TEST REPORT

Report Number: 101779121MPK-001
Project Number: G101779121
November 07, 2014

Testing performed on the
Ampt Communication Unit (SDAG)
Model: 31570013
FCC ID: X3R-31570013
IC: 8399A-31570013

To

FCC Part 15 Subpart C (15.247)
Industry Canada RSS-210 Issue 8
FCC Part 15, Subpart B
Industry Canada ICES-003

For

Ampt, LLC.

Test Performed by:	Test Authorized by:
Intertek	Ampt, LLC.
1795 Dogwood St. Suite 200	4850 Innovation Drive
Louisville, CO 80027 USA	Fort Collins, CO 80525 USA

Prepared by: _____ **Date:** November 07, 2014
Anderson Soungpanya

Reviewed by: _____ **Date:** November 07, 2014
Krishna K Vemuri

Report No. 101779121MPK-001

Equipment Under Test:	Ampt Communication Unit (SDAG)
Trade Name:	Ampt
Model Number:	31570013
Serial Number(s)	Conducted Unit: 0514K000001 Radiated Unit: 2014K000037
Applicant:	Ampt, LLC.
Contact:	Robin Richardson
Address:	Ampt, LLC. 4850 Innovation Drive Fort Collins, CO 80525
Country	USA
Tel. Number:	(970) 372-6960
Email:	robin.richardson@ampt.com
Applicable Regulation:	FCC Part 15 Subpart C (15.247) Industry Canada RSS-210 Issue 8 FCC Part 15, Subpart B Industry Canada ICES-003
Date of Test:	October 6 to 10, 2014

We attest to the accuracy of this report:

Anderson Soungpanya
Project Engineer

Krishna K Vemuri
EMC Senior Staff Engineer

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1.0 Introduction

The Equipment Under Test (EUT) is the Ampt Communication Unit (SDAG), model number 31570013, consisting of four FHSS radios. This test report covers all four radios. In actual use, only one radio is used at a time.

This report is designed to show compliance of the 2.4 GHz transceiver with the requirements of FCC Part 15 Subpart C (15.247) and RSS-210.

1.1 Summary of Tests

TEST	REFERENCE FCC Part 15 Subpart C (15.247)	REFERENCE RSS-210	RESULTS
RF Output Power	15.247(b)	A8.4	Complies
20-dB Bandwidth	15.247(a)(1)	A8.1(a)	Complies
Channel Separation	15.247(a)(1)	A8.1(b)	Complies
Number of Hopping Channels	15.247(a)(1)	A8.1(d)	Complies
Average Channel Occupancy Time	15.247(a)(1)	A8.1(d)	Complies
Out-of-Band Antenna Conducted Emission	15.247(d)	A8.5	Complies
Transmitter Radiated Emissions	15.247(d), 15.209, 15.205	A8.5, 2.2	Complies
RF Exposure	15.247(i)	RSS-102	Complies
AC Conducted Emission	15.207	RSS-GEN	Complies
Radiated Emission from Digital Parts	15.109	ICES-003	Complies to Class A
Conducted Emission from Digital Parts	15.107	ICES-003	Complies to Class A
Antenna Requirement	15.203	RSS-Gen	Complies. The EUT utilizes internal antennas only.

2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is the Ampt Communication Unit (SDAG), model number 31570013, which is a communication unit for use in utility scale solar installations using Ampt technology. The EUT consists of four FHSS radios.

Overview of the EUT

Applicant	Ampt, LLC 4850 Innovation Drive Fort Collins, CO 80525 USA
Manufacturer name & address	Ampt, LLC 4850 Innovation Drive Fort Collins, CO 80525 USA
Trade Name	Ampt
Model Number	31570013
Part No.	31570013-00
FCC Identifier	X3R-31570013
IC Identifier	8399A-31570013
Type of Transmission	Frequency Hopping Spread Spectrum
Rated RF Output	10 mW
Frequency Range	2409.950 - 2474.385 MHz
Number of Channel(s)	256, (Channels 0-255)
Modulation Type	FSK
Duty Cycle	2.5 %
Data Rate	12.1 kbps
Antenna(s) type & Gain	2 x Omni-Directionl Inverted F, -1 dBi Gain 2 x Rectangular Patch , +5 dBi Gain 4 Total Antennas (Non MIMO configuration, only one radio is used at a time)

EUT receive date: October 6, 2014
EUT receive condition: The prototype version of the EUT was received in good condition with no apparent damage. As declared by the Applicant it is identical to the production units.
Test start date: October 6, 2014
Test completion date: October 10, 2014
The test results in this report pertain only to the item tested.

2.2 Related Submittal(s) Grants

None.

2.3 Test Methodology

Antenna conducted measurements were performed according to the procedure DA 00-705 Released March 30, 2000 “Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.”

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4. Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Data Sheet"** of this Application.

All other measurements were made in accordance with the procedures in part 2 of CFR 47.

Following is the channel test plan:

Channels in 2.4 GHz band			
Test Channel		Frequency, MHz	Tested
Low	0	2409.950	√
Middle	124	2441.283	√
High	255	2474.385	√

2.4 Test Facility

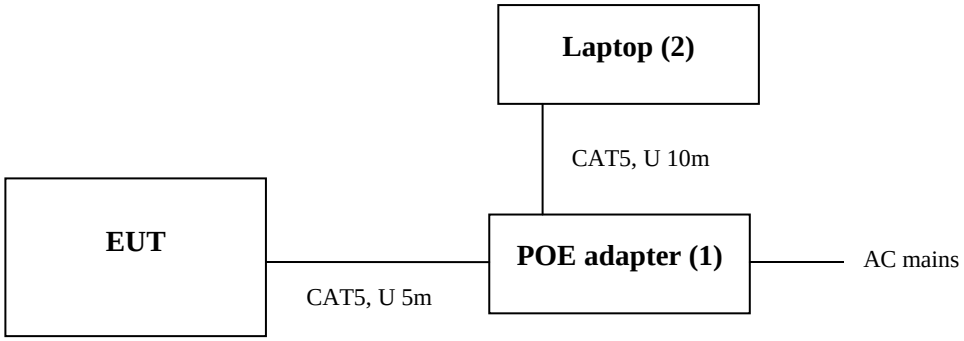
Intertek Denver’s testing facilities are located at 1795 Dogwood St. Suite 200 Louisville, CO 80027. The testing facility is ISO17025:2005 accredited by A2LA, our lab code is 2506.02, our VCCI registration number under Article 14 is A-0160, our FCC registration no. 432519 and our IC lab no. 2042N.

3.0 System Test Configuration

3.1 Support Equipment

Item #	Description	Manufacturer	Model No.
1	POE Power adapter	EnGenius	EPE-5818af
2	Laptop	Sony	SVS13AB1GL

3.2 Block Diagram of Test Setup



S = Shielded **U** = Unshielded	**F** = With Ferrite **m** = Length in Meters

3.3 Justification

For radiated emission measurements the EUT is placed on a non-conductive table. The EUT is attached to peripherals and they are connected and operational (as typical as possible). The EUT is wired to transmit full power. During testing, all cables are manipulated to produce worst-case emissions.

The EUT is comprised of 4 internal radios which are identical. Each radio is attached to a single permanent internal antenna (4 total Antennas, 2 Omnis & 2 Patches). EUT is not a MIMO as only one radio can transmit at a time.

The highest frequency being generated is a 300MHz processor clock.

3.4 Mode of Operation During Test

During transmitter testing, the transmitter was setup to transmit continuously at maximum RF power on the low channel, middle channel, high channel and with hopping channels enabled.

3.5 Modifications Required for Compliance

Intertek installed no modifications during compliance testing in order to bring the product into compliance.

3.6 Additions, Deviations and Exclusions from Standards

No additions, deviations or exclusions from the standard were made.

4.0 Transmitter Emissions Measurement Results

4.1 20dB Bandwidth, and 99% Occupied Bandwidth
FCC Rule 15.247(a)(1)

4.1.1 Procedure

The Procedure described in the FCC Publication DA 00-705 Released March 30, 2000 “Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems” was used to determine the 20dB bandwidth.

- Span = Approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
- RBW = 1% of the 20 dB bandwidth
- VBW = 3 x RBW
- Sweep = Auto
- Detector function = Peak
- Trace = Max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the markerdelta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

For 99% power bandwidth measurement, the bandwidth was determined by using the built-in 99% occupied bandwidth function of the spectrum analyzer.

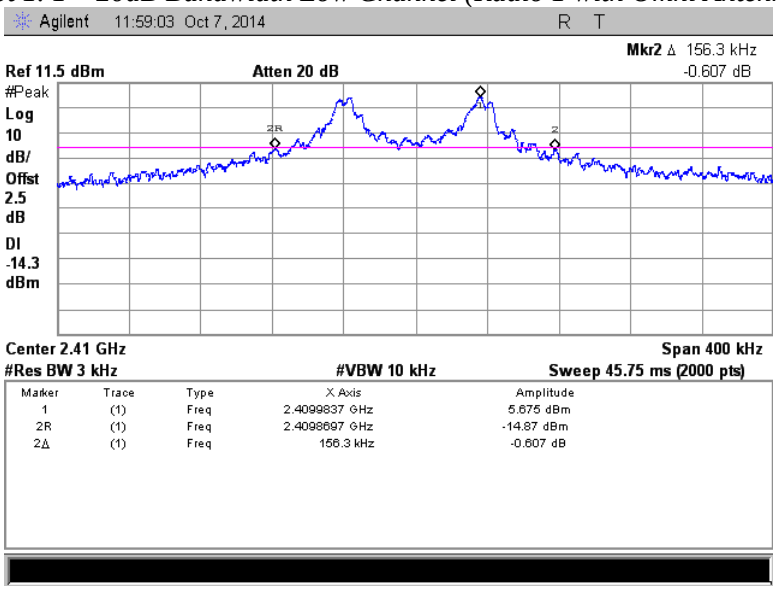
The antenna port of the EUT was connected to the input of a spectrum analyzer (SA). For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A Peak output reading was taken, a Display line was drawn for 20dB lower than Peak level. The 20dB bandwidth was determined from where the channel output spectrum intersected the display line.

4.1.2 Test Result

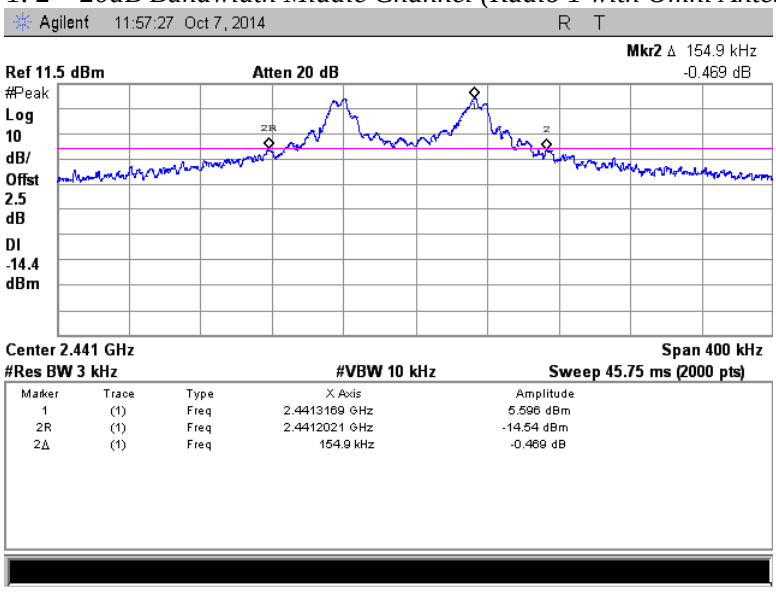
Radio	Channel	Frequency MHz	20 dB FCC Bandwidth, MHz	Plot #	99% Bandwidth, MHz	Plot #
Radio 1 Omni Antenna	0	2409.950	156.3	1.1	359.0	1.13
	124	2441.283	154.9	1.2	367.0	1.14
	255	2474.385	146.5	1.3	395.8	1.15
Radio 2 Omni Antenna	0	2409.950	157.7	1.4	402.2	1.16
	124	2441.283	158.9	1.5	411.9	1.17
	255	2474.385	155.3	1.6	474.4	1.18
Radio 3 Patch Antenna	0	2409.950	155.3	1.7	383.0	1.19
	124	2441.283	148.9	1.8	375.0	1.20
	255	2474.385	158.9	1.9	431.1	1.21
Radio 4 Patch Antenna	0	2409.950	146.5	1.10	399.0	1.22
	124	2441.283	151.9	1.11	383.0	1.23
	255	2474.385	143.1	1.12	397.4	1.24

4.1.2 20dB Bandwidth Test Result (Continued)

Plot 1. 1 – 20dB Bandwidth Low Channel (Radio 1 with Omni Antenna)

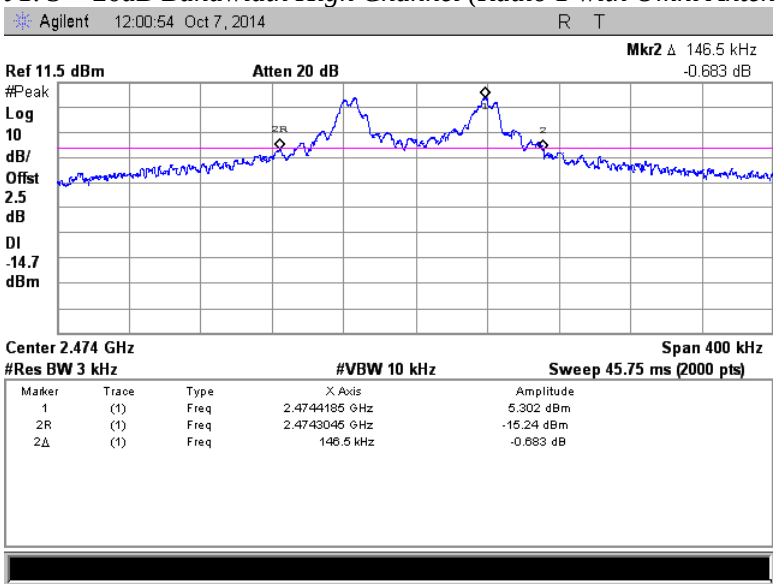


Plot 1. 2 – 20dB Bandwidth Middle Channel (Radio 1 with Omni Antenna)

