Axis



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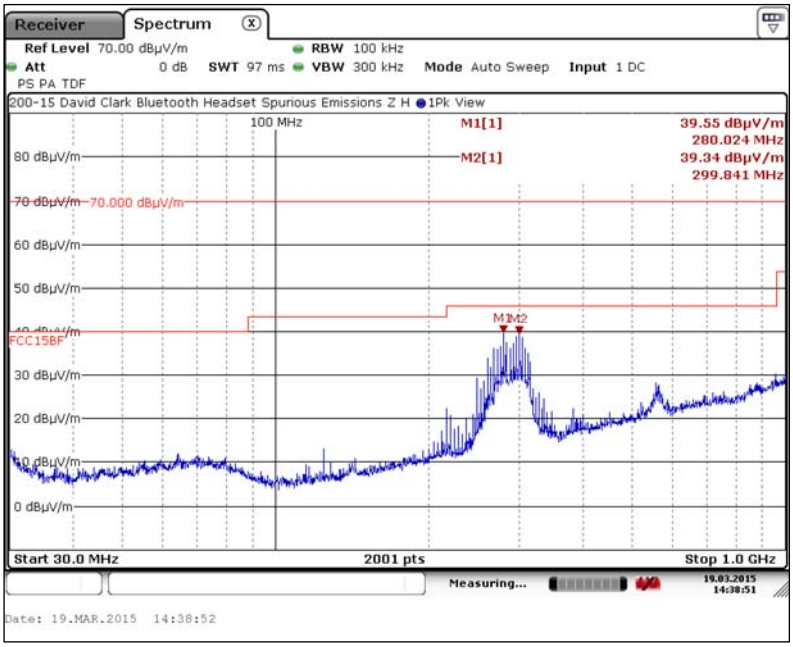
Appendix A (continued)

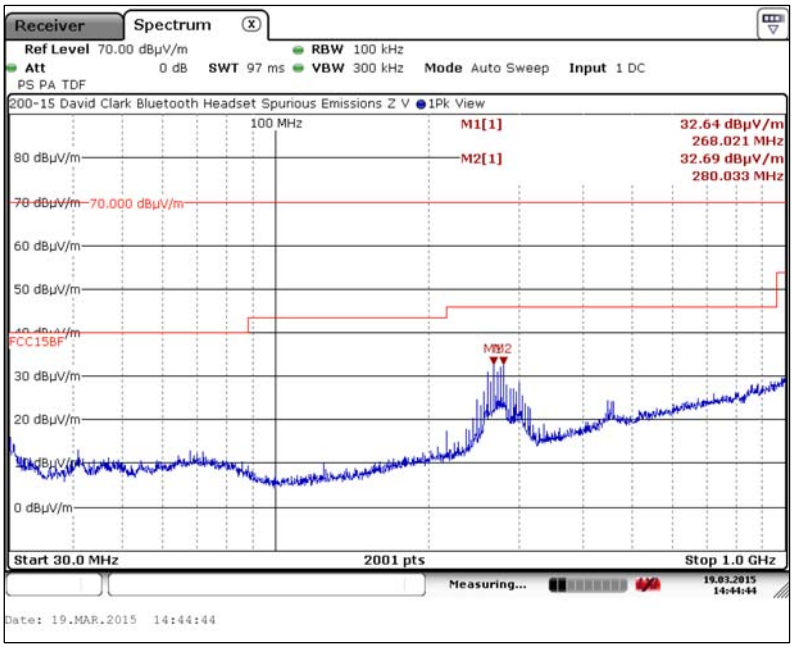
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

3. Measurement Results – 30 MHz to 1 GHz (continued)

3.5. Horizontal Antenna, Z-Axis



3.6. Vertical Antenna, Z-Axis



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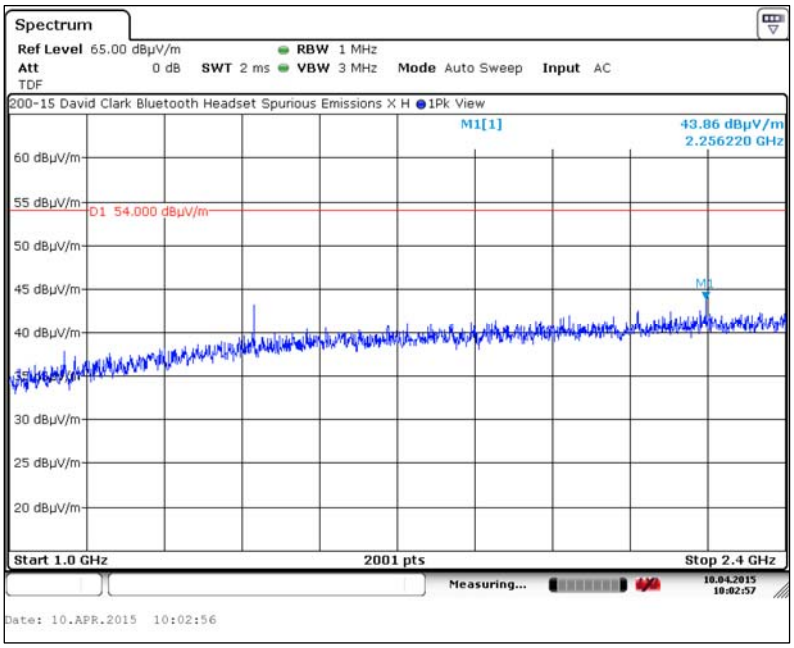
Appendix A (continued)

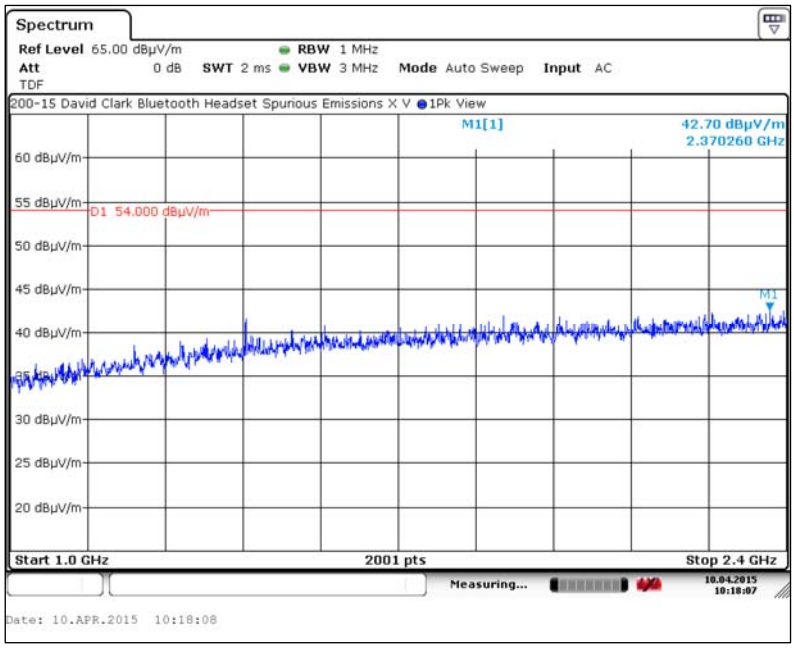
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

4. Measurement Results – 1 GHz to 2.4 GHz

4.1. Horizontal Antenna, X-Axis



4.2. Vertical Antenna, X-Axis



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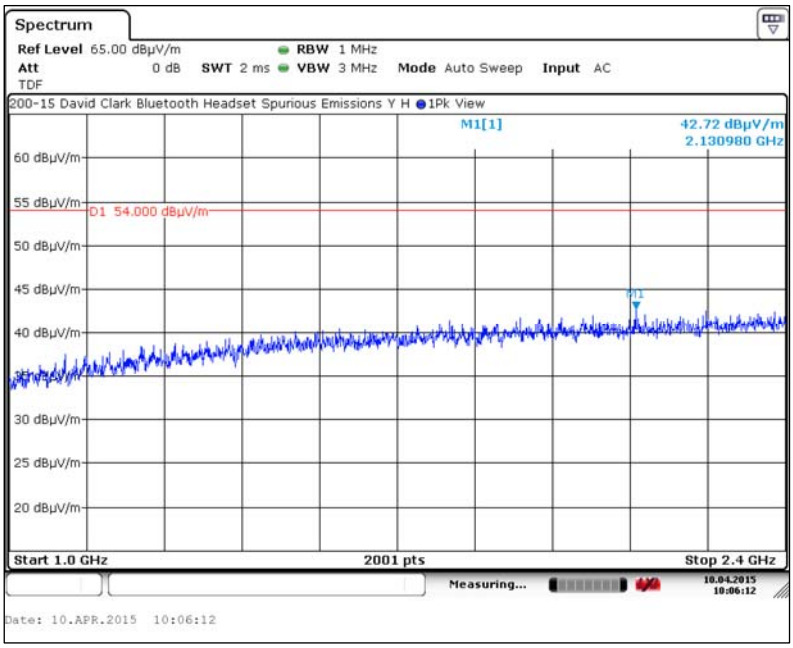
Appendix A (continued)

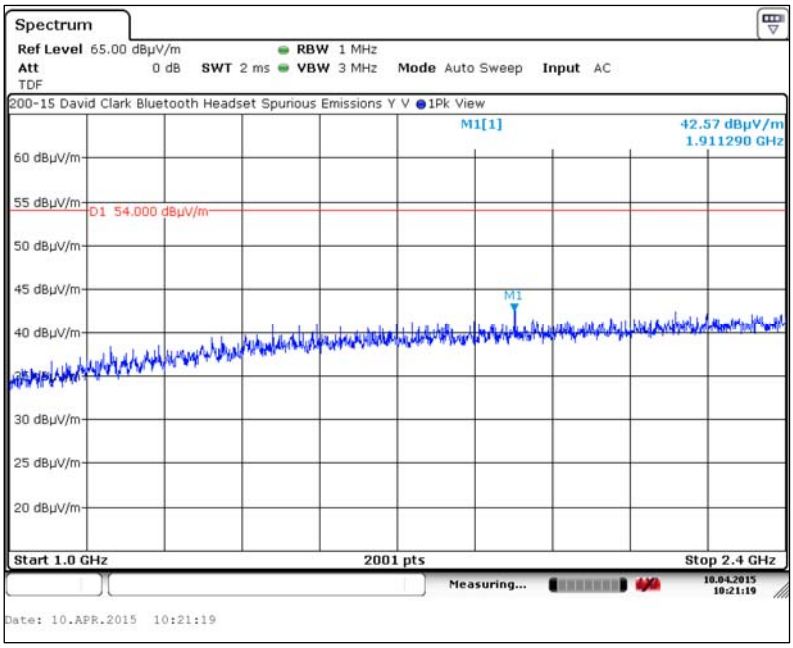
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

4. Measurement Results – 1 GHz to 2.4 GHz (continued)

4.3. Horizontal Antenna, Y-Axis



4.4. Vertical Antenna, Y-Axis



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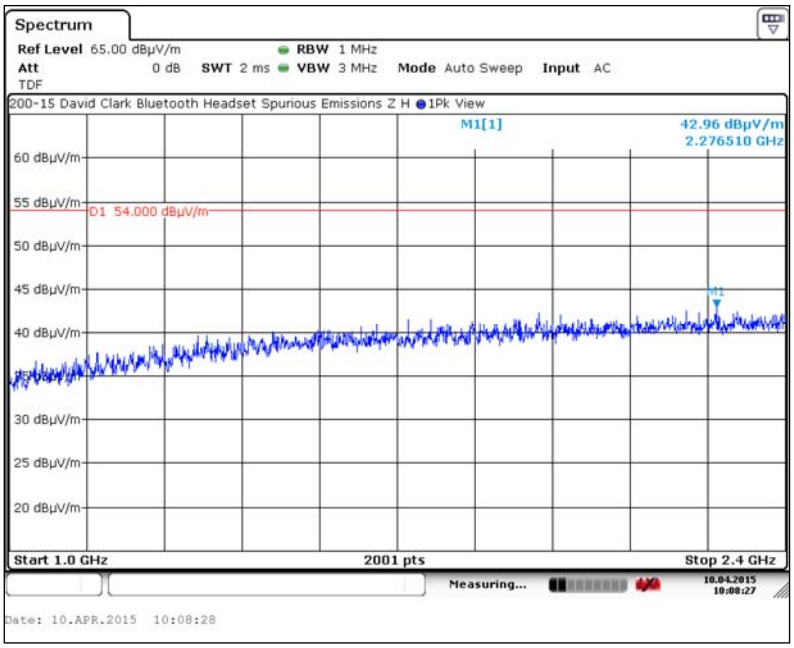
Appendix A (continued)