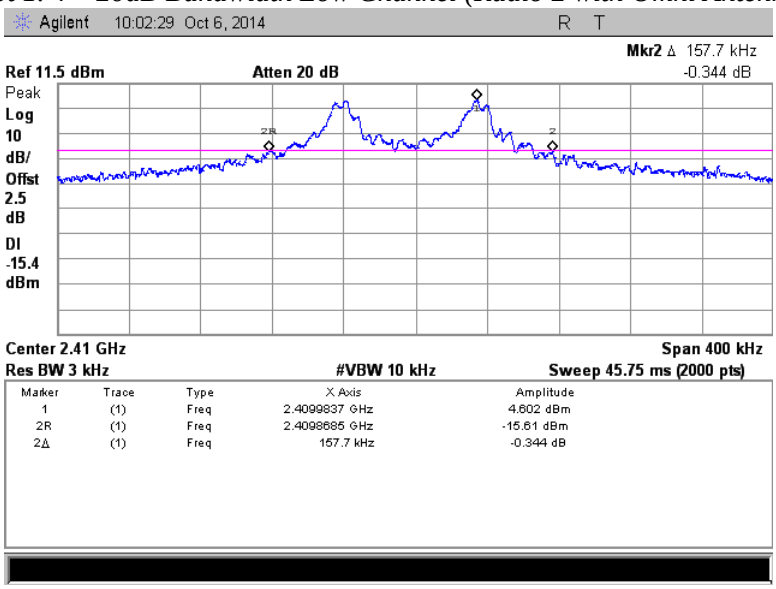


4.1.2 20dB Bandwidth Test Result (Continued)

Plot 1. 3 – 20dB Bandwidth High Channel (Radio 1 with Omni Antenna)

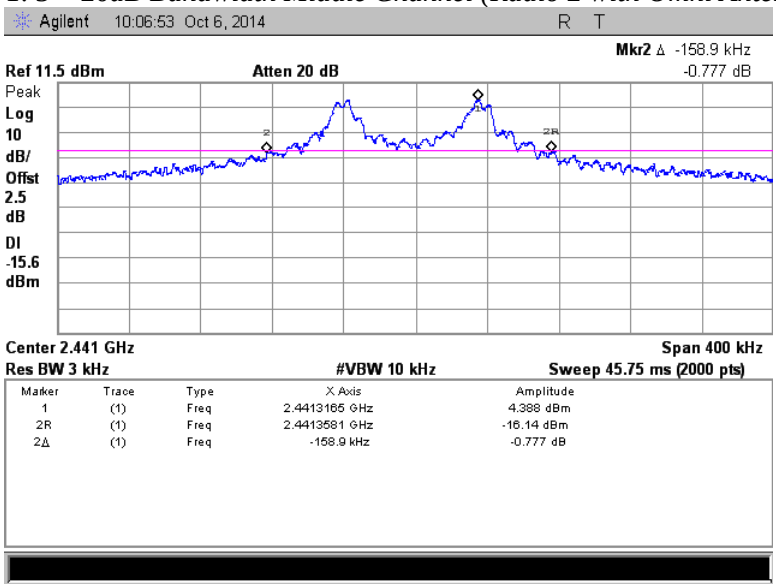


Plot 1. 4 – 20dB Bandwidth Low Channel (Radio 2 with Omni Antenna)

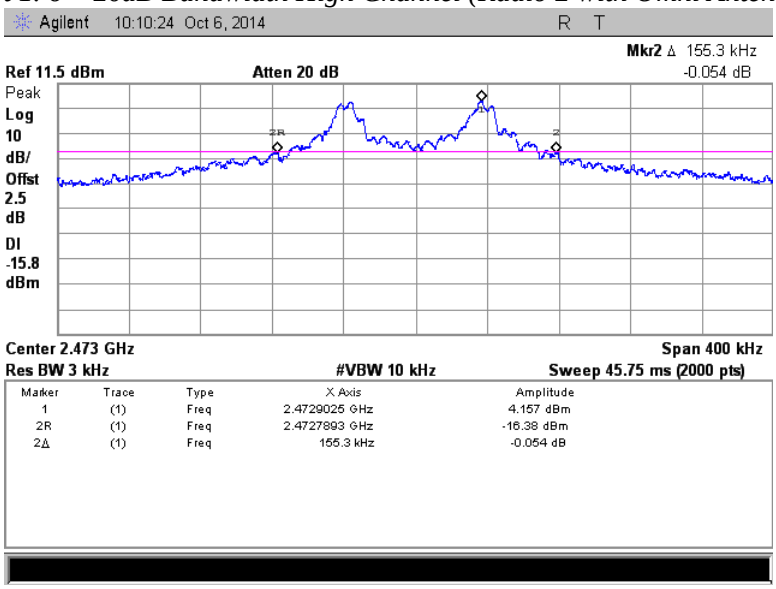


4.1.2 20dB Bandwidth Test Result (Continued)

Plot 1. 5 – 20dB Bandwidth Middle Channel (Radio 2 with Omni Antenna)

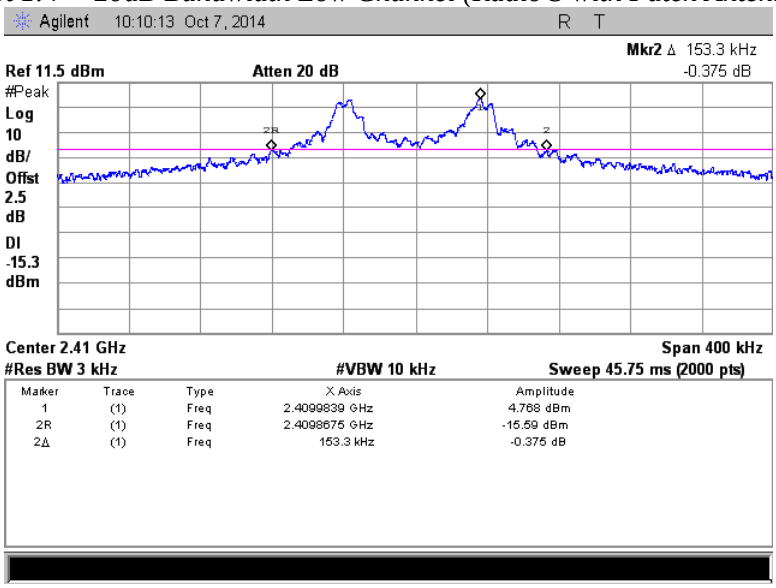


Plot 1. 6 – 20dB Bandwidth High Channel (Radio 2 with Omni Antenna)

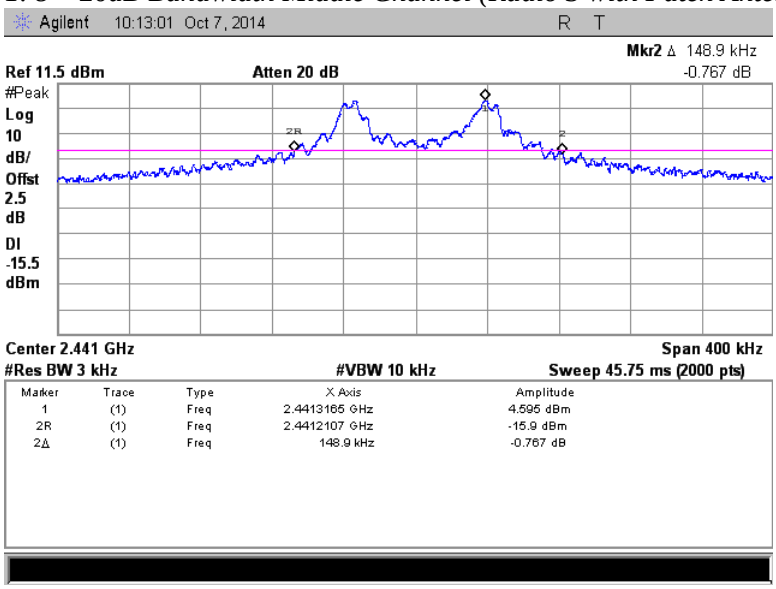


4.1.2 20dB Bandwidth Test Result (Continued)

Plot 1. 7 – 20dB Bandwidth Low Channel (Radio 3 with Patch Antenna)

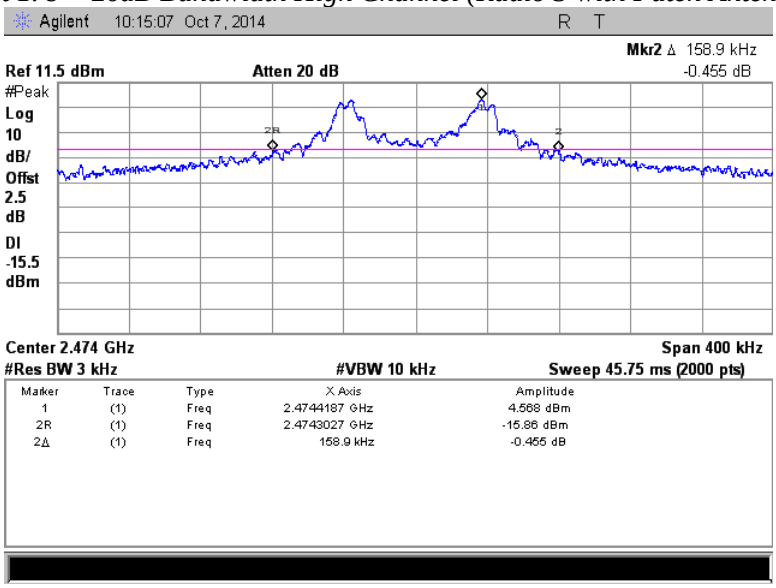


Plot 1. 8 – 20dB Bandwidth Middle Channel (Radio 3 with Patch Antenna)

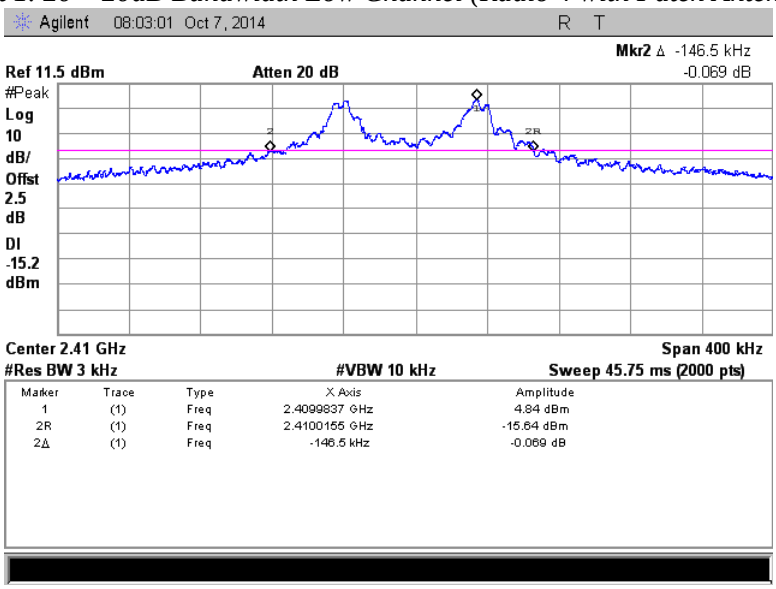


4.1.2 20dB Bandwidth Test Result (Continued)

Plot 1. 9 – 20dB Bandwidth High Channel (Radio 3 with Patch Antenna)

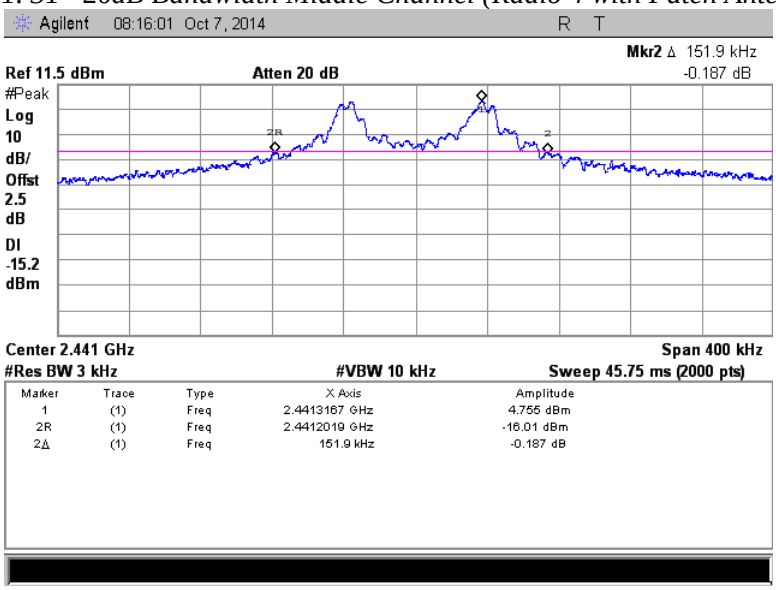


Plot 1. 20 – 20dB Bandwidth Low Channel (Radio 4 with Patch Antenna)

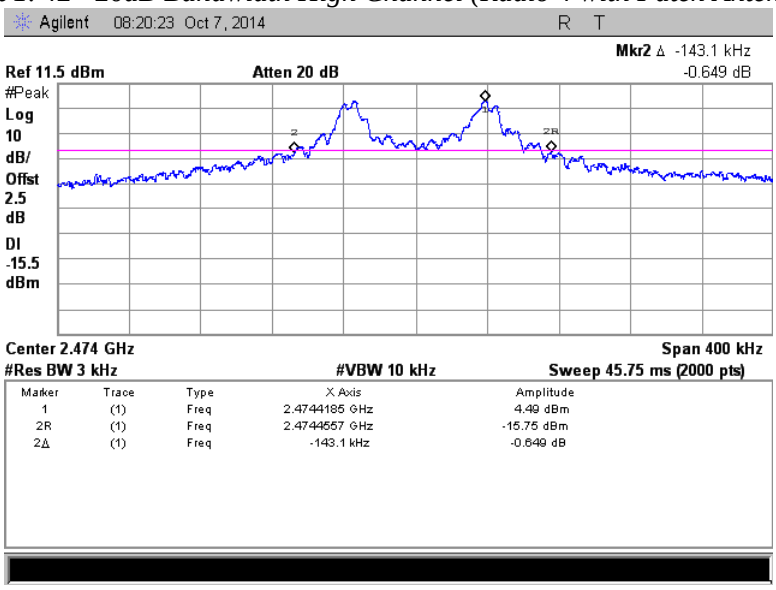


4.1.2 20dB Bandwidth Test Result (Continued)

Plot 1. 31– 20dB Bandwidth Middle Channel (Radio 4 with Patch Antenna)

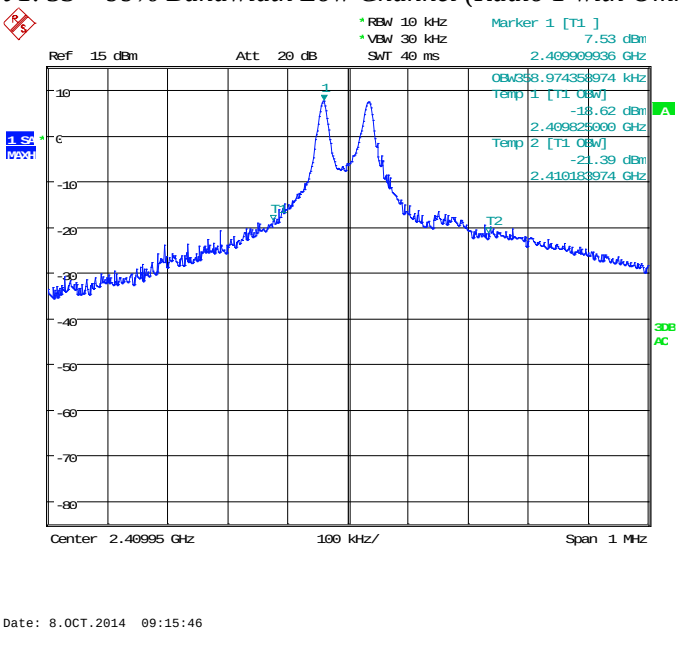


Plot 1. 42– 20dB Bandwidth High Channel (Radio 4 with Patch Antenna)

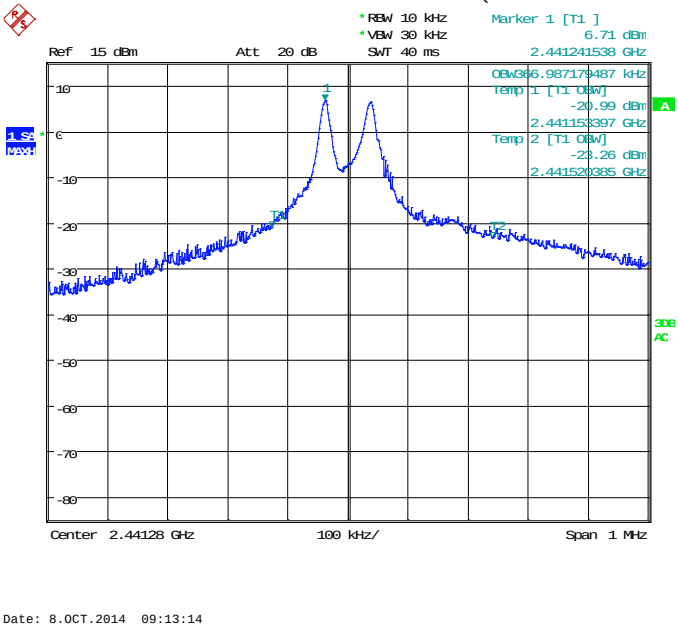


4.1.2 99% Bandwidth Test Result (Continued)

Plot 1. 53 – 99% Bandwidth Low Channel (Radio 1 with Omni Antenna)

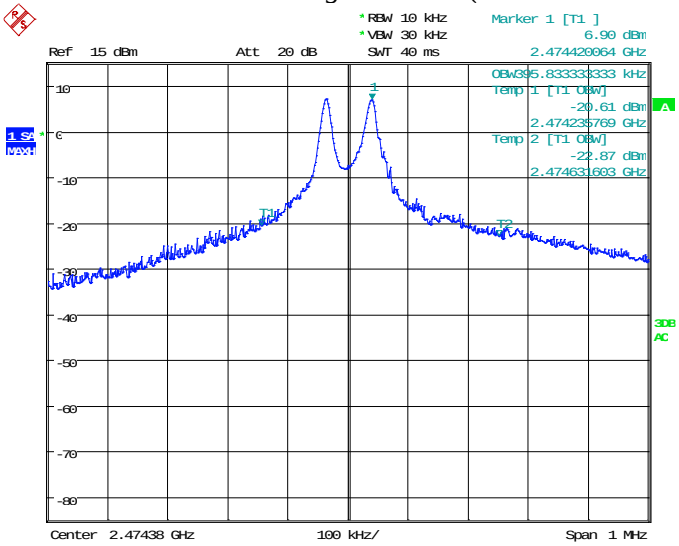


Plot 1. 14 – 99% Bandwidth Middle Channel (Radio 1 with Omni Antenna)

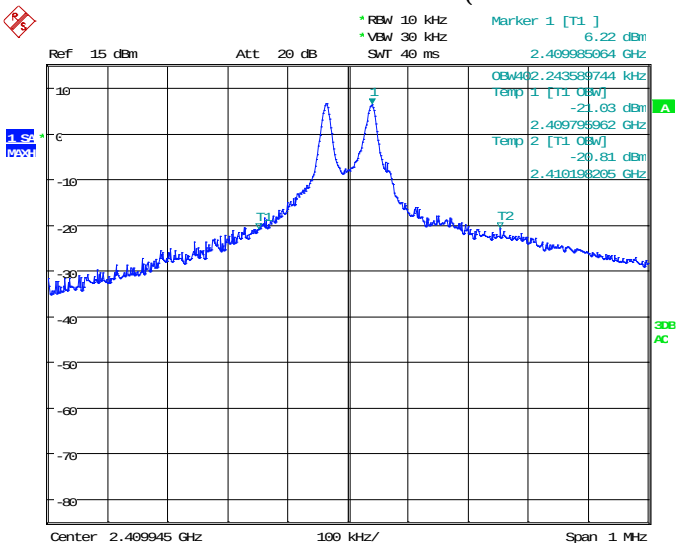


4.1.2 99% Bandwidth Test Result (Continued)

Plot 1. 15 – 99% Bandwidth High Channel (Radio 1 with Omni Antenna)

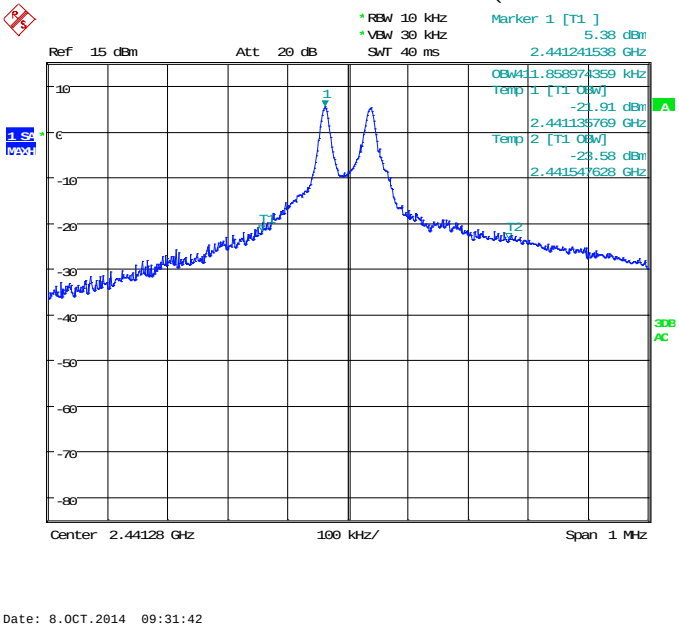


Plot 1. 16 – 99% Bandwidth Low Channel (Radio 2 with Omni Antenna)

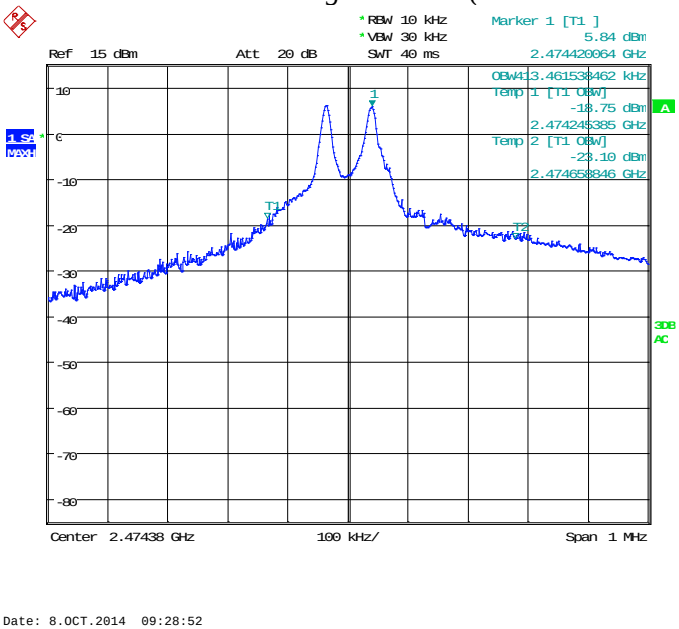


4.1.2 99% Bandwidth Test Result (Continued)

Plot 1. 17 – 99% B Bandwidth Middle Channel (Radio 2 with Omni Antenna)

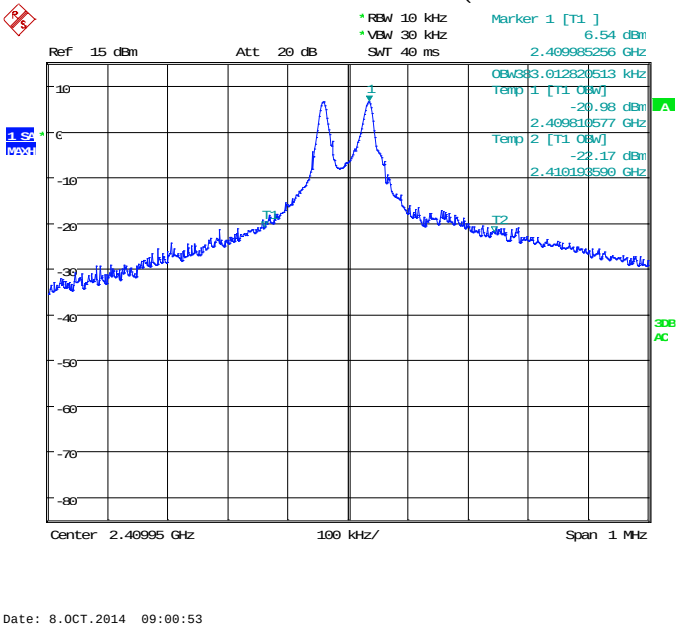


Plot 1. 18 – 99% Bandwidth High Channel (Radio 2 with Omni Antenna)

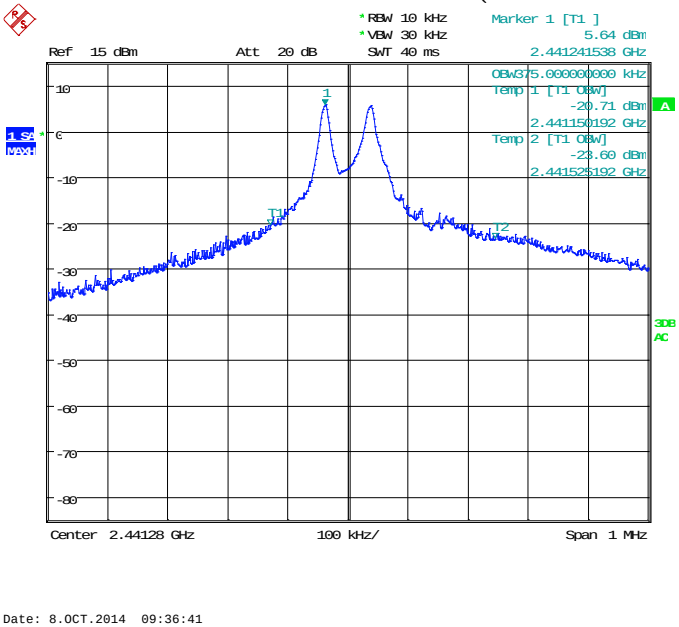


4.1.2 99% Bandwidth Test Result (Continued)

Plot 1. 19 – 99% Bandwidth Low Channel (Radio 3 with Patch Antenna)

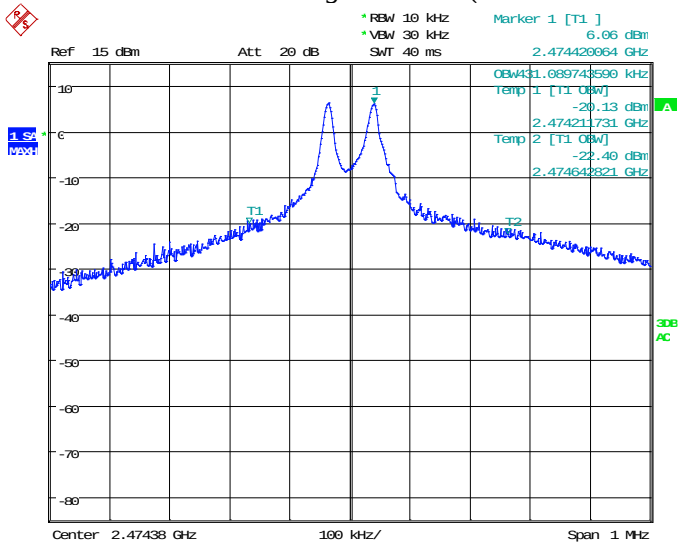


Plot 1. 20 – 99% Bandwidth Middle Channel (Radio 3 with Patch Antenna)