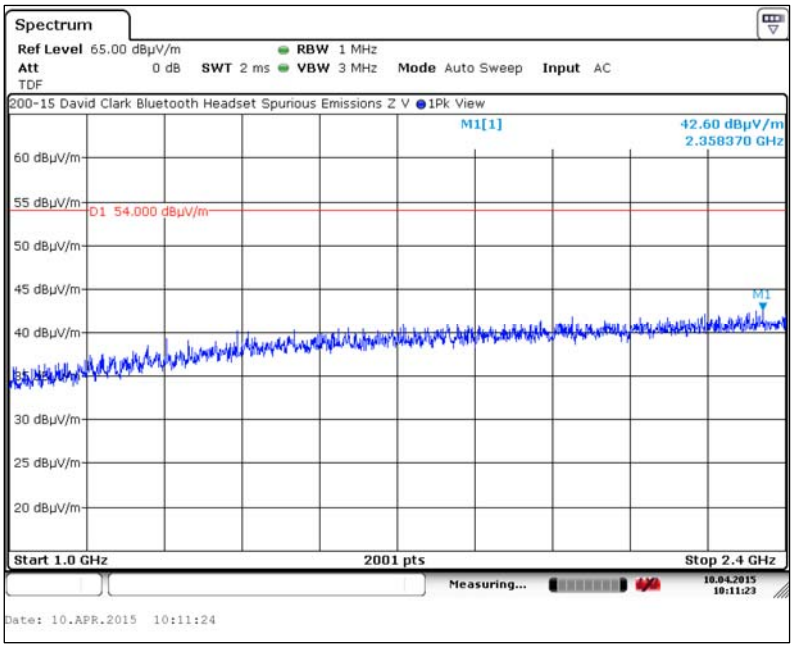
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

4. Measurement Results – 1 GHz to 2.4 GHz (continued)

4.5. Horizontal Antenna, Z-Axis



4.6. Vertical Antenna, Z-Axis



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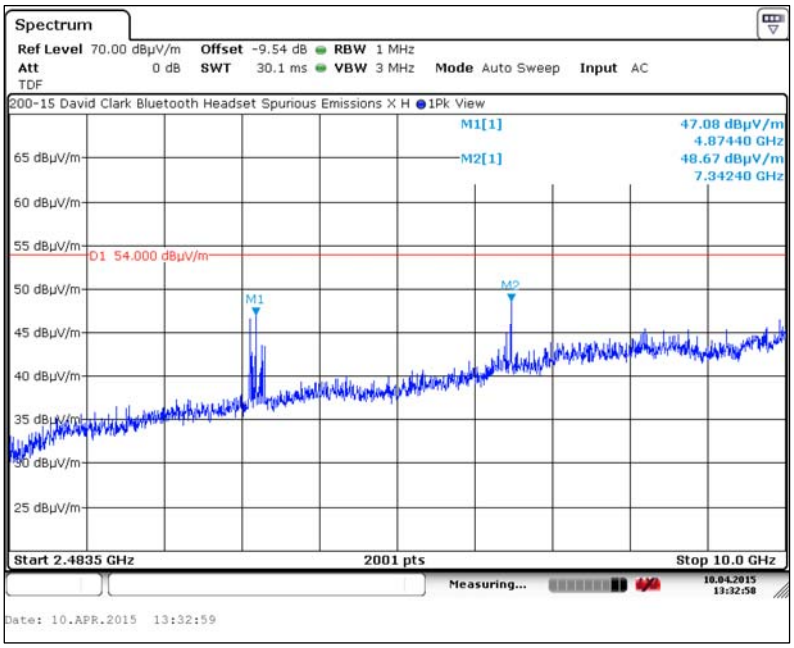
Appendix A (continued)

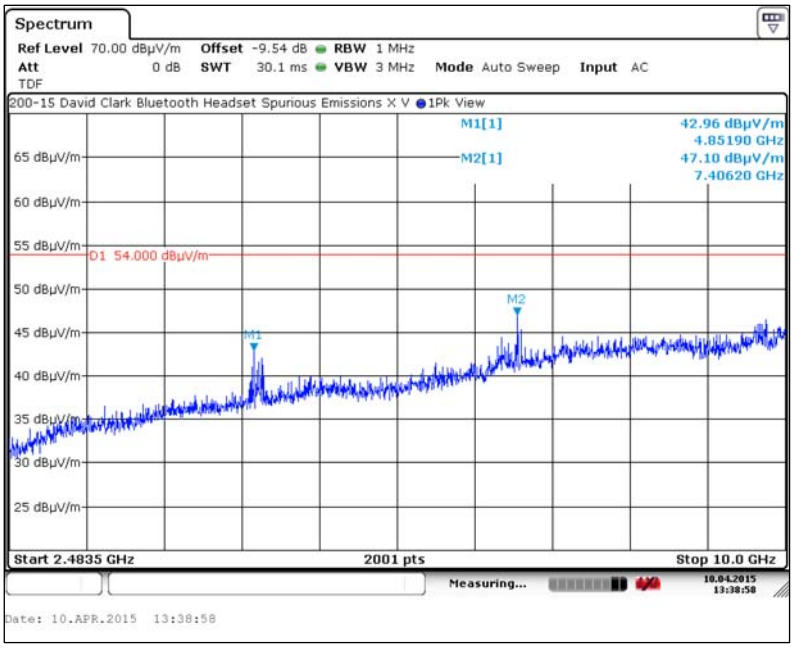
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

5. Measurement Results – 2.4835 GHz to 10 GHz

5.1. Horizontal Antenna, X-Axis



5.2. Vertical Antenna, X-Axis



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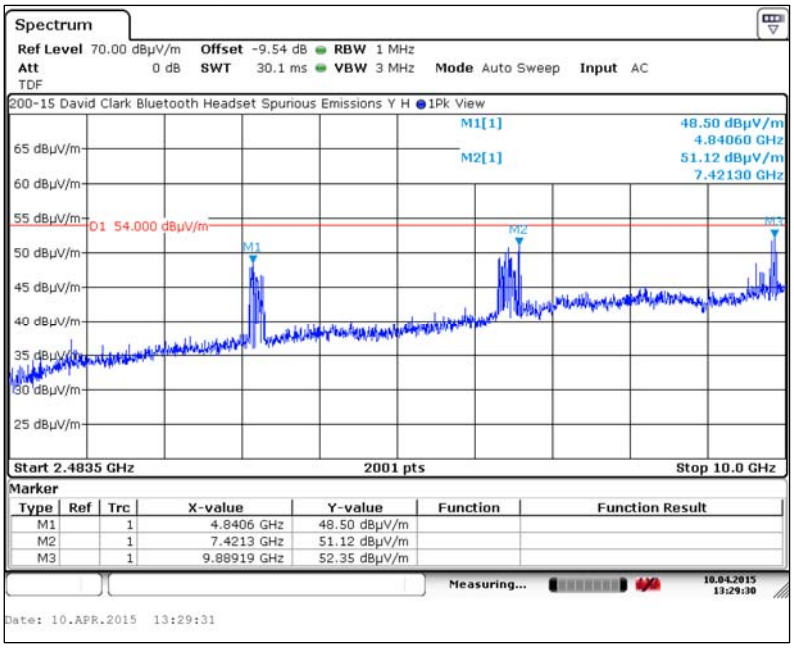
Appendix A (continued)

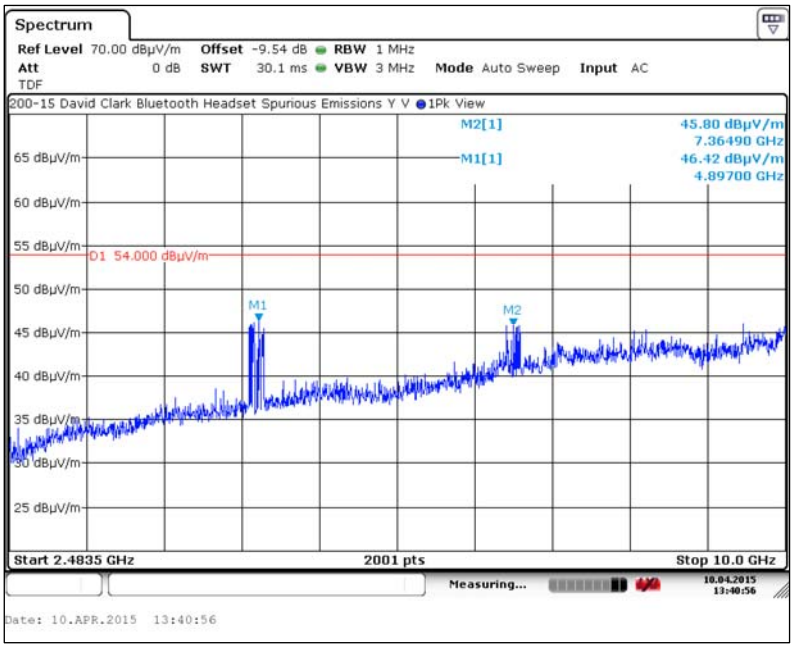
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

5. Measurement Results – 2.4835 GHz to 10 GHz (continued)

5.3. Horizontal Antenna, Y-Axis



5.4. Vertical Antenna, Y-Axis



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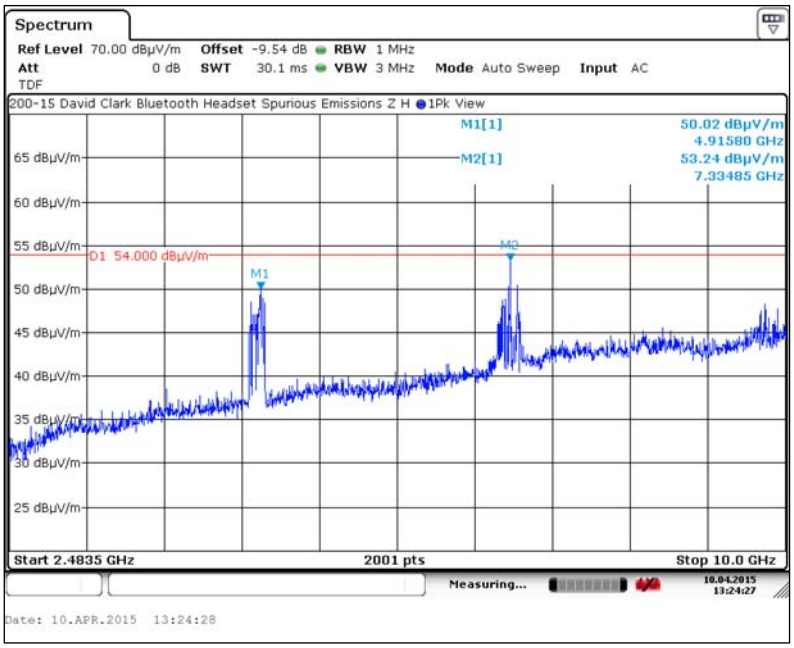
Appendix A (continued)

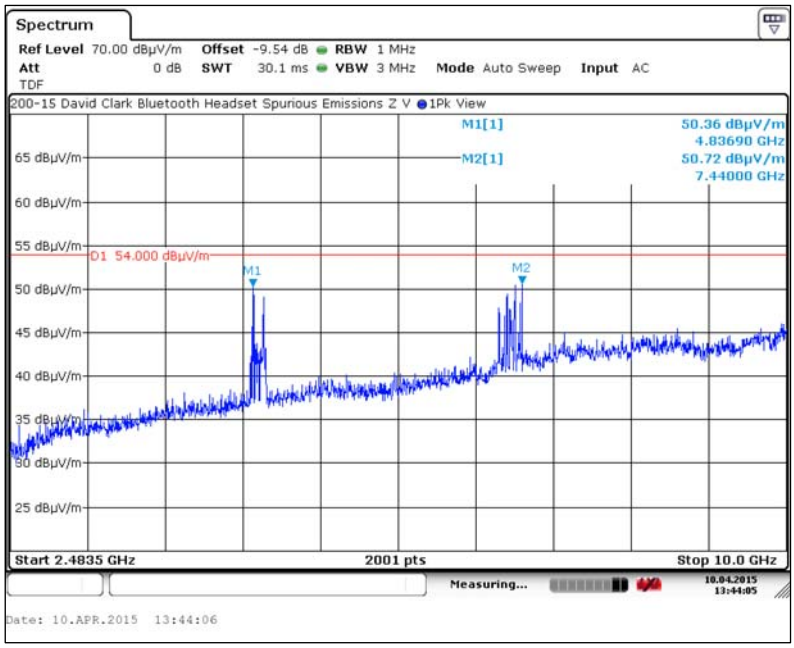
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