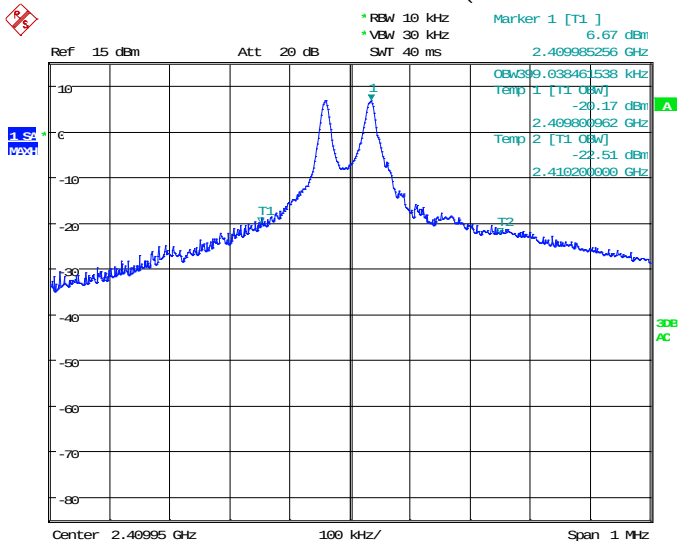


4.1.2 99% Bandwidth Test Result (Continued)

Plot 1. 21 – 99% Bandwidth High Channel (Radio 3 with Patch Antenna)

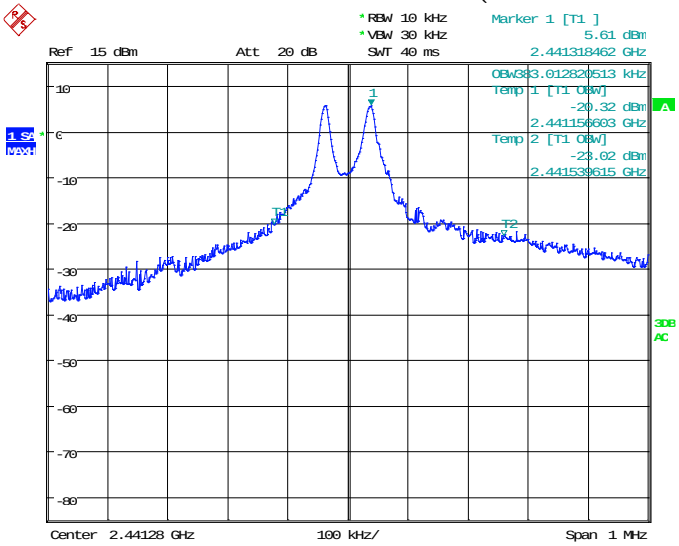


Plot 1. 22 – 99% Bandwidth Low Channel (Radio 4 with Patch Antenna)

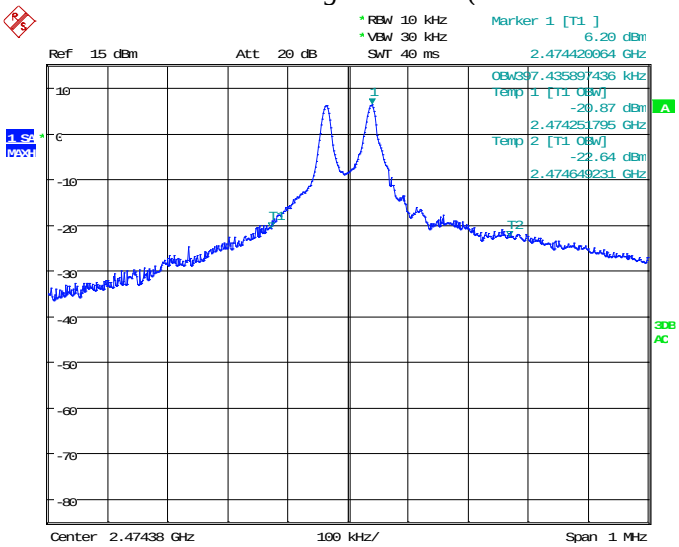


4.1.2 99% Bandwidth Test Result (Continued)

Plot 1. 23 – 99% Bandwidth Middle Channel (Radio 4 with Patch Antenna)



Plot 1. 24 – 99% Bandwidth High Channel (Radio 4 with Patch Antenna)



4.2 Conducted Output Power at Antenna Terminals
FCC Rule 15.247(b)(1)

4.2.1 Requirement

For systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum peak output power is 1 watt (30 dBm), for all other systems 0.125 W (21 dBm).

4.2.2 Procedure

The Procedure described in the FCC Publication DA 00-705 Released March 30, 2000 "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" was used to determine the RF Output Power.

- Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
- RBW > the 20 dB bandwidth of the emission being measured
- VBW = 3 x RBW
- Sweep = auto
- Detector function = peak
- Trace = max hold

Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (see the NOTE above regarding external attenuation and cable loss). The limit is specified in one of the subparagraphs of this Section. Submit this plot.

The antenna port of the EUT was connected to the input of a spectrum analyzer. Power was read directly from the spectrum analyzer and cable loss correction was added to the reading to obtain the power at the antenna terminals.

4.3.3 Test Result

Refer to the following plots for the test result:

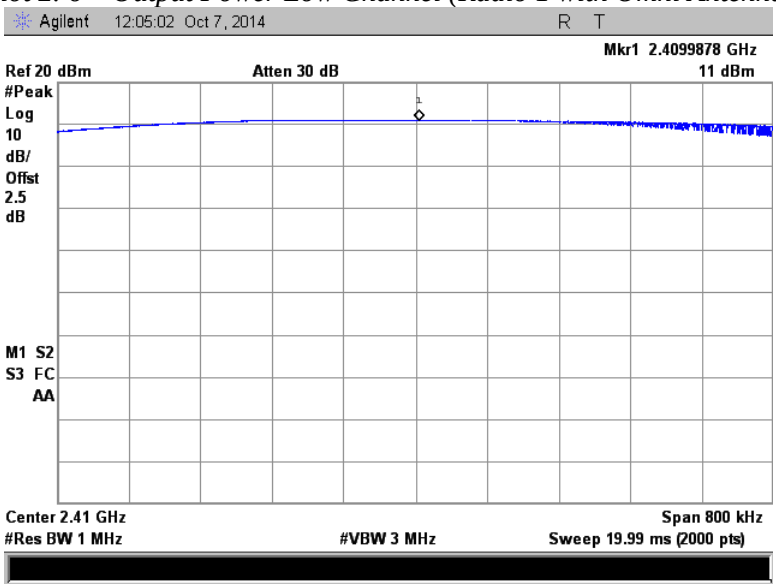
Radio	Channel	Frequency MHz	Conducted Peak Power dBm	Conducted Peak Power mW	Plot #
Radio 1 Omni Antenna	0	2409.950	11.000	12.589	2.1
	124	2441.283	10.830	12.106	2.2
	255	2474.385	10.570	11.402	2.3
Radio 2 Omni Antenna	0	2409.950	9.807	9.565	2.4
	124	2441.283	9.681	9.292	2.5
	255	2474.385	9.379	8.668	2.6
Radio 3 Patch Antenna	0	2409.950	10.040	10.093	2.7
	124	2441.283	9.911	9.797	2.7
	255	2474.385	9.641	9.207	2.9
Radio 4 Patch Antenna	0	2409.950	10.200	10.471	2.10
	124	2441.283	10.070	10.162	2.11
	255	2474.385	9.801	9.552	2.12

Notes: Radios were set to transmit at their max power levels.

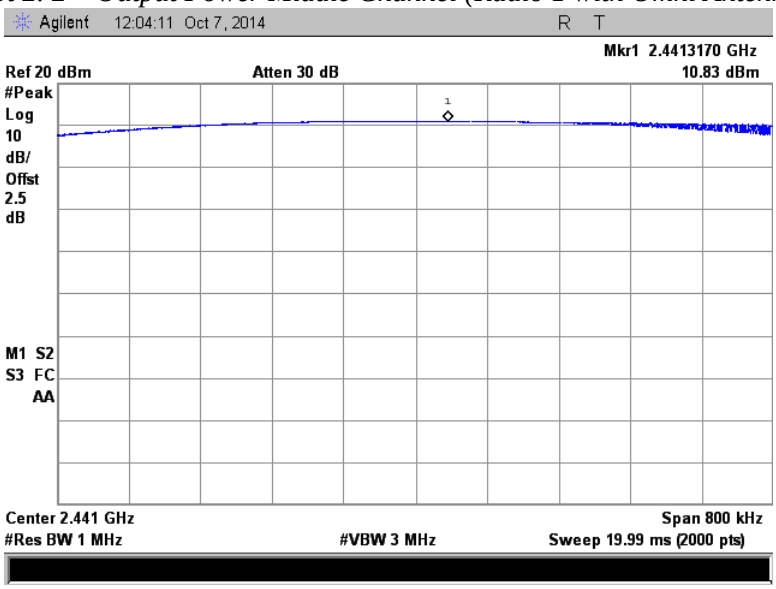
Results	Complies

4.3.3 Output Power Test Result (Continued)

Plot 2. 6 – Output Power Low Channel (Radio 1 with Omni Antenna)

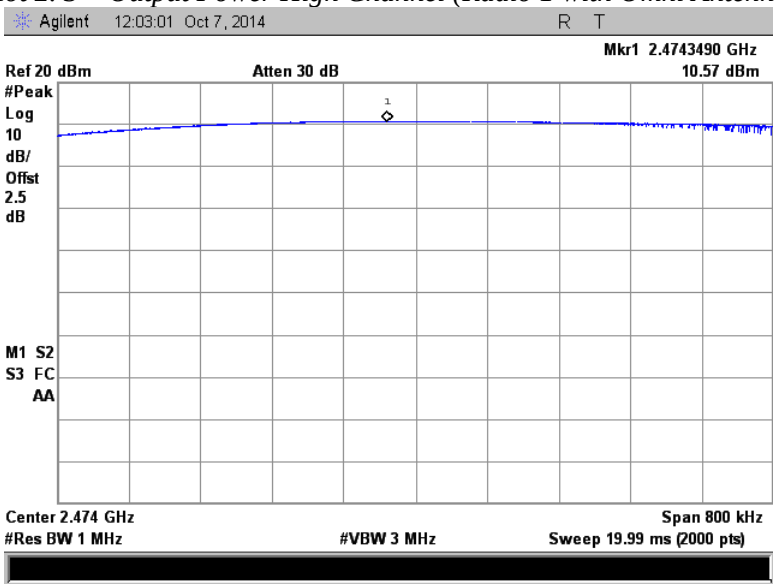


Plot 2. 2 – Output Power Middle Channel (Radio 1 with Omni Antenna)

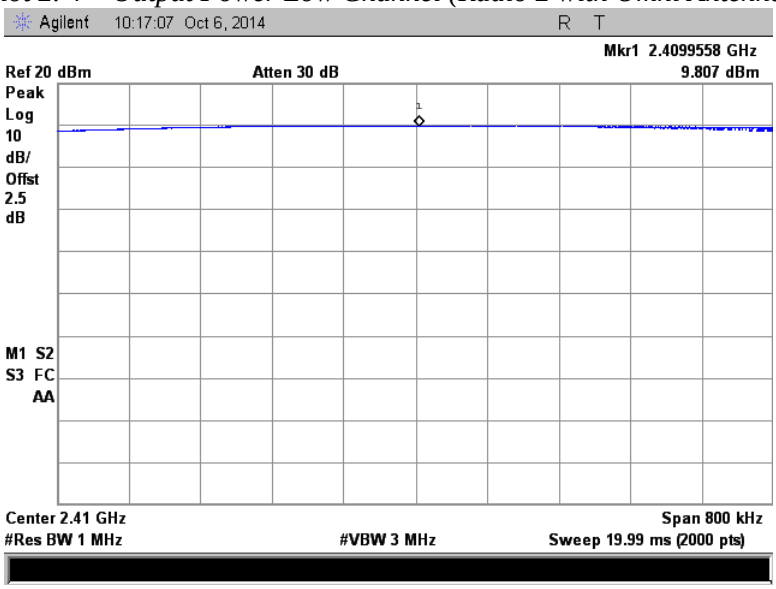


4.3.3 Output Power Test Result (Continued)

Plot 2. 3 – Output Power High Channel (Radio 1 with Omni Antenna)

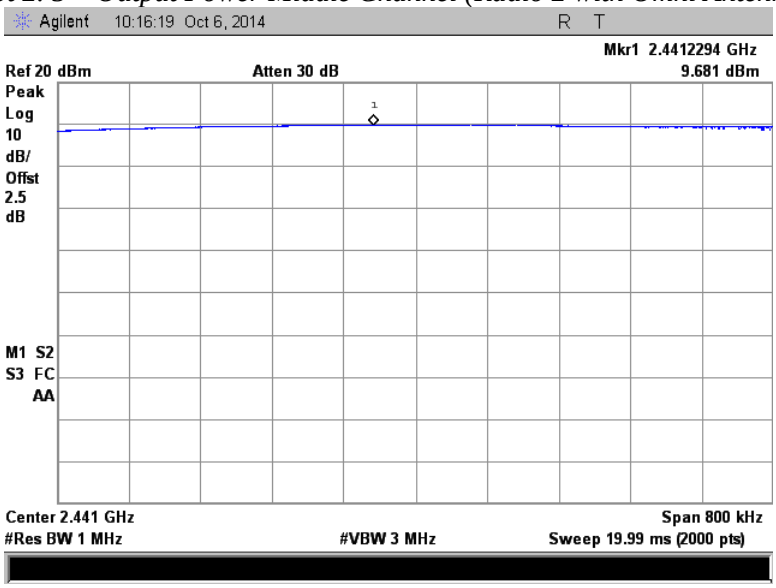


Plot 2. 4 – Output Power Low Channel (Radio 2 with Omni Antenna)