5. Measurement Results – 2.483.5 GHz to 10 GHz (continued)

5.5. Horizontal Antenna, Z-Axis



5.6. Vertical Antenna, Z-Axis



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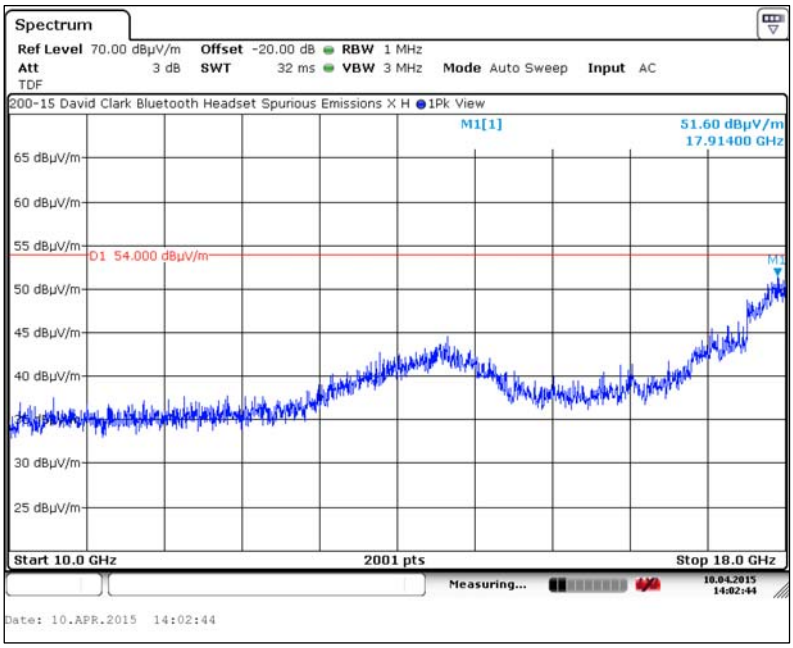
Appendix A (continued)

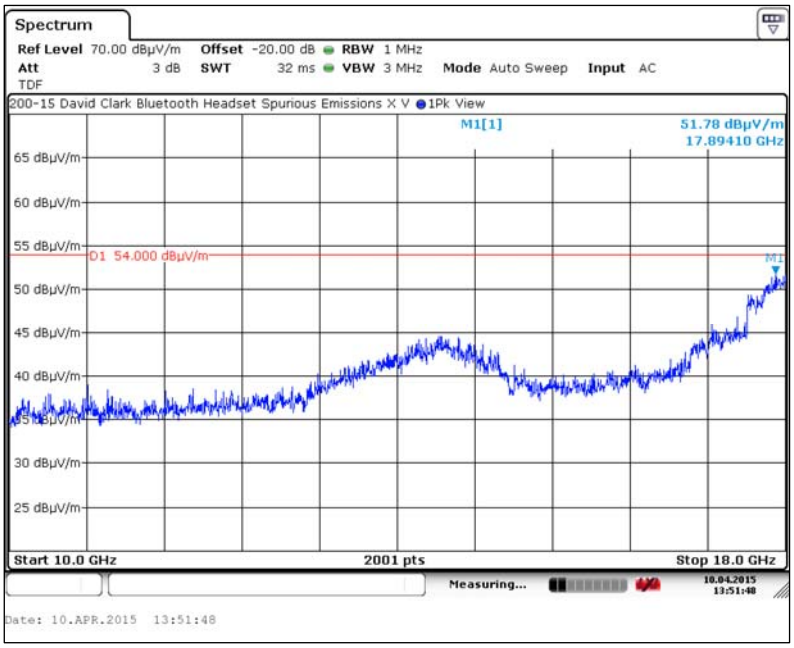
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

6. Measurement Results – 10 GHz to 18 GHz (continued)

6.1. Horizontal Antenna, X-Axis



6.2. Vertical Antenna, X-Axis



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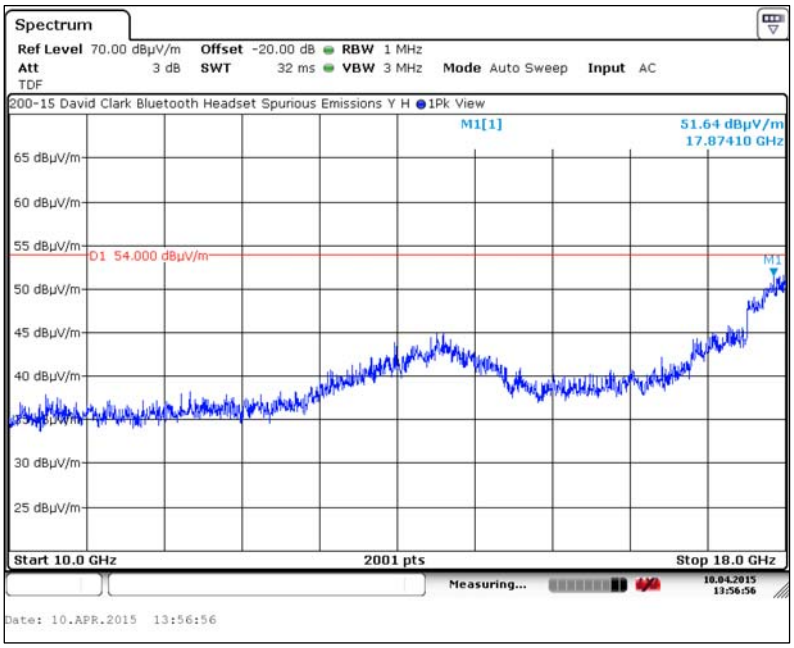
Appendix A (continued)

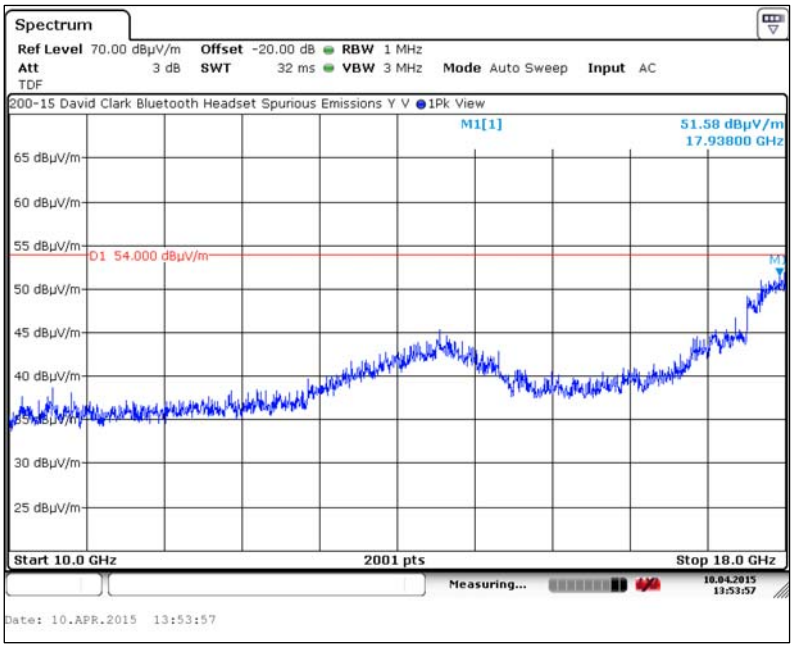
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

6. Measurement Results – 10 GHz to 18 GHz (continued)

6.3. Horizontal Antenna, Y-Axis



6.4. Vertical Antenna, Y-Axis



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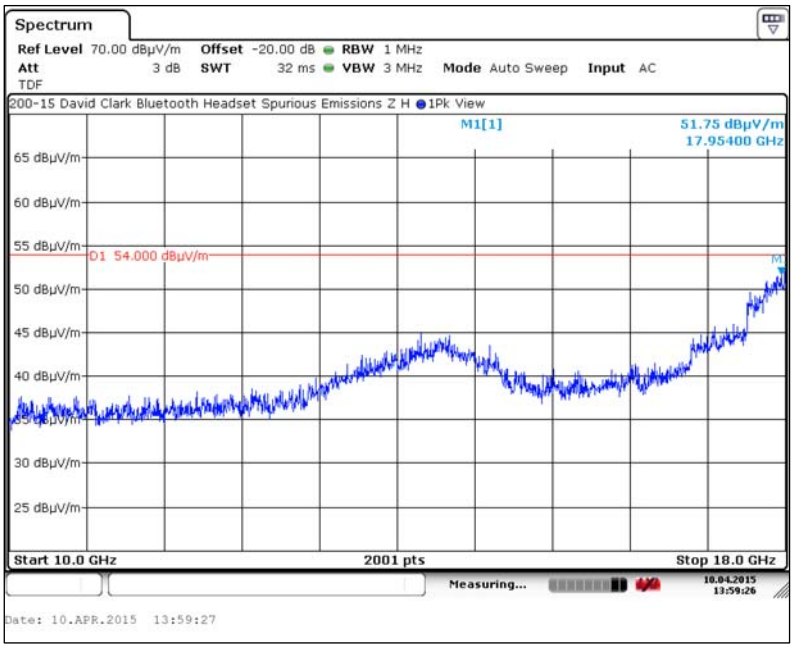
Appendix A (continued)

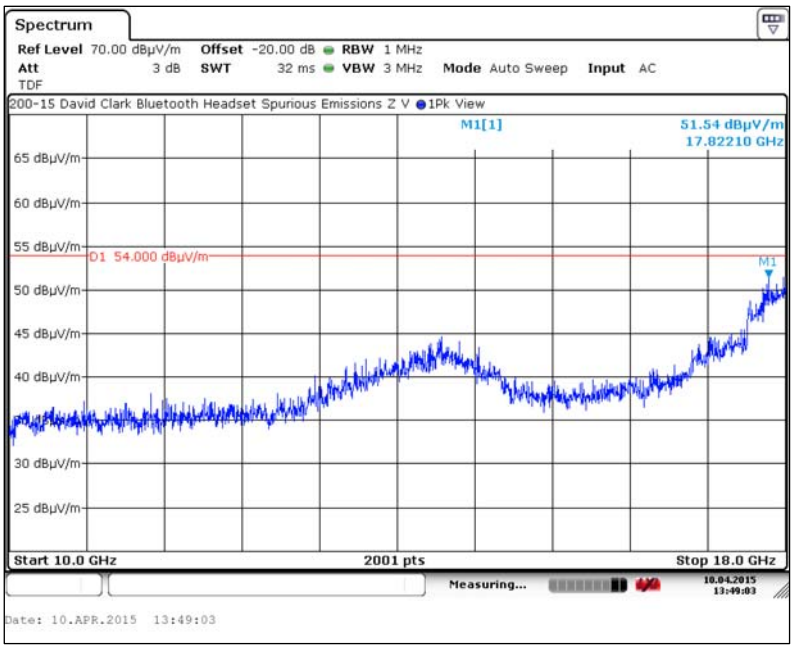
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

6. Measurement Results – 10 GHz to 18 GHz (continued)

6.5. Horizontal Antenna, Z-Axis



6.6. Vertical Antenna, Z-Axis



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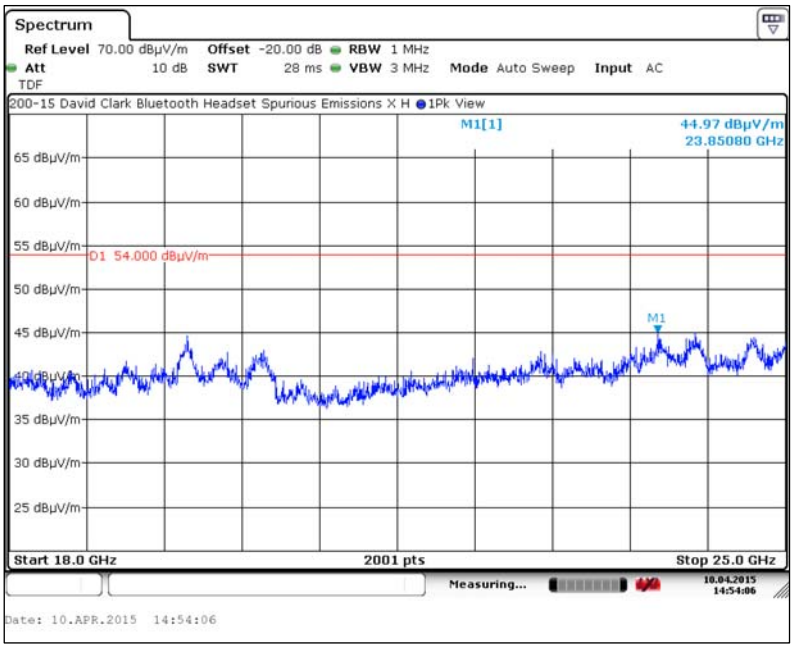
Appendix A (continued)