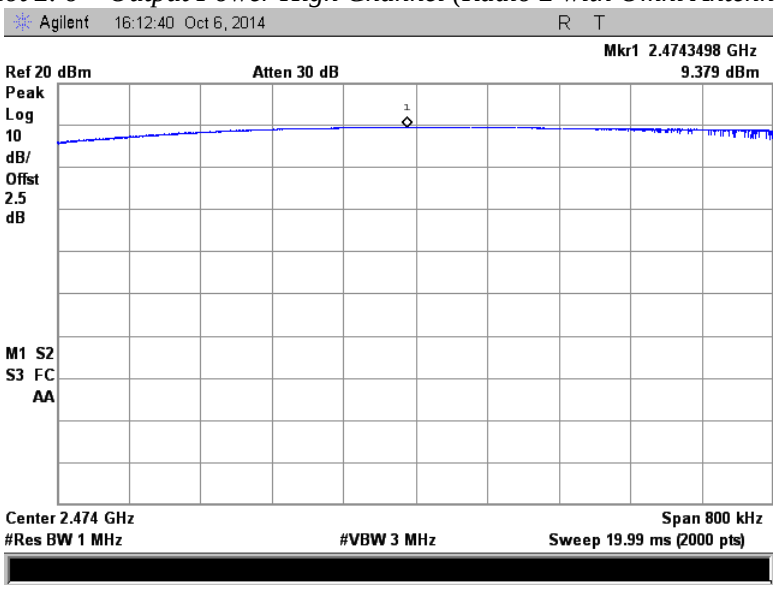


4.3.3 Output Power Test Result (Continued)

Plot 2. 5 – Output Power Middle Channel (Radio 2 with Omni Antenna)

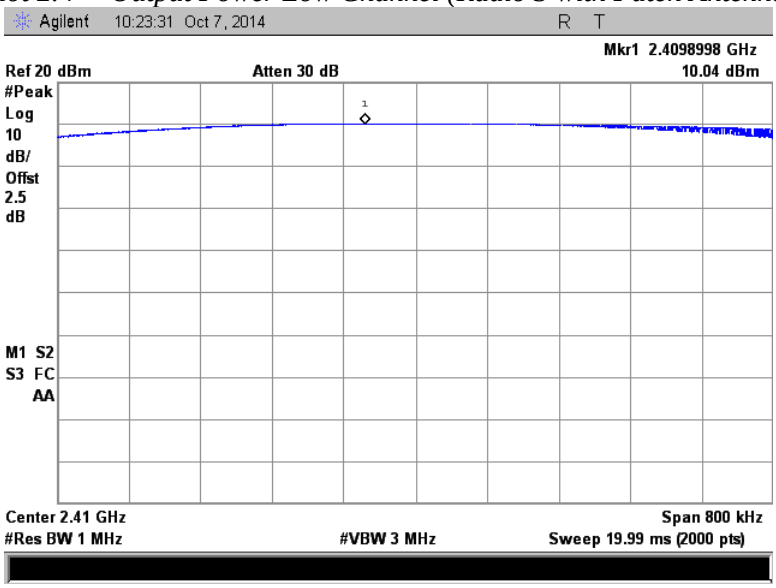


Plot 2. 6 – Output Power High Channel (Radio 2 with Omni Antenna)

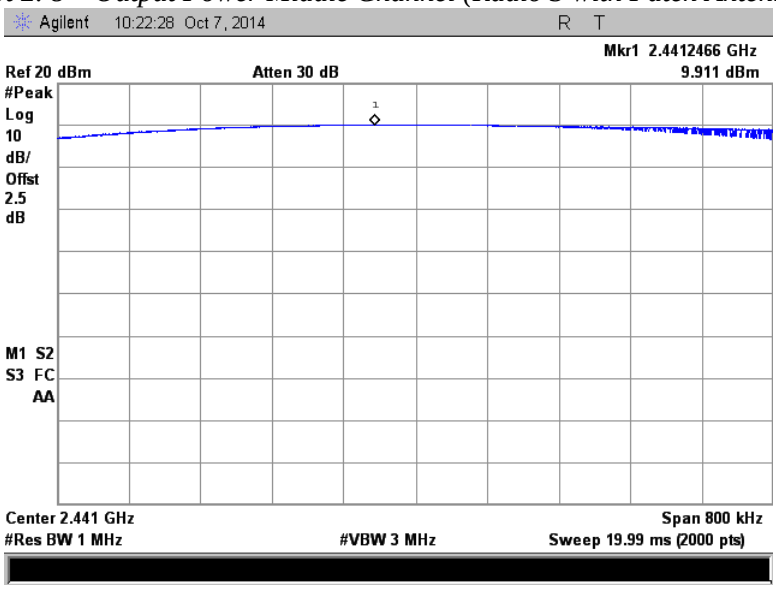


4.3.3 Output Power Test Result (Continued)

Plot 2. 7 – Output Power Low Channel (Radio 3 with Patch Antenna)

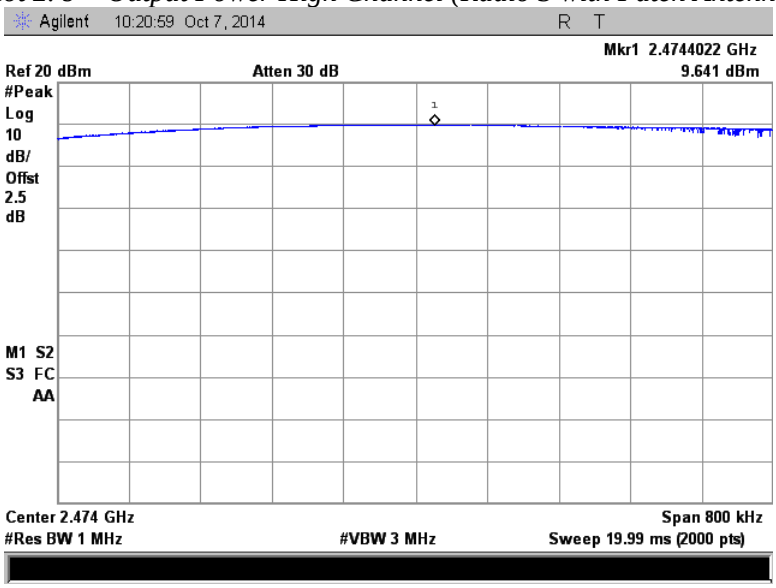


Plot 2. 8 – Output Power Middle Channel (Radio 3 with Patch Antenna)

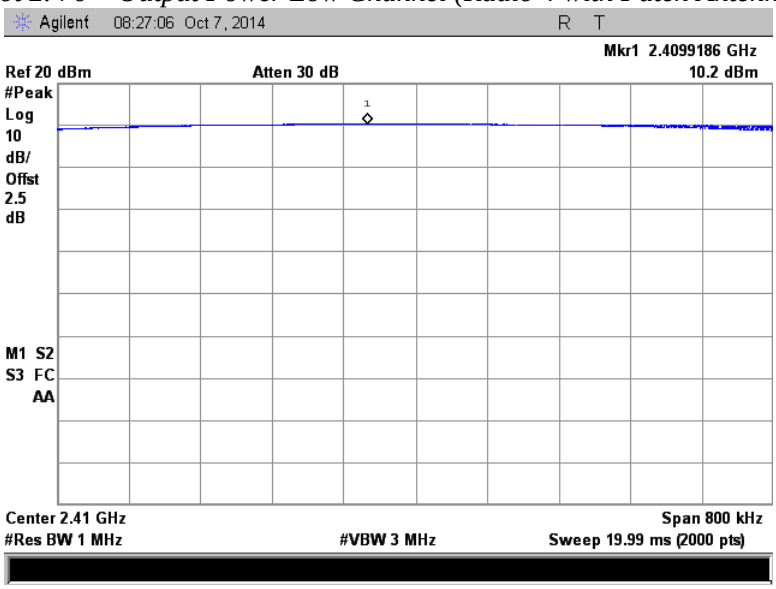


4.3.3 Output Power Test Result (Continued)

Plot 2. 9 – Output Power High Channel (Radio 3 with Patch Antenna)

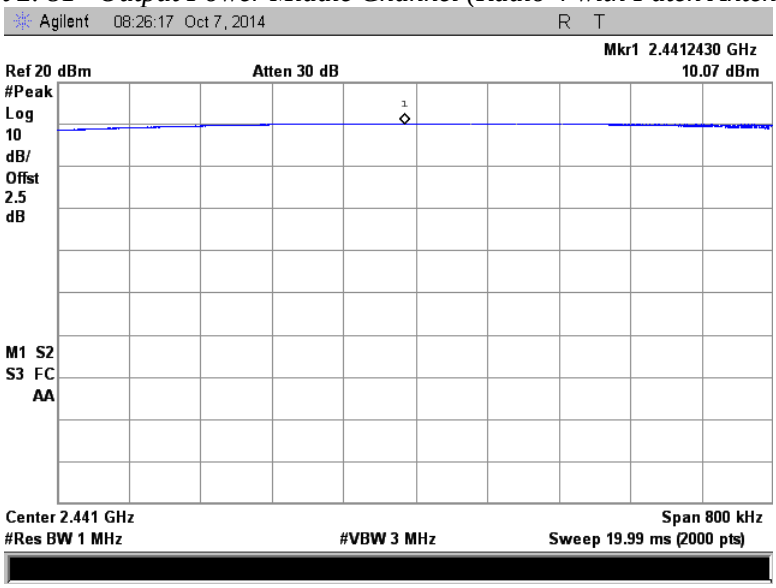


Plot 2. 70 – Output Power Low Channel (Radio 4 with Patch Antenna)

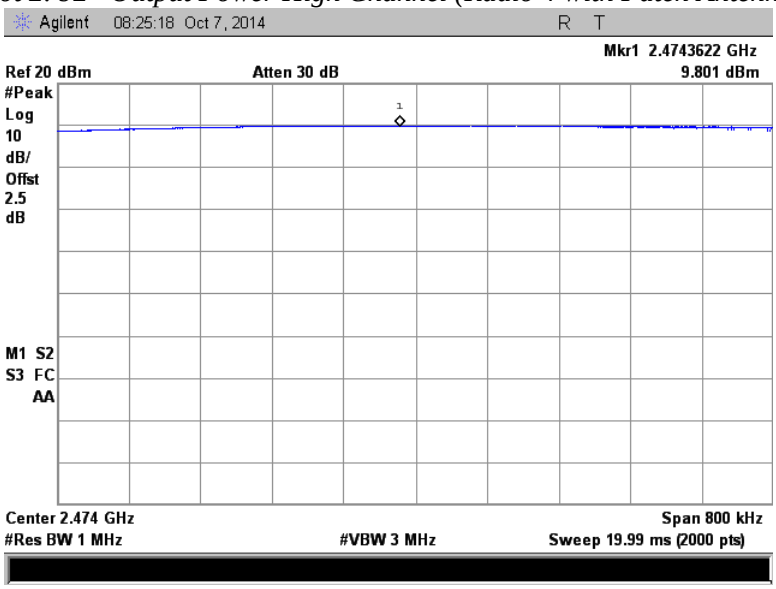


4.3.3 Output Power Test Result (Continued)

Plot 2. 81– Output Power Middle Channel (Radio 4 with Patch Antenna)



Plot 2. 92– Output Power High Channel (Radio 4 with Patch Antenna)



4.3 Carrier Frequency Separation
FCC 15.247 (a)(1)

4.3.1 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.

4.3.2 Procedure

The Procedure described in the FCC Publication DA 00-705 Released March 30, 2000 "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" was used to determine the Carrier Frequency Separation.

- The EUT must have its hopping function enabled
- Span = wide enough to capture the peaks of two adjacent channels
- Resolution (or IF) Bandwidth (RBW) = 1% of the span
- Video (or Average) Bandwidth (VBW) = 3 x RBW
- Sweep = auto
- Detector function = peak
- Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

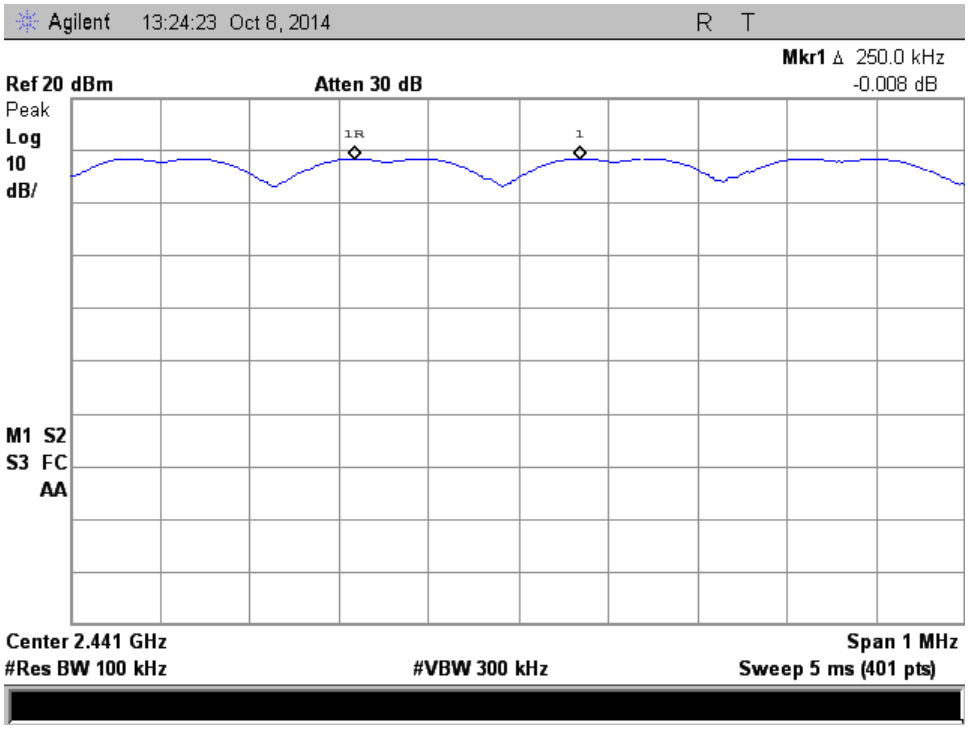
4.3.3 Test Result

The worst case 20dB Bandwidth is 158.9 kHz, therefor this bandwidth was used to calculate the minimum limit for Carrier Frequency Separation below.

(2/3) * 158.9 kHz = 105.03 kHz (minimum requirement)

The Carrier Frequency Separation is **250 kHz**, therefore meets the minimum requirement. Please refer to spectrum analyzer plot 3.1 below for the test result.