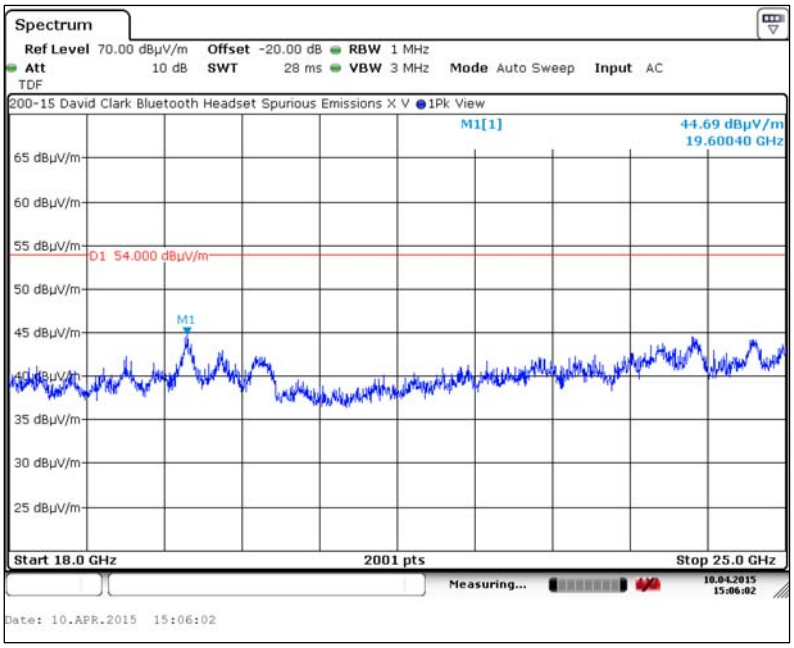
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

7. Measurement Results – 18 GHz to 25 GHz

7.1. Horizontal Antenna, X-Axis



7.2. Vertical Antenna, X-Axis



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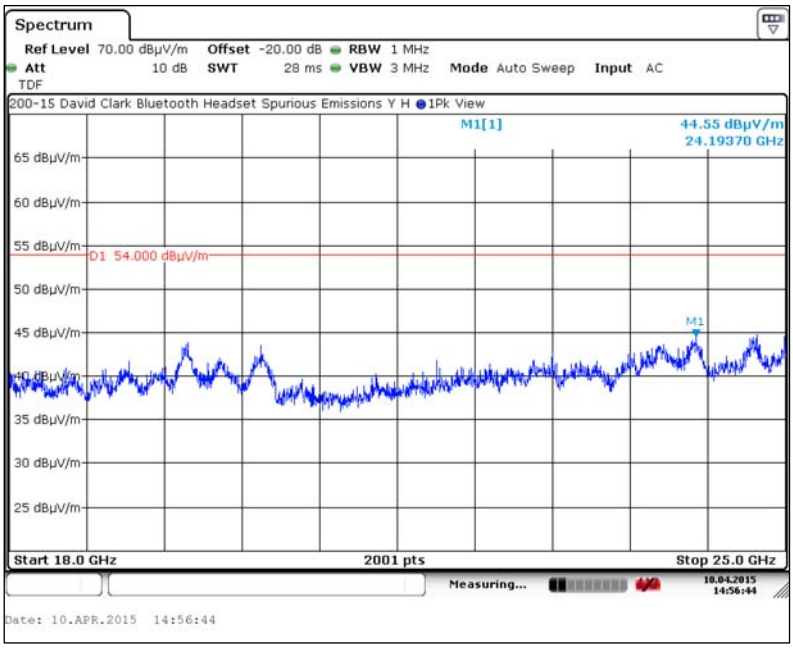
Appendix A (continued)

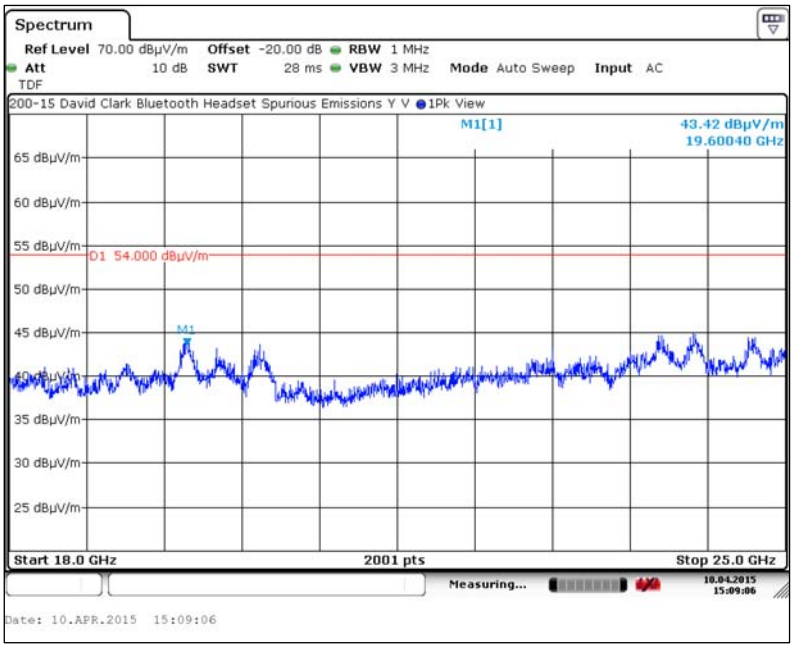
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

7. Measurement Results – 18 GHz to 25 GHz (continued)

7.3. Horizontal Antenna, Y-Axis



7.4. Vertical Antenna, Y-Axis



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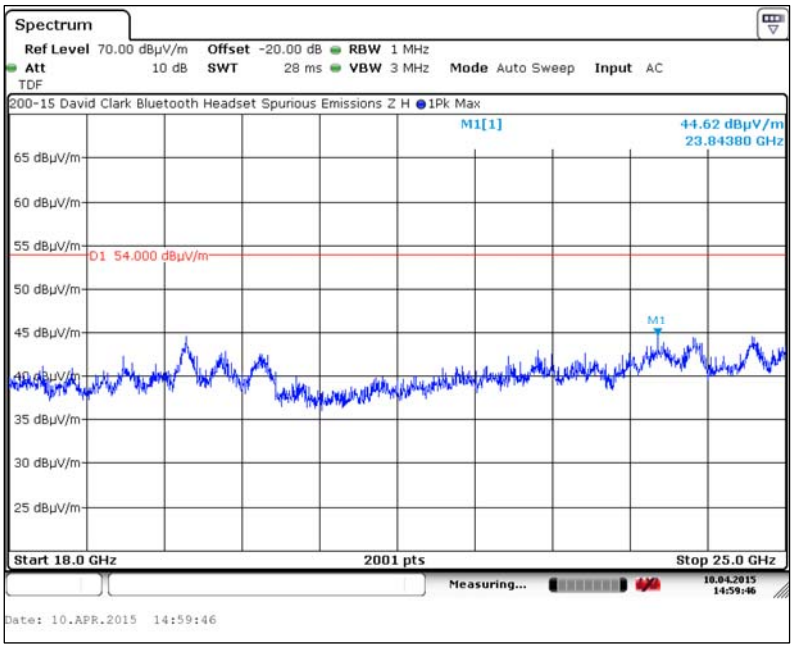
Appendix A (continued)

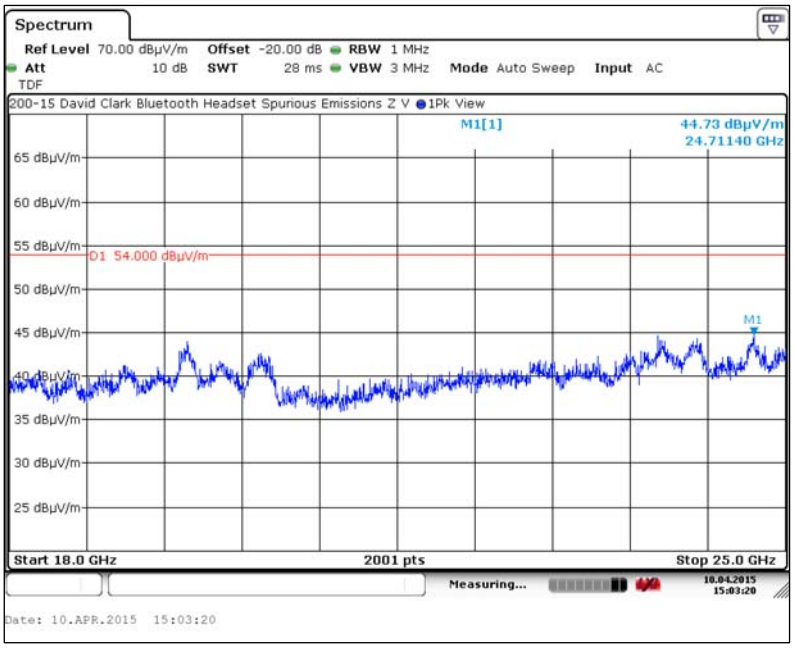
Spurious Radiated Emissions Test Results (15.209), IC RSS-GEN, ISSUE 4

7. Measurement Results – 18 GHz to 25 GHz (continued)

7.5. Horizontal Antenna, Z-Axis



7.6. Vertical Antenna, Z-Axis



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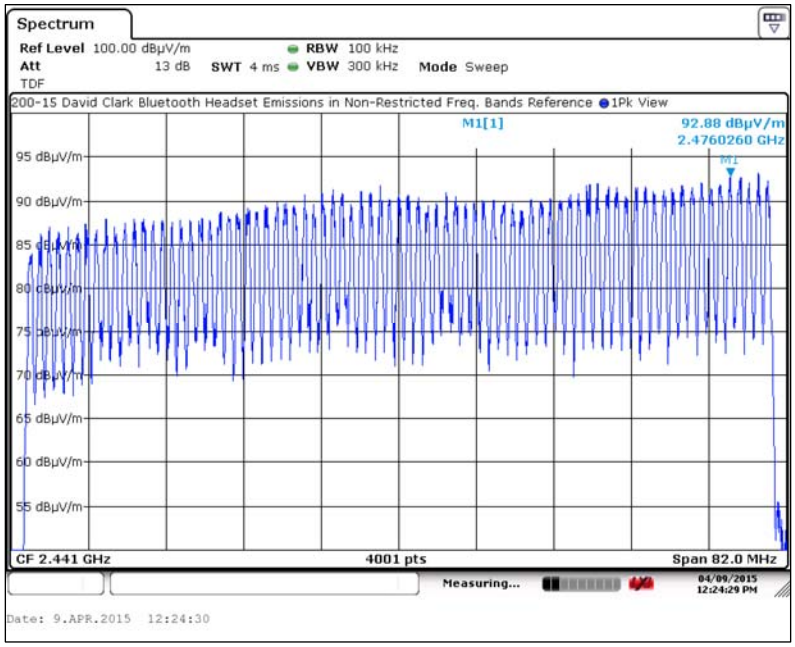
Appendix B

Emissions in Non-Restricted Frequency Bands (15.247(d))

Reference Measurement



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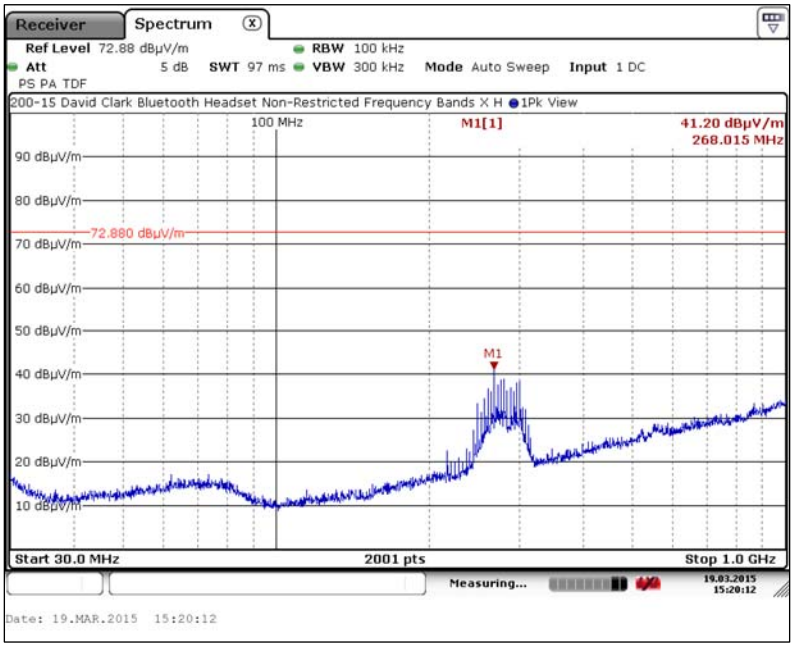
Appendix B (continued)

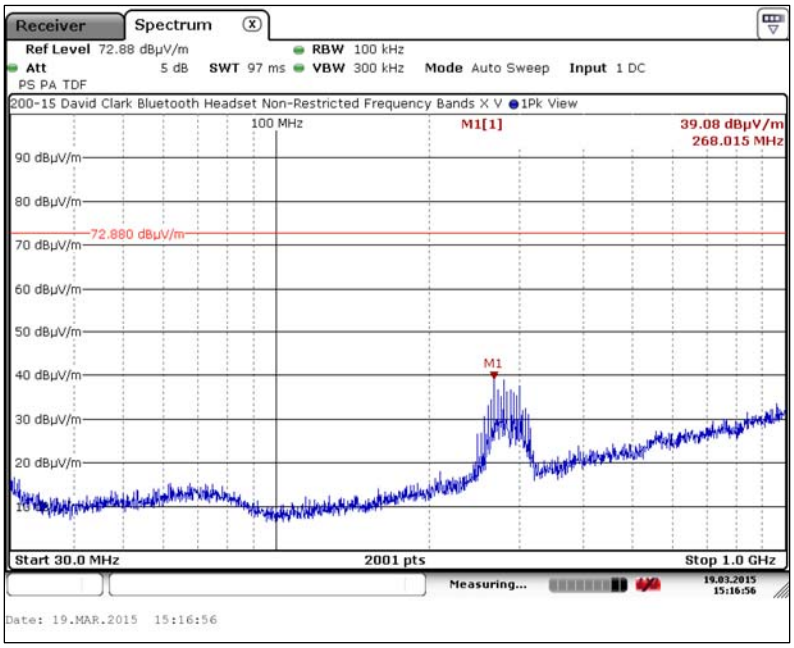
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

1. Measurement Results – 30 MHz to 1 GHz

1.1. Horizontal Antenna, X-Axis



1.2. Vertical Antenna, X-Axis



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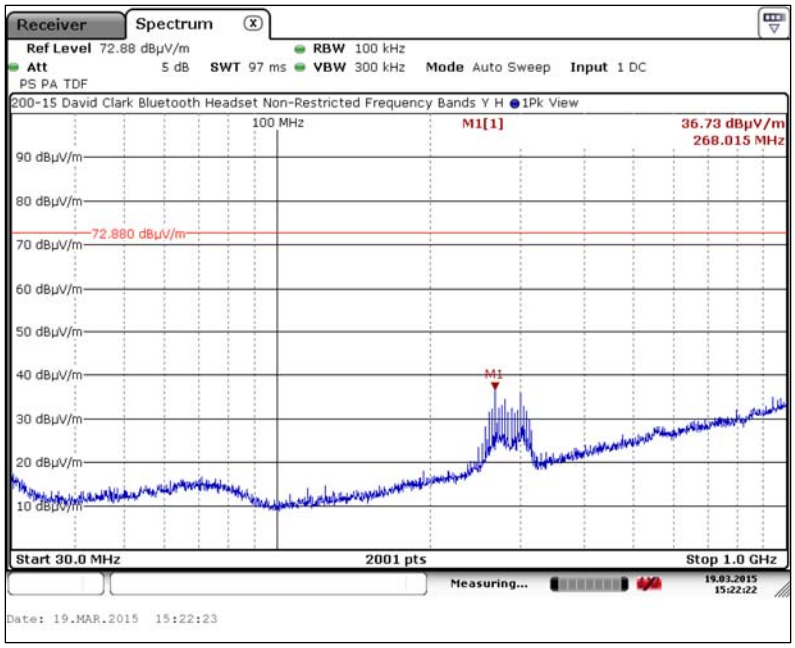
Appendix B (continued)

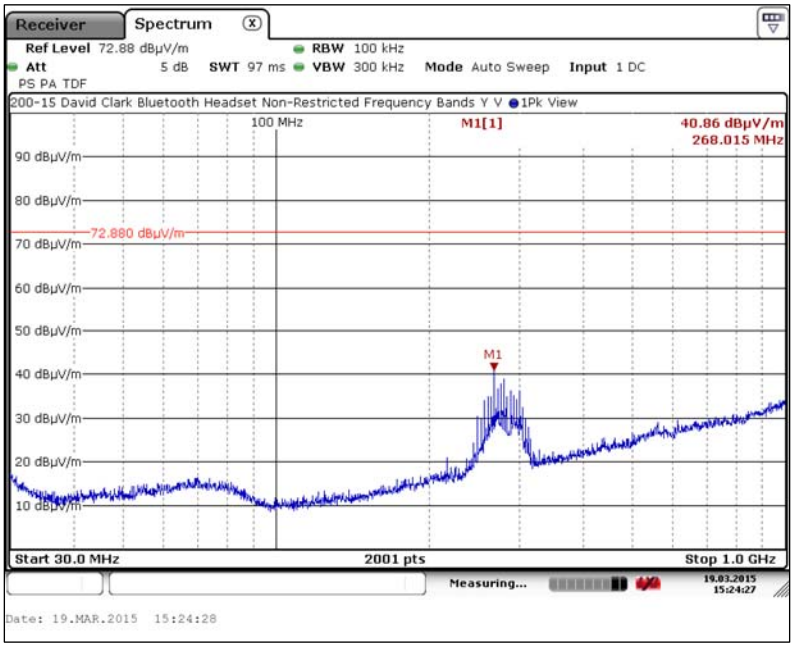
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

1. Measurement Results – 30 MHz to 1 GHz (continued)

1.3. Horizontal Antenna, Y-Axis



1.4. Vertical Antenna, Y-Axis



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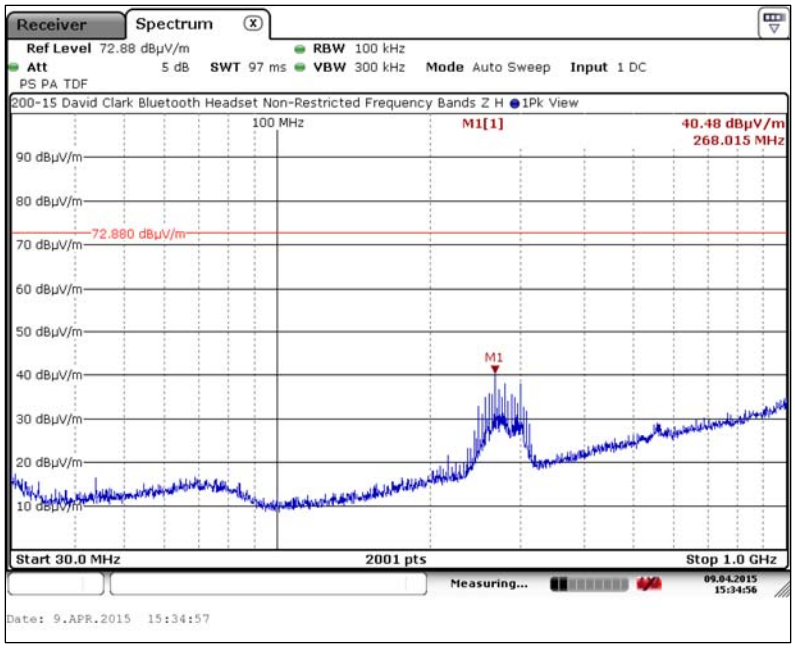
Appendix B (continued)

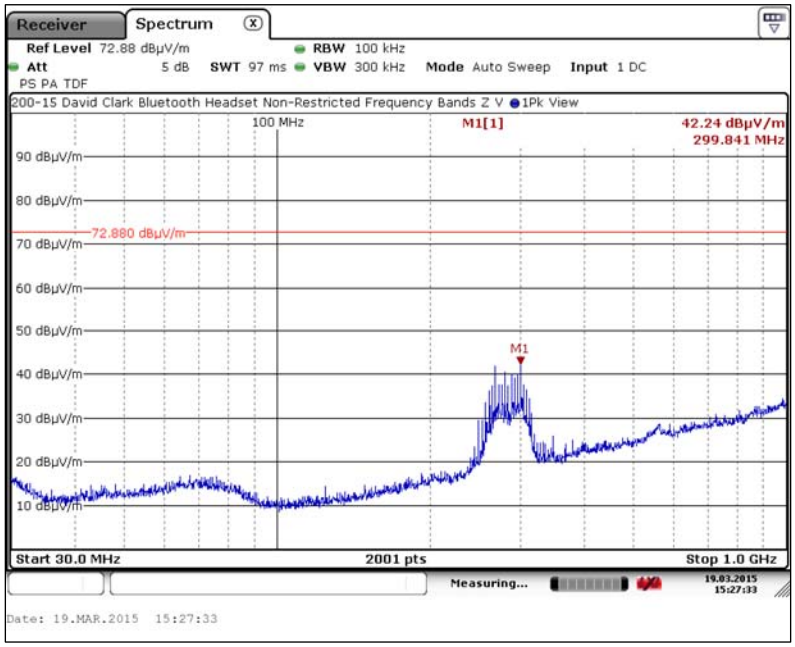
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

1. Measurement Results – 30 MHz to 1 GHz (continued)

1.5. Horizontal Antenna, Z-Axis



1.6. Vertical Antenna, Z-Axis



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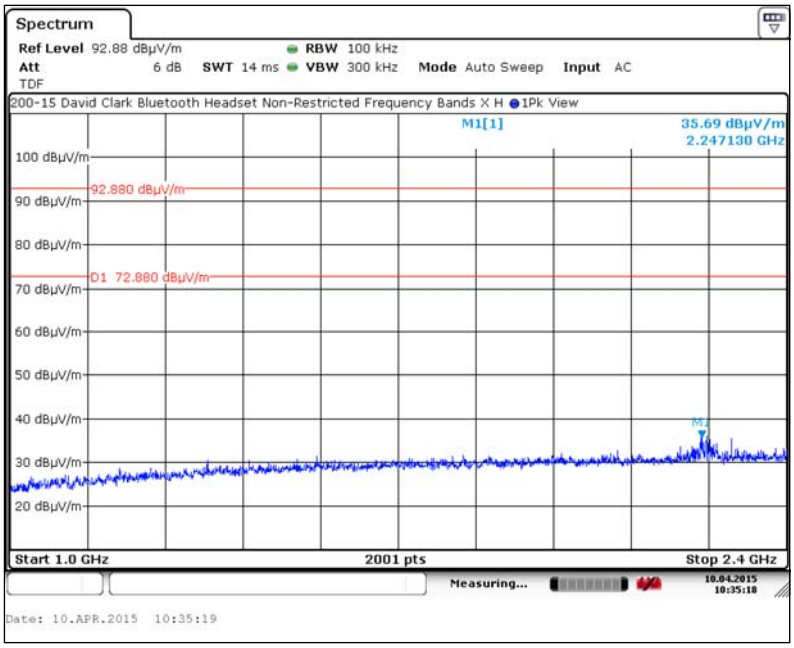
Appendix B (continued)

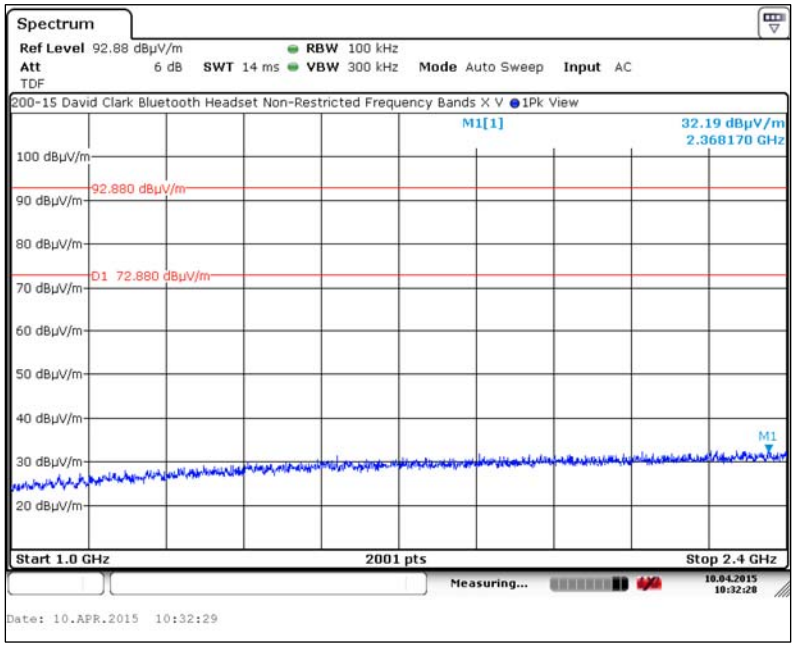
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

2. Measurement Results – 1 GHz to 2.4 GHz

2.1. Horizontal Antenna, X-Axis



2.2. Vertical Antenna, X-Axis



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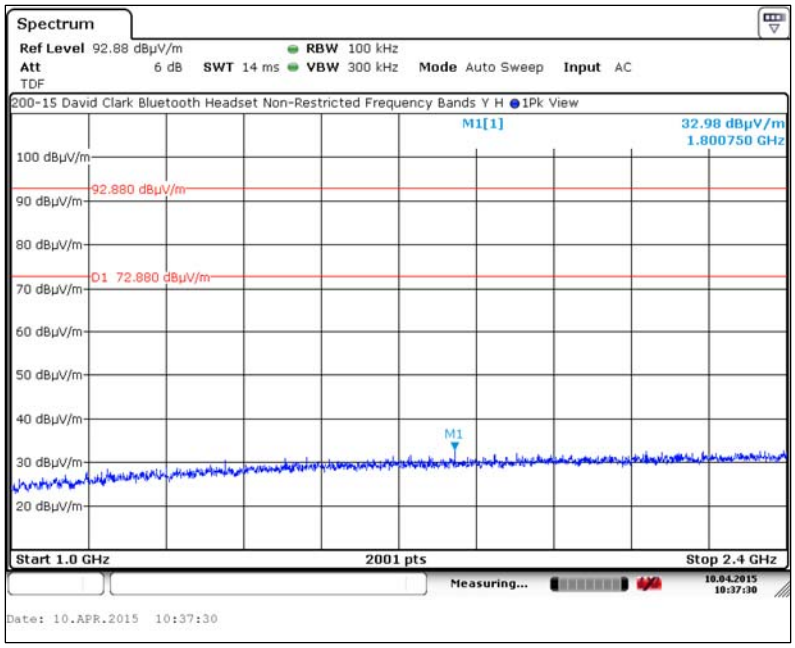
Appendix B (continued)