Plot 3.10– Channel Separation



Results	Complies

4.4 Number of Channels
FCC 15.247 (a)(1)(iii)

4.4.1 Requirement

Systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping channels.

4.4.2 Procedure

The Procedure described in the FCC Publication DA 00-705 Released March 30, 2000 "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" was used to determine the Number of Channels.

- The EUT must have its hopping function enabled.
- Span = the frequency band of operation
- RBW = 1% of the span
- VBW = 3 x RBW
- Sweep = auto
- Detector function = peak
- Trace = max hold

Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

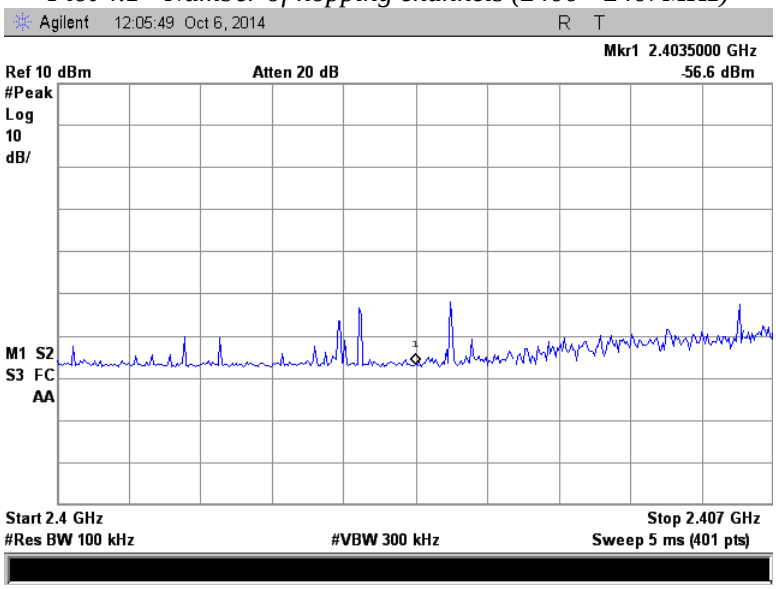
With the analyzer set to MAX HOLD, readings were taken once channels were filled in. The traces were broken down into 7 MHz spans from 2400 to 2483.5MHz. The channel peaks were recorded and compared to the minimum number of channels required in the regulation.

4.4.3 Test Result

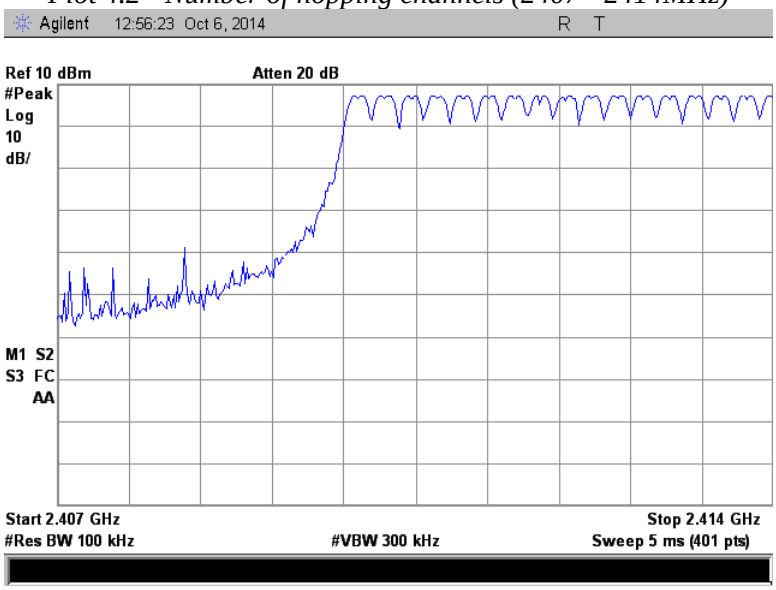
The Number of hopping channels counted are 256.

Results	**Complies**

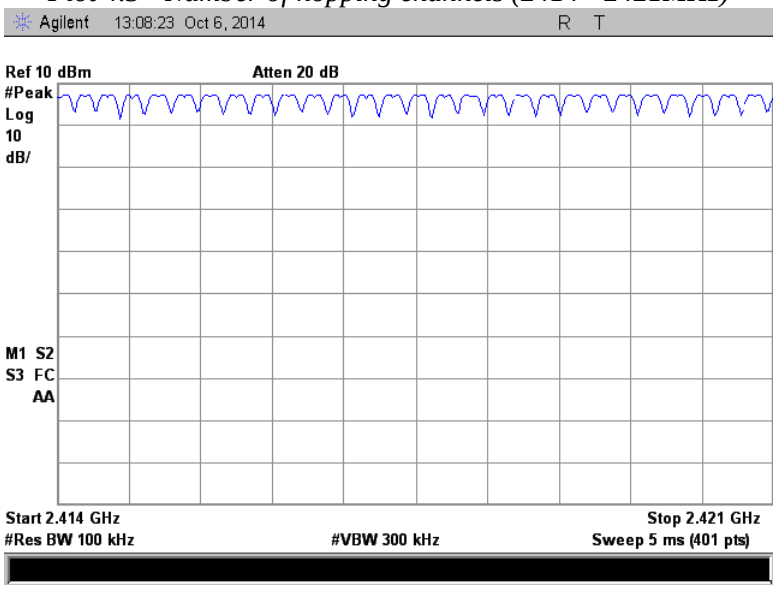
Plot 4.1 - Number of hopping channels (2400 - 2407MHz)



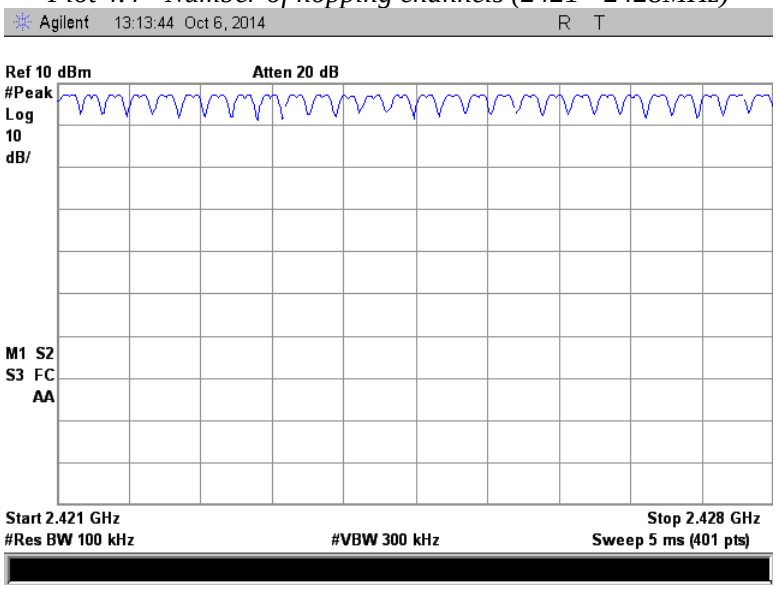
Plot 4.2 - Number of hopping channels (2407 - 2414MHz)



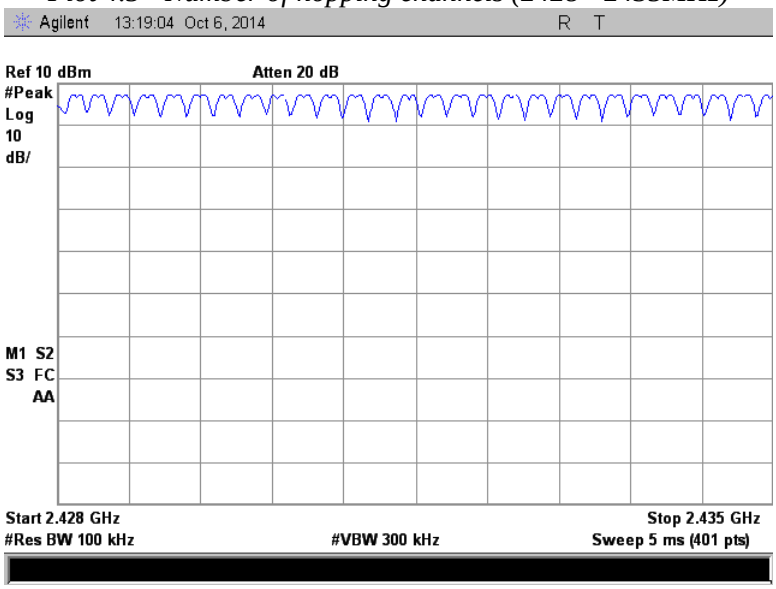
Plot 4.3 - Number of hopping channels (2414 - 2421MHz)



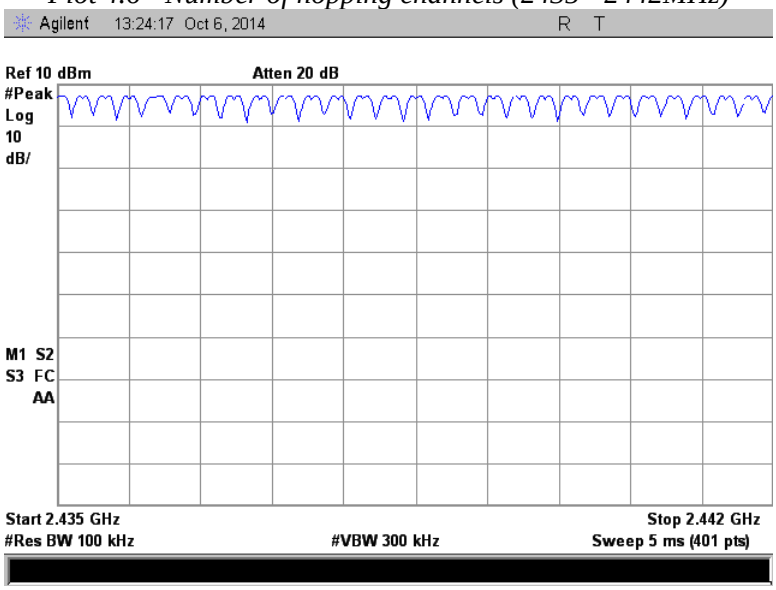
Plot 4.4 - Number of hopping channels (2421 - 2428MHz)



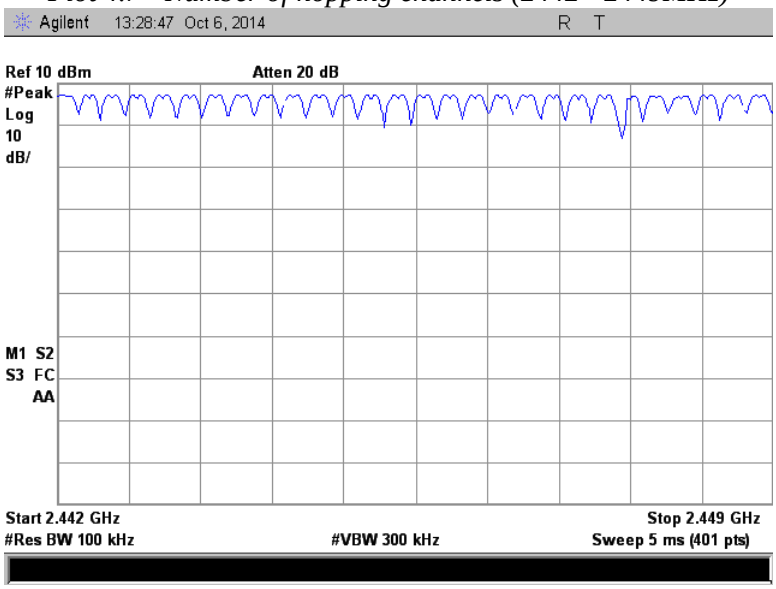
Plot 4.5 - Number of hopping channels (2428 - 2435MHz)



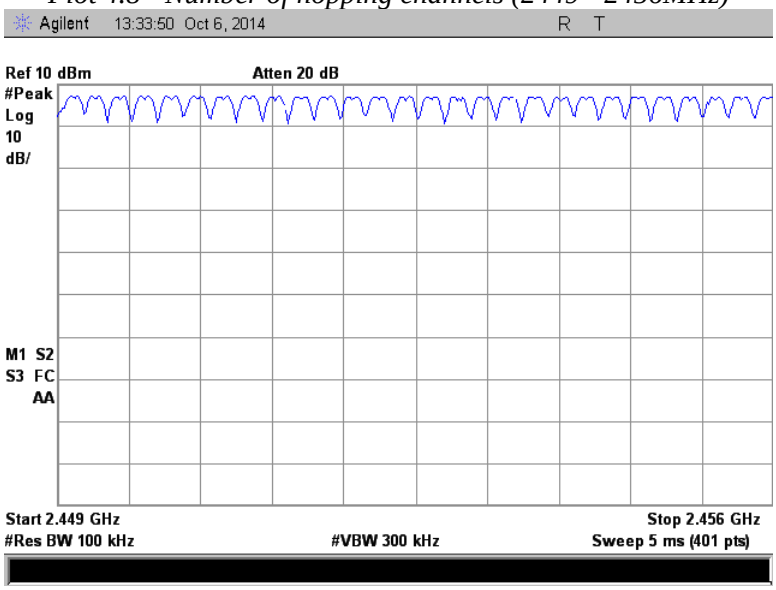
Plot 4.6 - Number of hopping channels (2435 - 2442MHz)