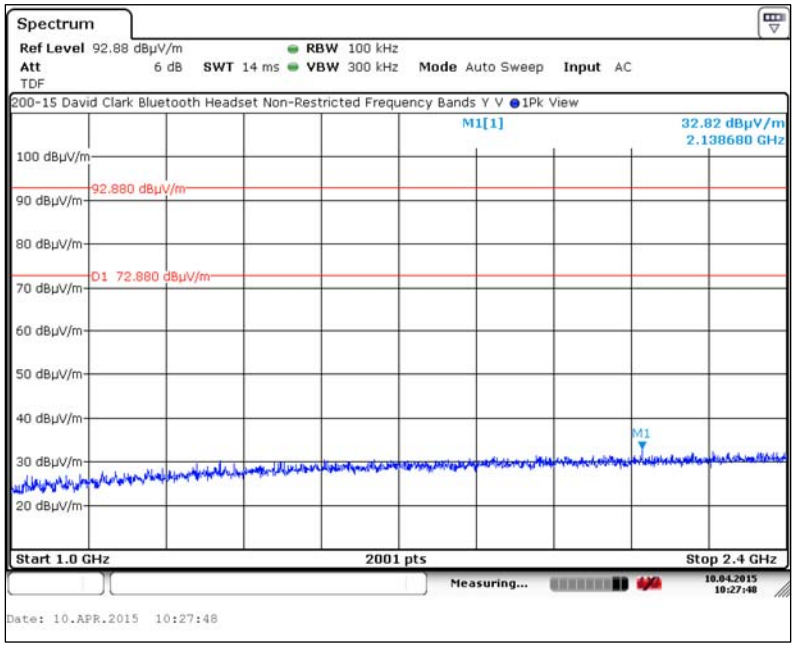
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

2. Measurement Results – 1 GHz to 2.4 GHz (continued)

2.3. Horizontal Antenna, Y-Axis



2.4. Vertical Antenna, Y-Axis



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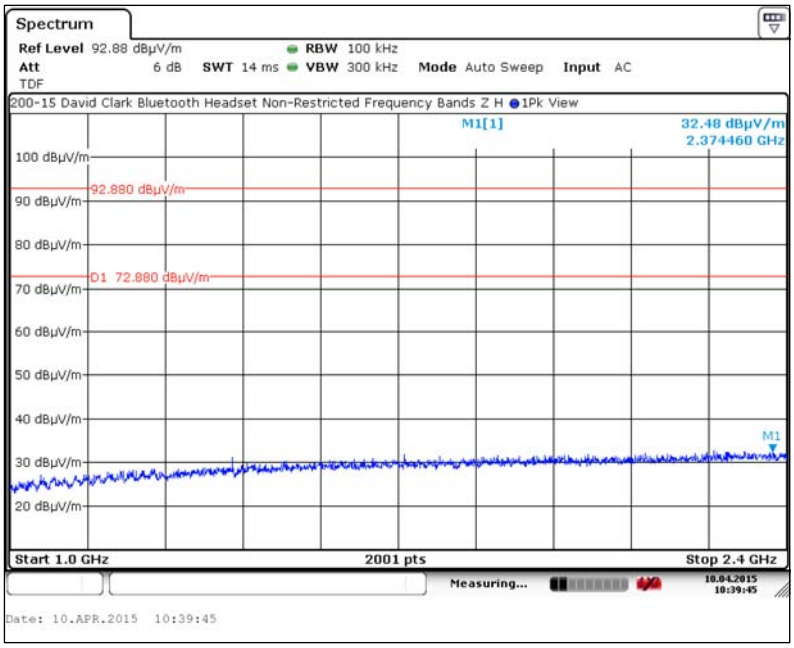
Appendix B (continued)

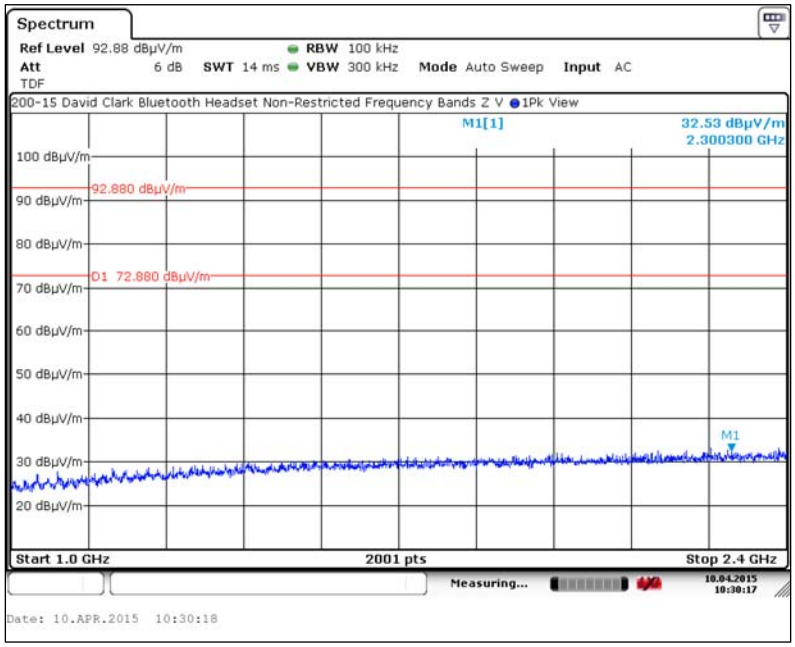
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

2. Measurement Results – 1 GHz to 2.4 GHz (continued)

2.5. Horizontal Antenna, Z-Axis



2.6. Vertical Antenna, Z-Axis



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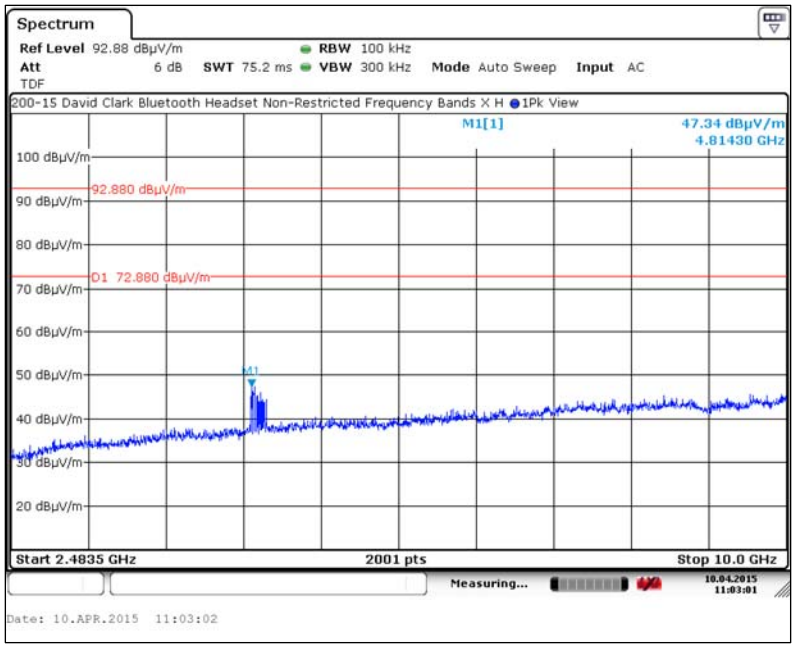
Appendix B (continued)

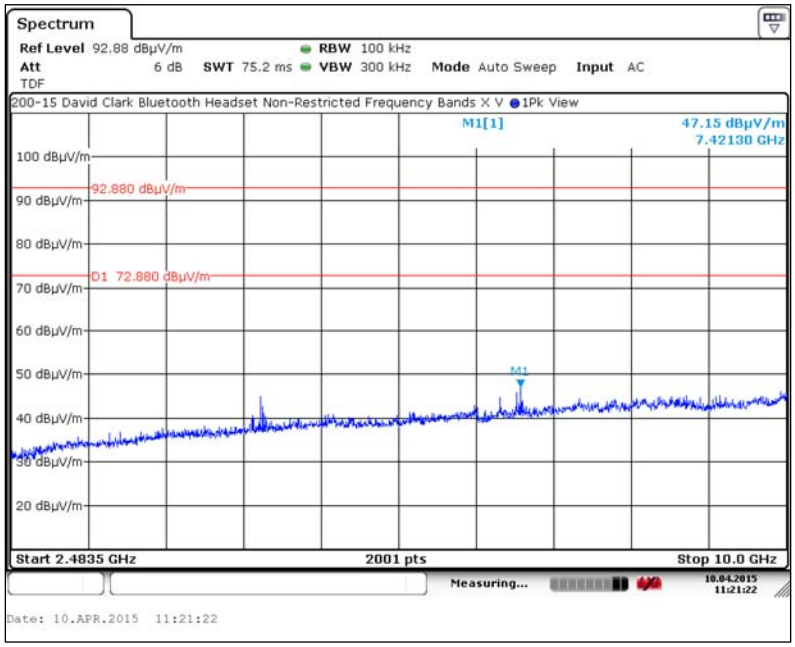
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

3. Measurement Results – 2.4835 GHz to 10 GHz

3.1. Horizontal Antenna, X-Axis



3.2. Vertical Antenna, X-Axis



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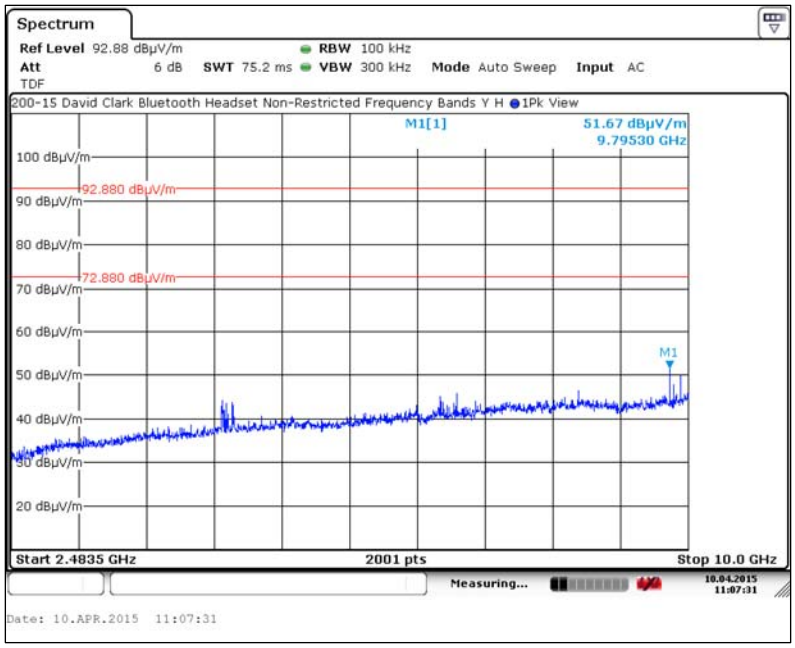
Appendix B (continued)

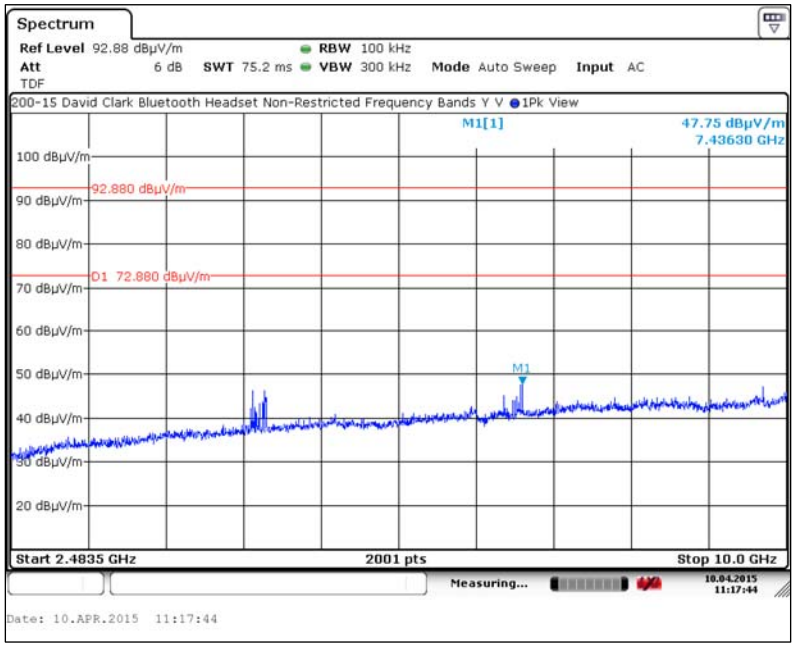
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