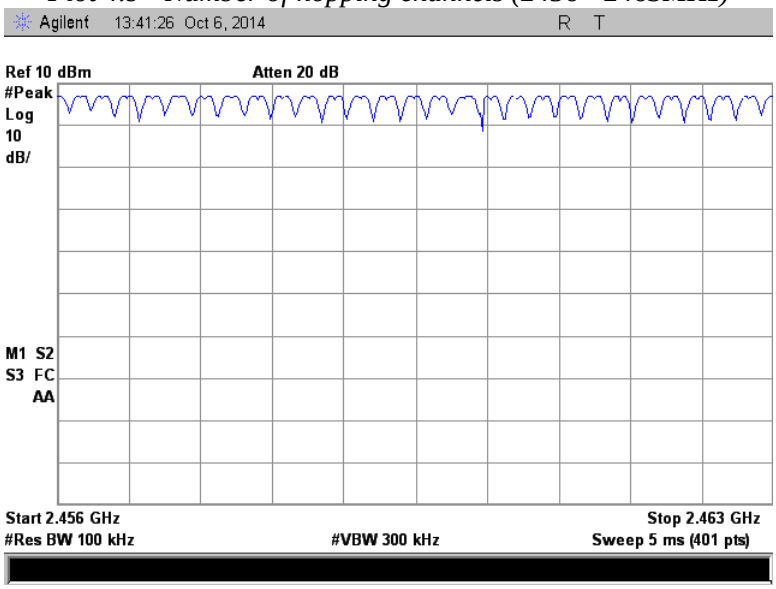
Plot 4.7 - Number of hopping channels (2442 - 2449MHz)



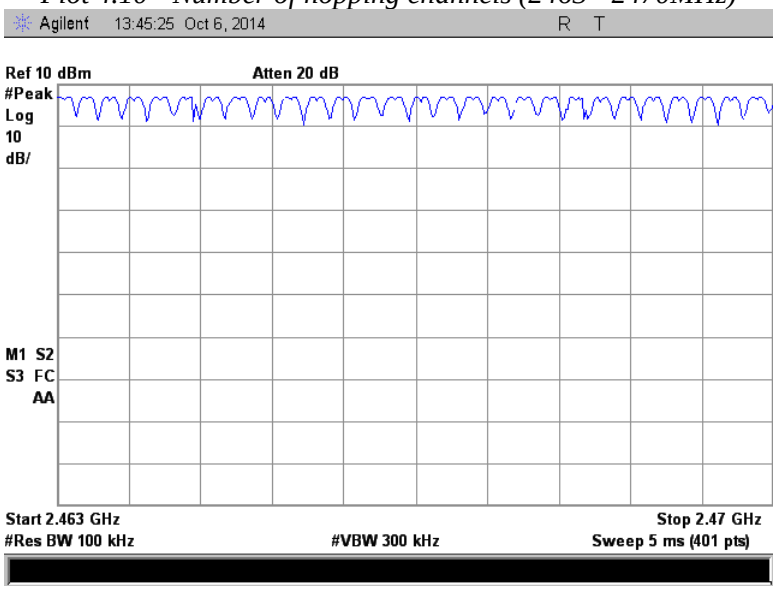
Plot 4.8 - Number of hopping channels (2449 - 2456MHz)



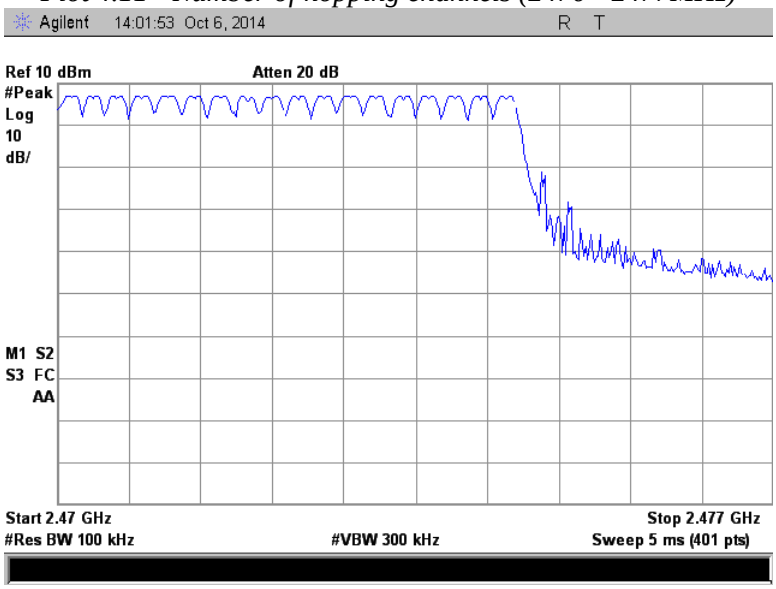
Plot 4.9 - Number of hopping channels (2456 - 2463MHz)



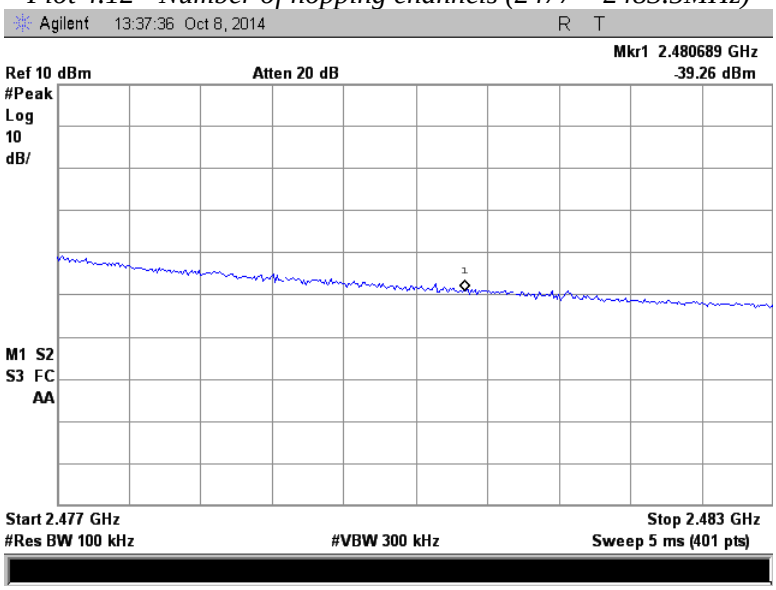
Plot 4.10 - Number of hopping channels (2463 - 2470MHz)



Plot 4.11 - Number of hopping channels (2470 - 2477MHz)



Plot 4.12 - Number of hopping channels (2477 – 2483.5MHz)



4.5 Average Channel Occupancy Time
FCC 15.247(a)(1)

4.5.1 Requirement

For systems operating in the 2400-2483.5 MHz band, the average time of occupancy on any channel shall not be greater than 0.4 second within a period of 0.4 second multiplied by the number of hopping channels employed.

4.5.2 Procedure

The Procedure described in the FCC Publication DA 00-705 Released March 30, 2000 “Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems” was used to determine the Average Channel Occupancy Time.

- The EUT must have its hopping function enabled.
- Span = zero span, centered on a hopping channel
- RBW = 1 MHz
- VBW = 3 x RBW
- Sweep = as necessary to capture the entire dwell time per hopping channel
- Detector function = peak
- Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. An oscilloscope may be used instead of a spectrum analyzer.

The spectrum analyzer center frequency was set to one of the known hopping channels, the SPAN was set to ZERO SPANS, and the TRIGGER was set to VIDEO. The time duration of the transmission so captured was measured with the MARKER DELTA function.

Since the radio is employed 256 hopping channels, the Occupancy Time was calculated for the period of 0.4 * 256 = 102.4 sec.

4.5.3 Test Results

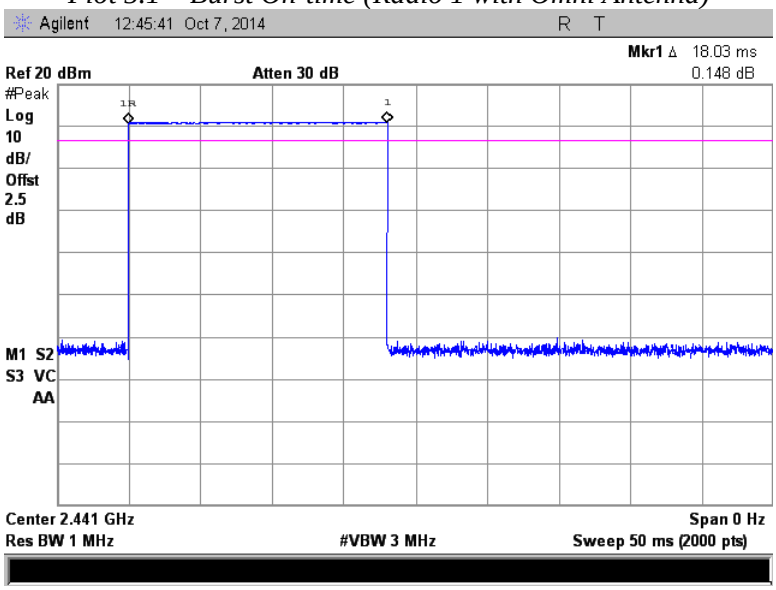
Results	**Complies**

4.5.3 Test Results (Continued)

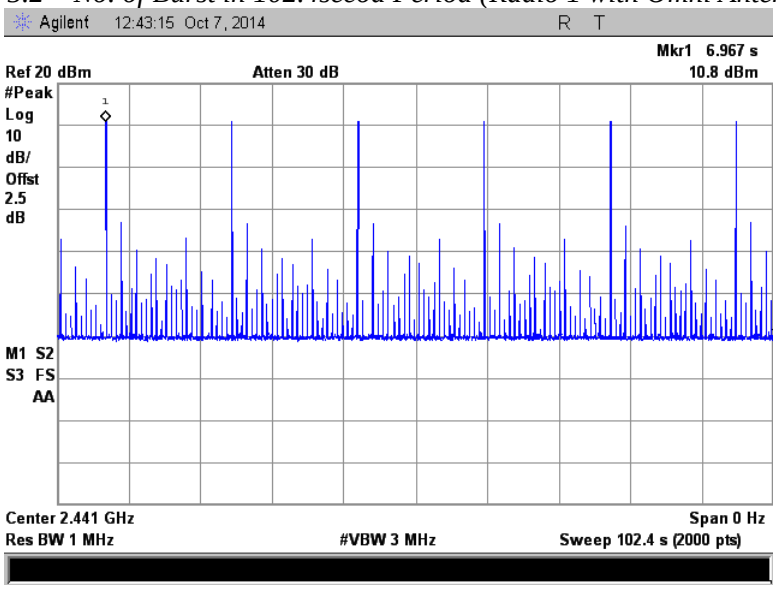
Radio 1 with Omni Antenna

No. of Burst in 102.4 Second Period	Burst On Time (ms)	Dwell Time (ms)	Dwell Time limit (ms)
6	18.03	108.18	400

Plot 5.1 – Burst On-time (Radio 1 with Omni Antenna)



Plot 5.2 – No. of Burst in 102.4secod Period (Radio 1 with Omni Antenna)

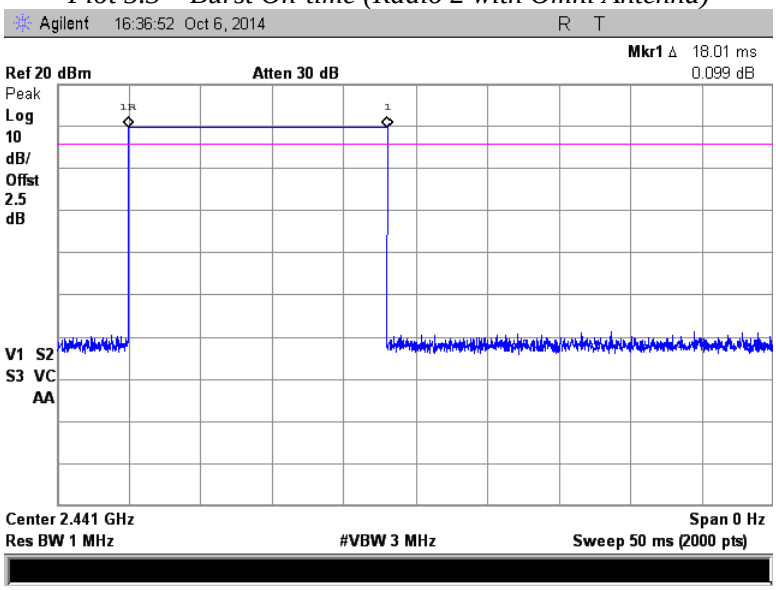


4.5.3 Test Results (Continued)

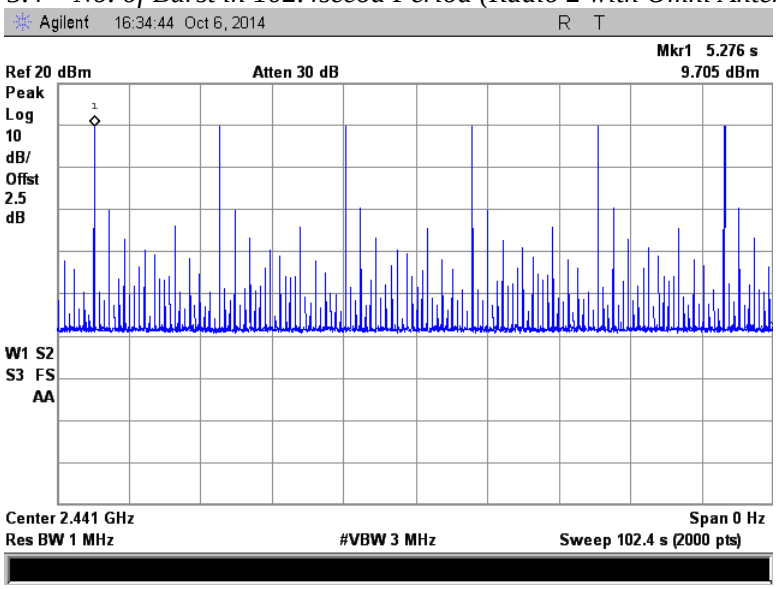
Radio 2 with Omni Antenna

No. of Burst in 102.4 Second Period	Burst On Time (ms)	Dwell Time (ms)	Dwell Time limit (ms)
6	18.01	108.06	400

Plot 5.3 – Burst On-time (Radio 2 with Omni Antenna)



Plot 5.4 – No. of Burst in 102.4secod Period (Radio 2 with Omni Antenna)