3. Measurement Results – 2.4835 GHz to 10 GHz (continued)

3.3. Horizontal Antenna, Y-Axis



3.4. Vertical Antenna, Y-Axis



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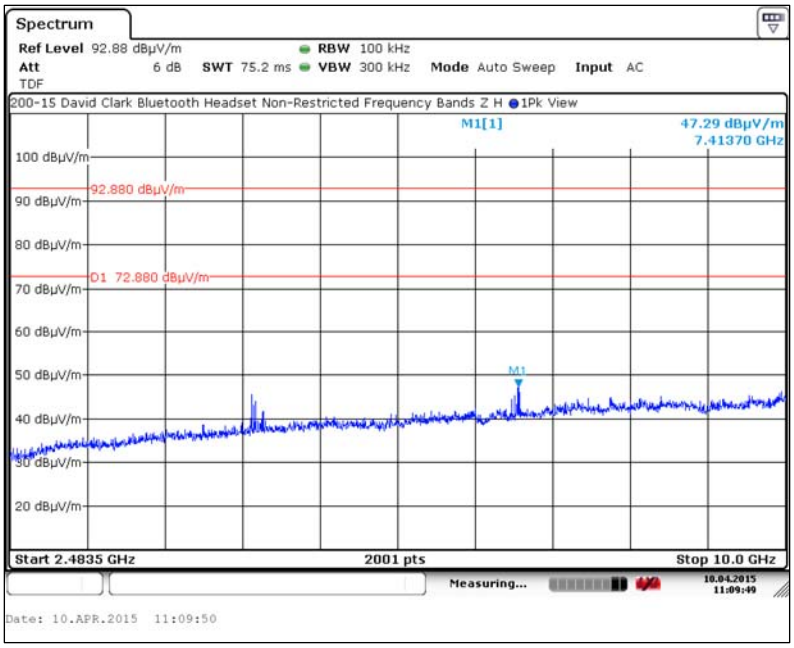
Appendix B (continued)

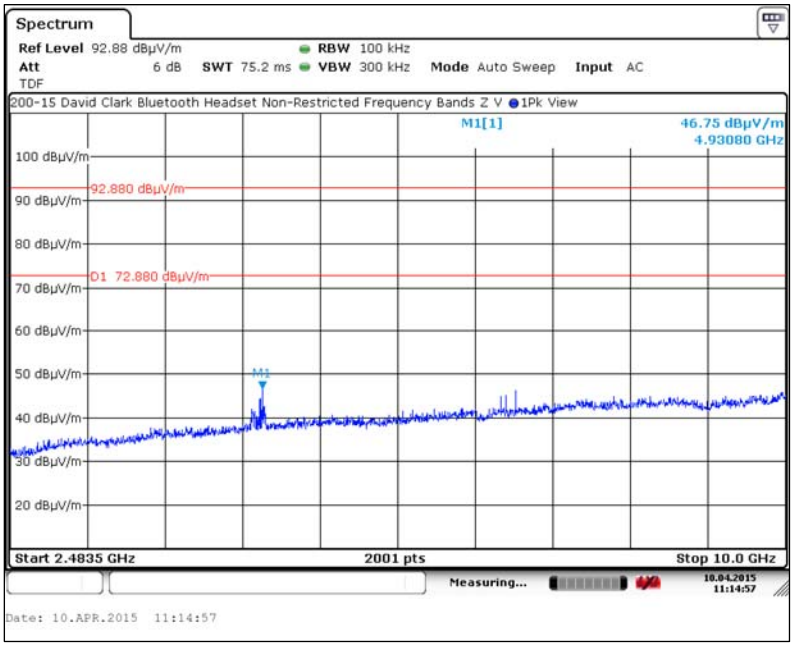
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

3. Measurement Results – 2.4835 GHz to 10 GHz (continued)

3.5. Horizontal Antenna, Z-Axis



3.6. Vertical Antenna, Z-Axis



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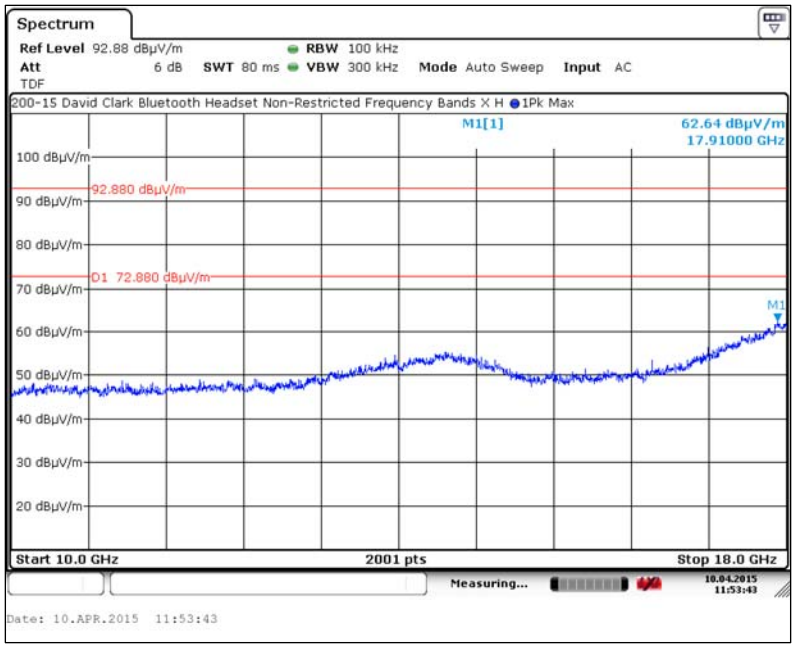
Appendix B (continued)

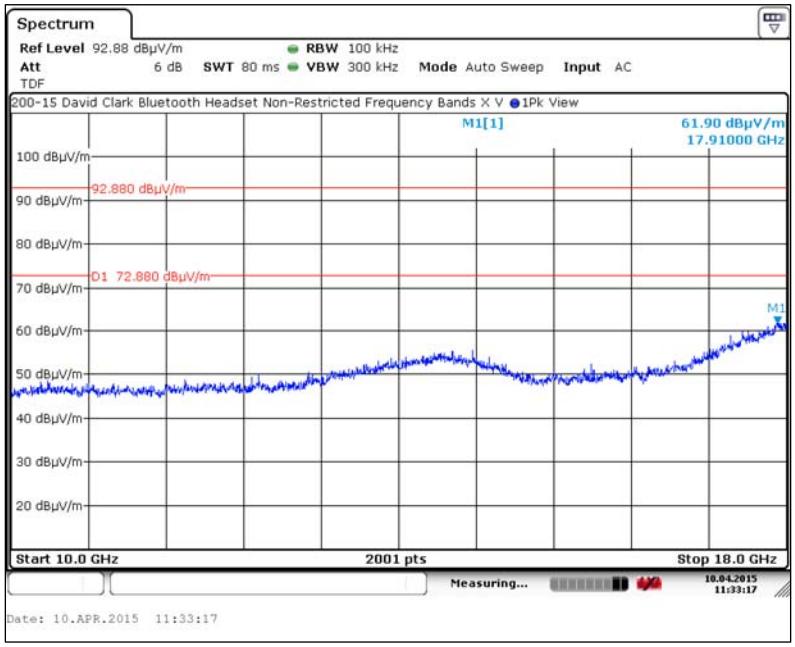
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

4. Measurement Results – 10 GHz to 18 GHz

4.1. Horizontal Antenna, X-Axis



4.2. Vertical Antenna, X-Axis



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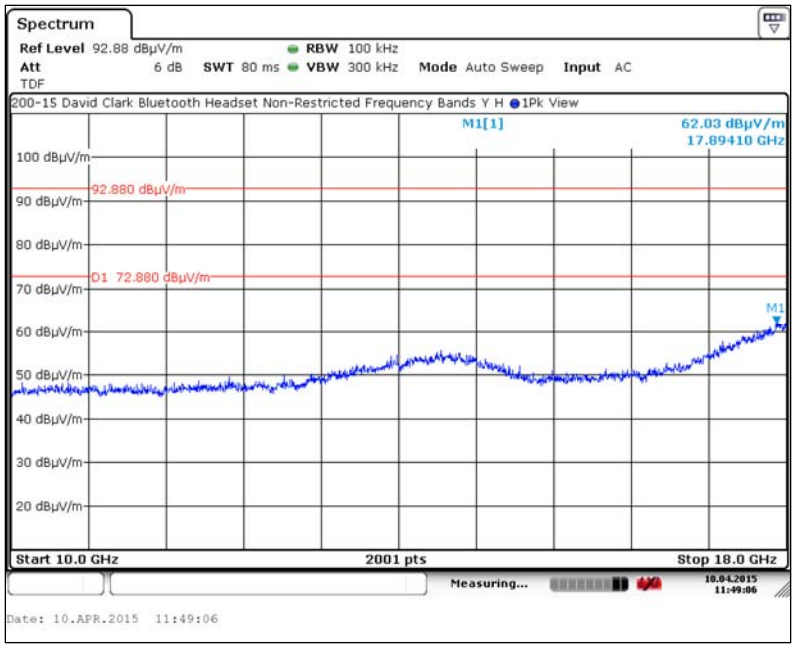
Appendix B (continued)

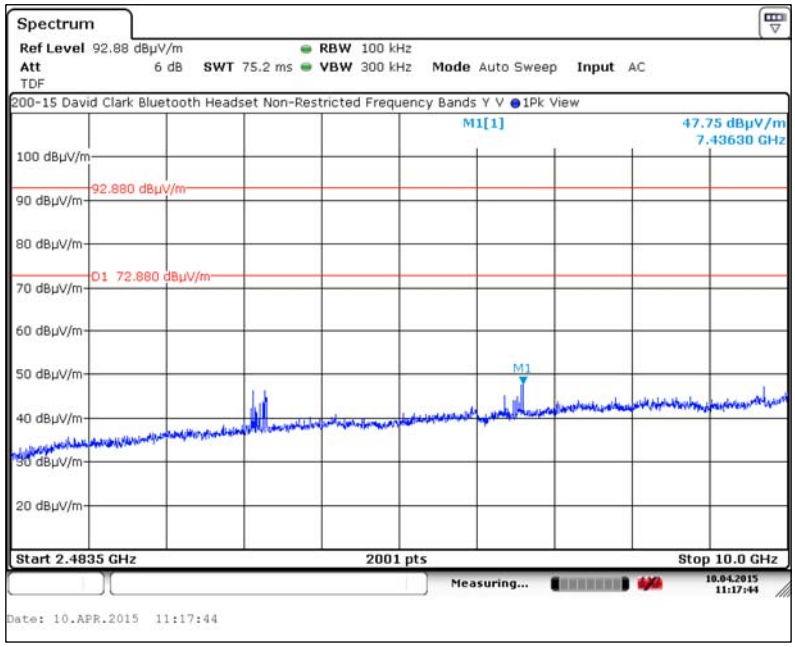
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

4. Measurement Results – 10 GHz to 18 GHz (continued)

4.3. Horizontal Antenna, Y-Axis



4.4. Vertical Antenna, Y-Axis



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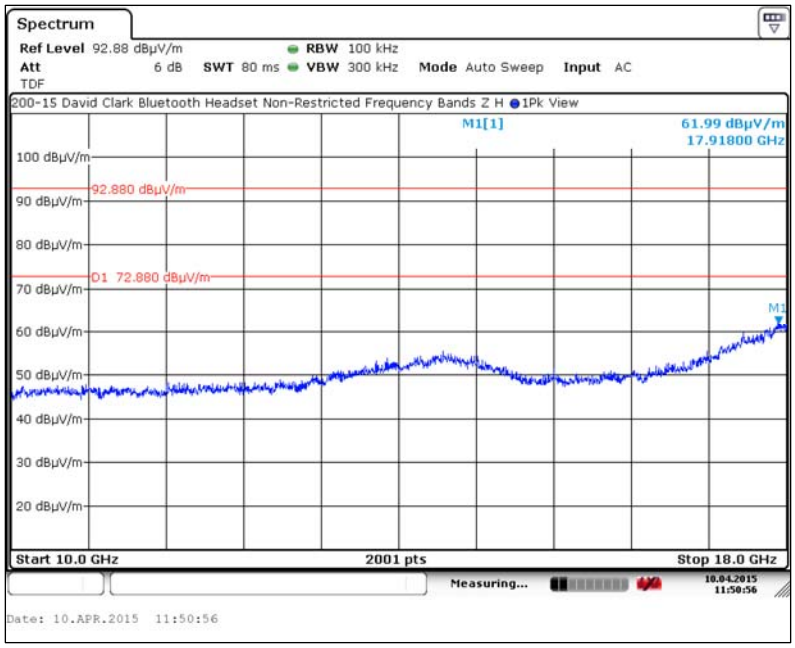
Appendix B (continued)

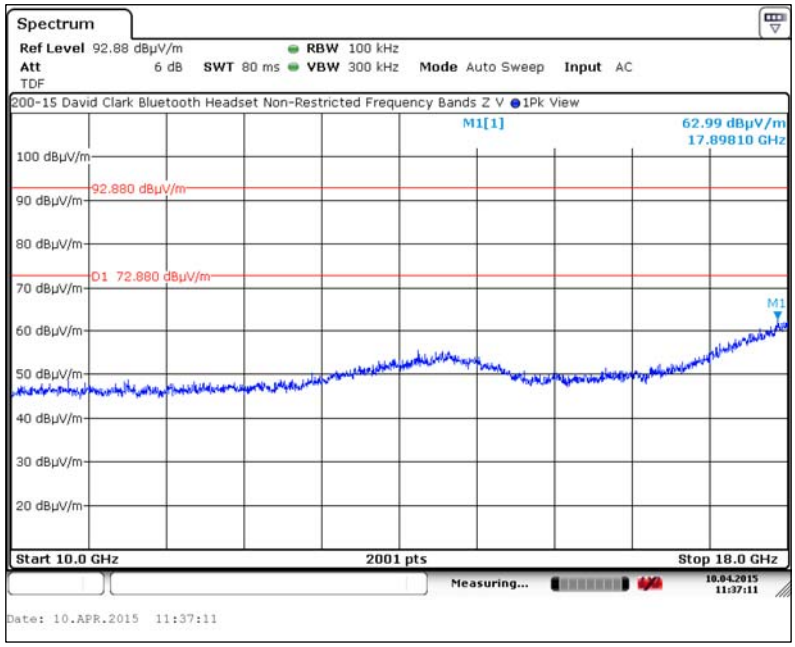
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

4. Measurement Results – 10 GHz to 18 GHz (continued)

4.5. Horizontal Antenna, Z-Axis



4.6. Vertical Antenna, Z-Axis



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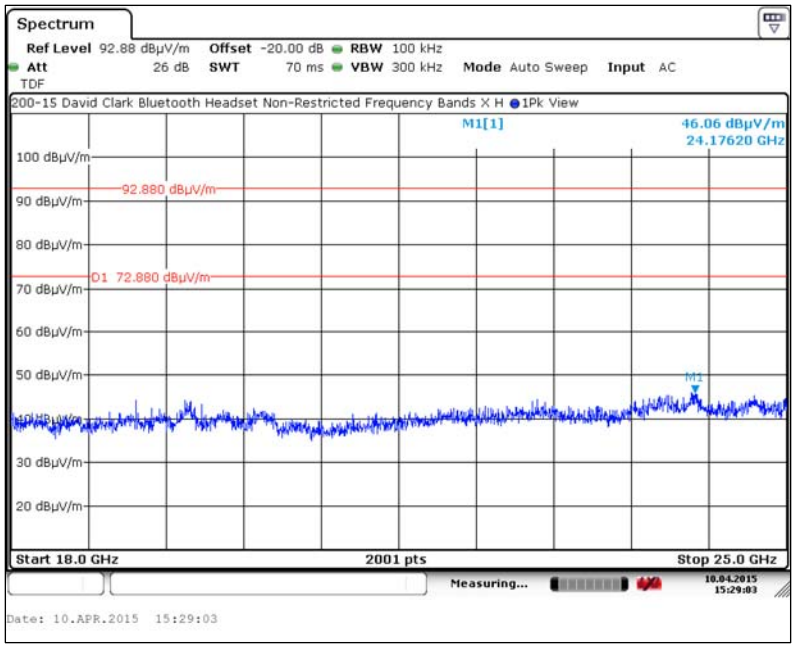
Appendix B (continued)

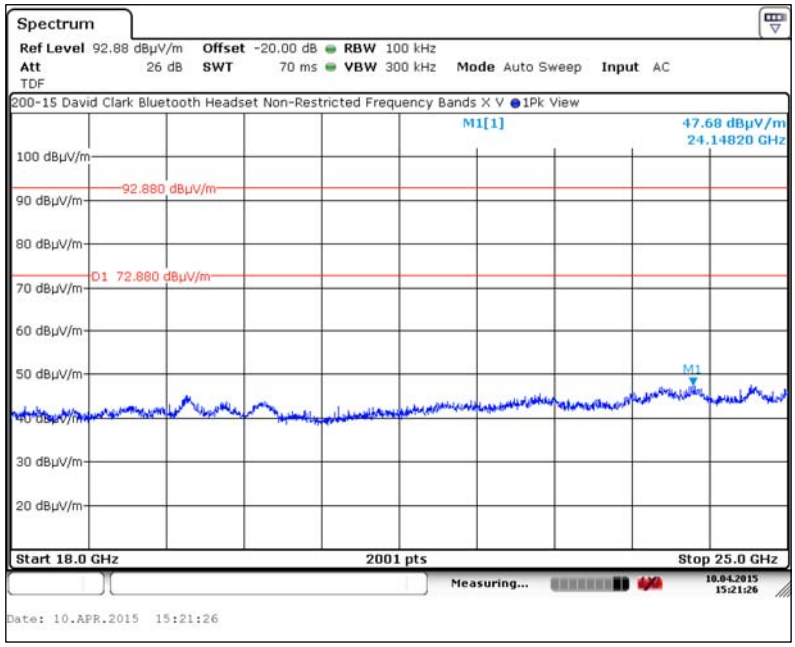
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

5. Measurement Results – 18 GHz to 25 GHz

5.1. Horizontal Antenna, X-Axis



5.2. Vertical Antenna, X-Axis



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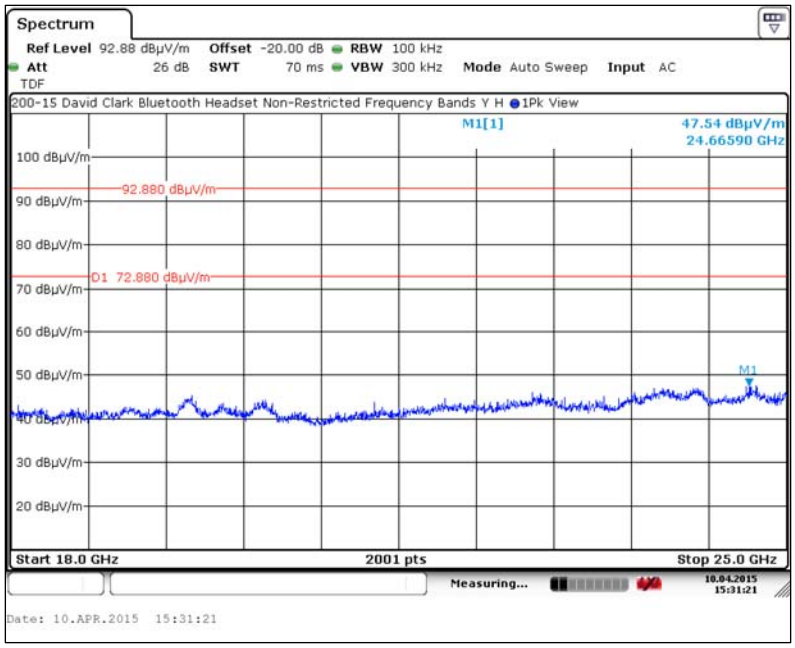
Appendix B (continued)

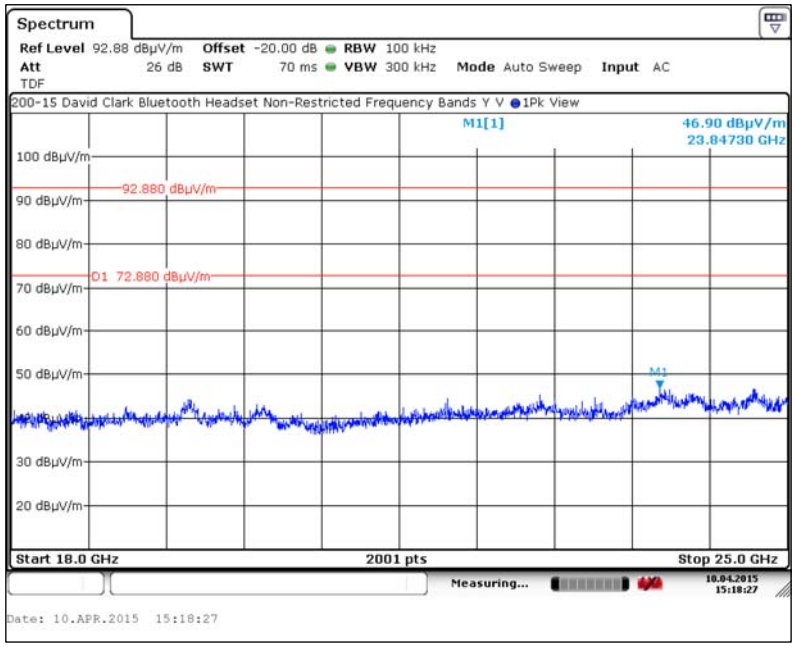
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

5. Measurement Results – 18 GHz to 25 GHz (continued)

5.3. Horizontal Antenna, Y-Axis



5.4. Vertical Antenna, Y-Axis



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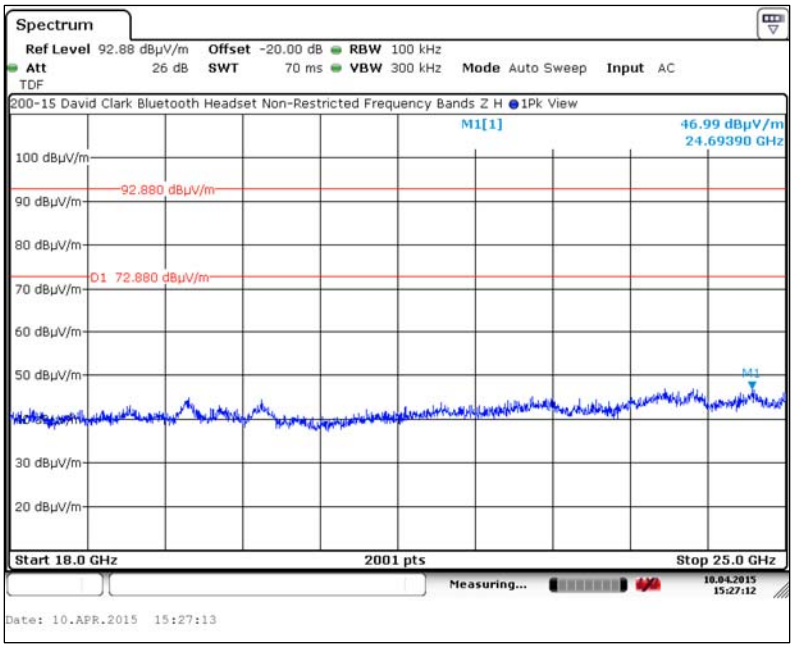
Appendix B (continued)

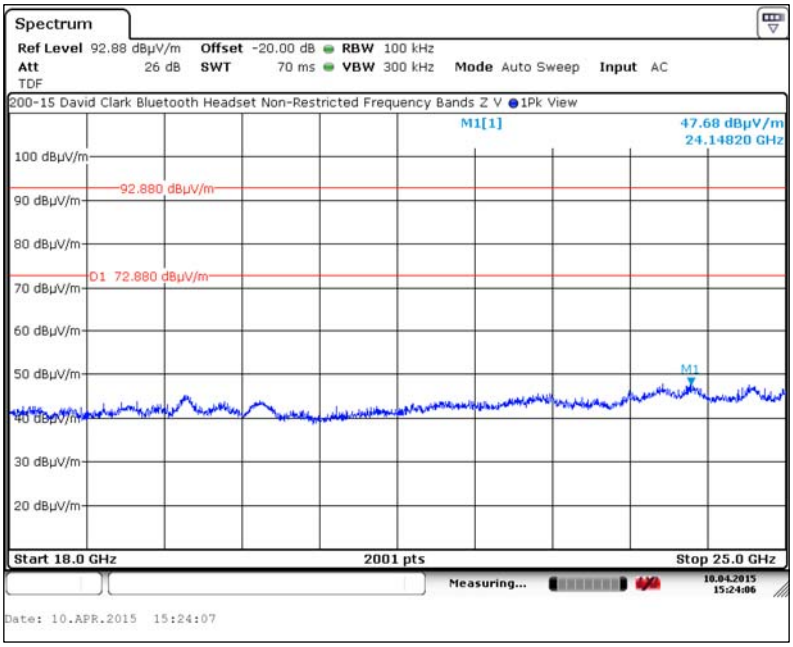
Emissions in Non-Restricted Frequency Bands (15.247(d)) (continued)

5. Measurement Results – 18 GHz to 25 GHz (continued)

5.5. Horizontal Antenna, Z-Axis



5.6. Vertical Antenna, Z-Axis



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