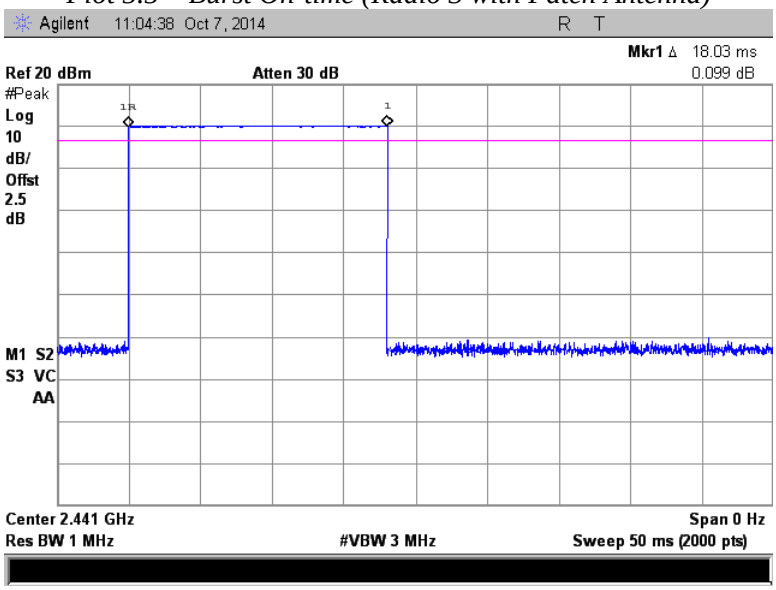


4.5.3 Test Results (Continued)

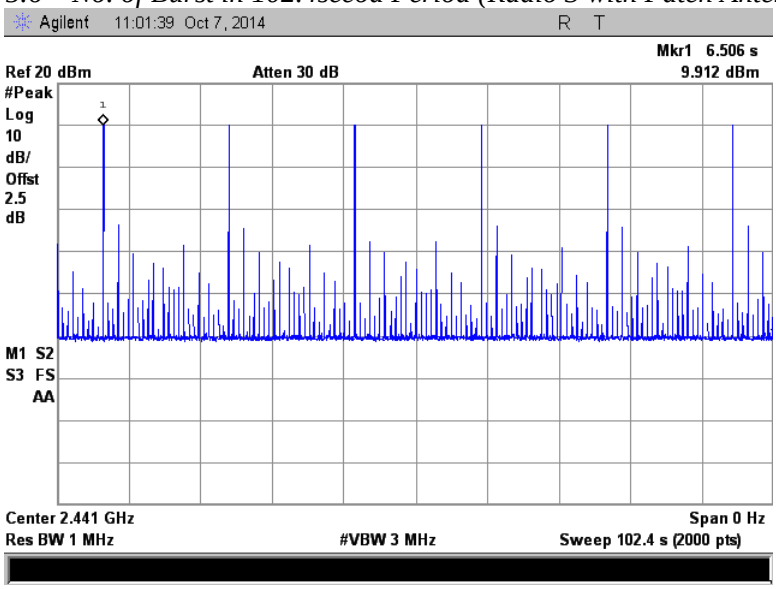
Radio 3 with Patch Antenna

No. of Burst in 102.4 Second Period	Burst On Time (ms)	Dwell Time (ms)	Dwell Time limit (ms)
6	18.03	108.18	400

Plot 5.5 – Burst On-time (Radio 3 with Patch Antenna)



Plot 5.6 – No. of Burst in 102.4secod Period (Radio 3 with Patch Antenna)

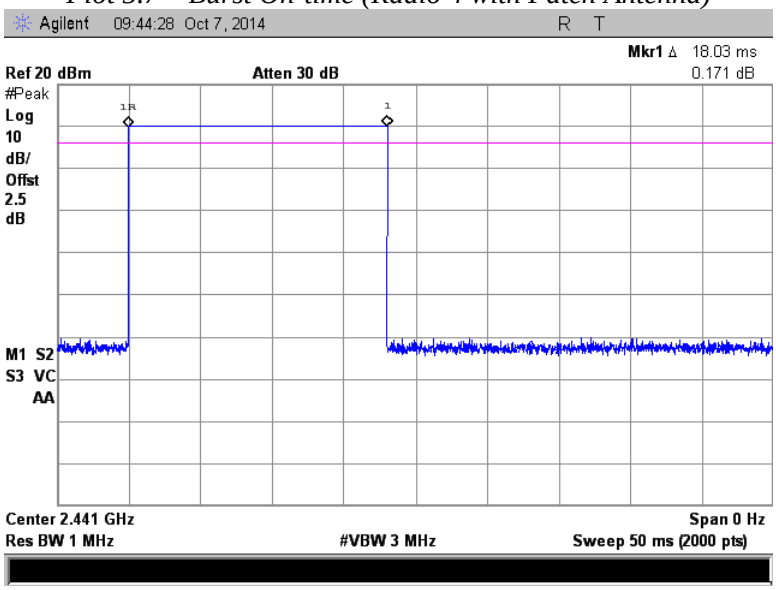


4.5.3 Test Results (Continued)

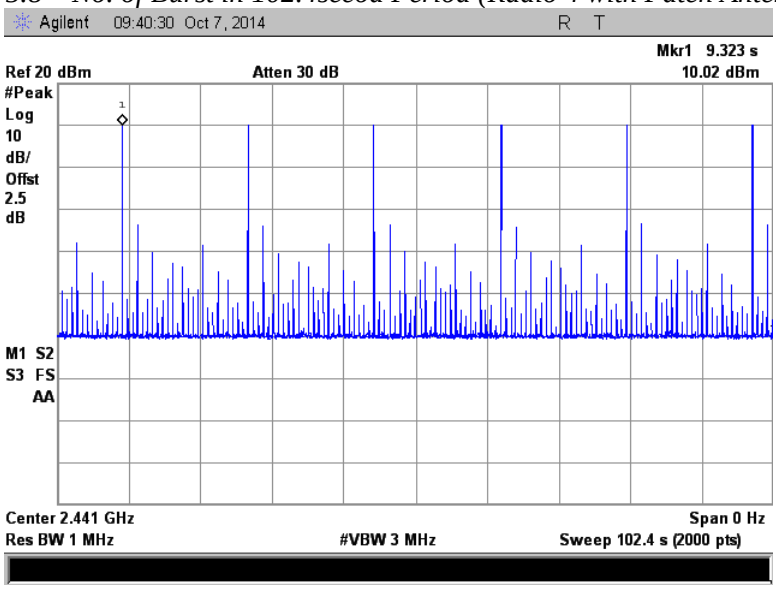
Radio 4 with Patch Antenna

No. of Burst in 102.4 Second Period	Burst On Time (ms)	Dwell Time (ms)	Dwell Time limit (ms)
6	18.03	108.18	400

Plot 5.7 – Burst On-time (Radio 4 with Patch Antenna)



Plot 5.8 – No. of Burst in 102.4secod Period (Radio 4 with Patch Antenna)



4.6 Out-of-Band Conducted Emissions
FCC 15.247(d)

4.6.1 Requirement

In any 100 kHz bandwidths outside the EUT pass-band, the RF power shall be at least 20dB (peak) or 30 dB (average) below that of the maximum in-band 100 kHz emissions.

4.6.2 Procedure

The Procedure described in the FCC Publication DA 00-705 Released March 30, 2000 “Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems” was used to determine the Out-of-Band Conducted Emissions.

- Span = wide enough to capture the peak level of the in-band emission and all spurious
- emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the
- 10th harmonic. Typically, several plots are required to cover this entire span.
- RBW = 100 kHz
- VBW = 3 x RBW
- Sweep = auto
- Detector function = peak
- Trace = max hold

Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.

A spectrum analyzer was connected to the antenna port of the transmitter. Analyzer Resolution Bandwidth was set to 100 kHz. For each channel investigated, the in-band and out-of-band emission measurements were performed. The out-of-band emissions were measured from 30 MHz to 26 GHz.

4.6.3 Test Result

Refer to the following plots and out-of-band conducted spurious emissions at the Band-Edge, Table 4.1 & 4.2 for the test results:

Table 4.1

Radio	Channel	Frequency MHz	Description	Plot #
Radio 1 Omni Antenna	0	2409.950	Scan 30 MHz – 26 GHz	4.1
	124	2441.283	Scan 30 MHz – 26 GHz	4.2
	255	2474.385	Scan 30 MHz – 26 GHz	4.3
Radio 2 Omni Antenna	0	2409.950	Scan 30 MHz – 26 GHz	4.4
	124	2441.283	Scan 30 MHz – 26 GHz	4.5
	255	2474.385	Scan 30 MHz – 26 GHz	4.6
Radio 3 Patch Antenna	0	2409.950	Scan 30 MHz – 26 GHz	4.7
	124	2441.283	Scan 30 MHz – 26 GHz	4.8
	255	2474.385	Scan 30 MHz – 26 GHz	4.9
Radio 4 Patch Antenna	0	2409.950	Scan 30 MHz – 26 GHz	4.10
	124	2441.283	Scan 30 MHz – 26 GHz	4.11
	255	2474.385	Scan 30 MHz – 26 GHz	4.12

Out-of-Band Conducted Spurious Emissions at the Band-Edge:

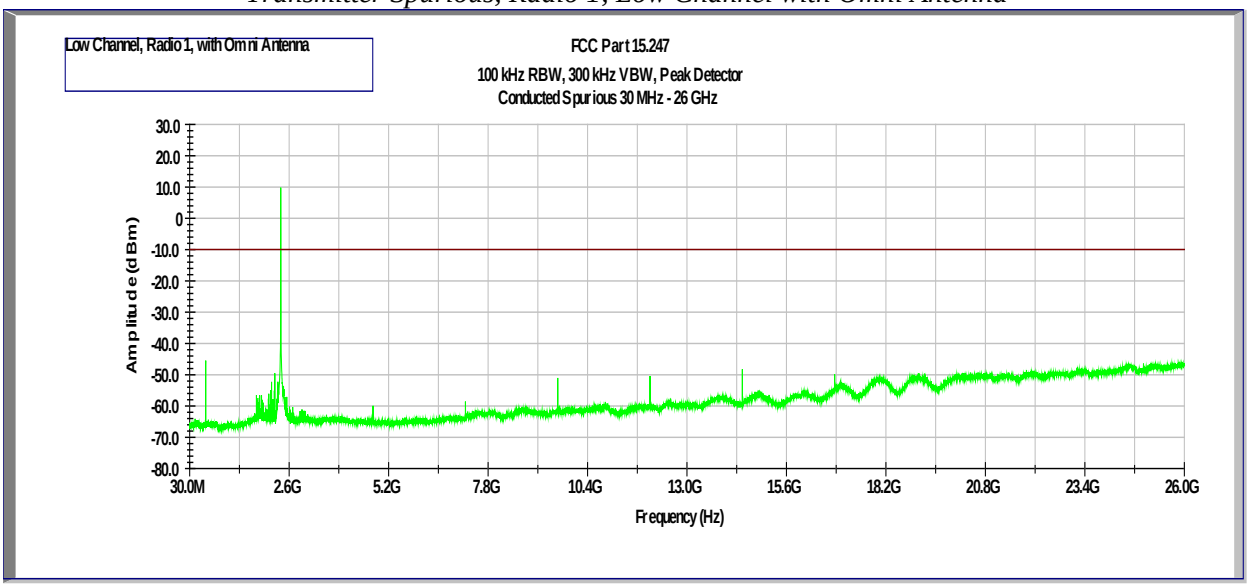
Table 4.2

Radio	Channel	Frequency MHz	Out-band emissions margin to In-band emissions (dB)	Plot #
Radio 1 Omni Antenna	0	2409.950	-49.84	4.13
	255	2474.385	-49.10	4.14
Radio 2 Omni Antenna	0	2409.950	-49.86	4.15
	255	2474.385	-48.74	4.16
Radio 3 Patch Antenna	0	2409.950	-49.92	4.17
	255	2474.385	-48.88	4.18
Radio 4 Patch Antenna	0	2409.950	-50.24	4.19
	255	2474.385	-49.90	4.20

Results	Complies

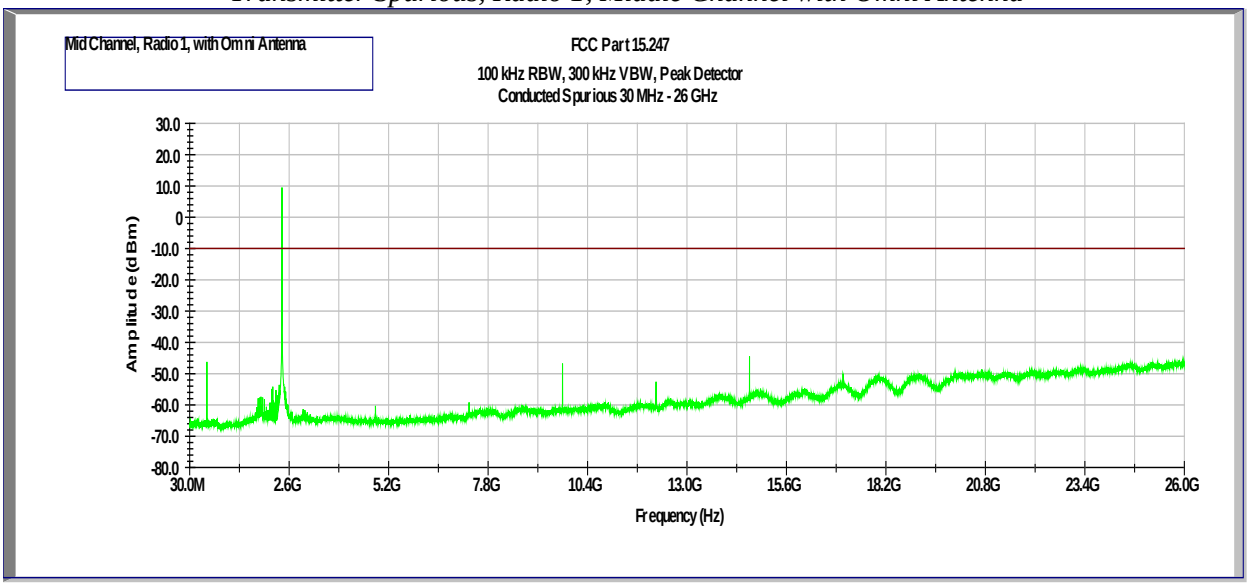
Plot 4.1

Transmitter Spurious, Radio 1, Low Channel with Omni Antenna



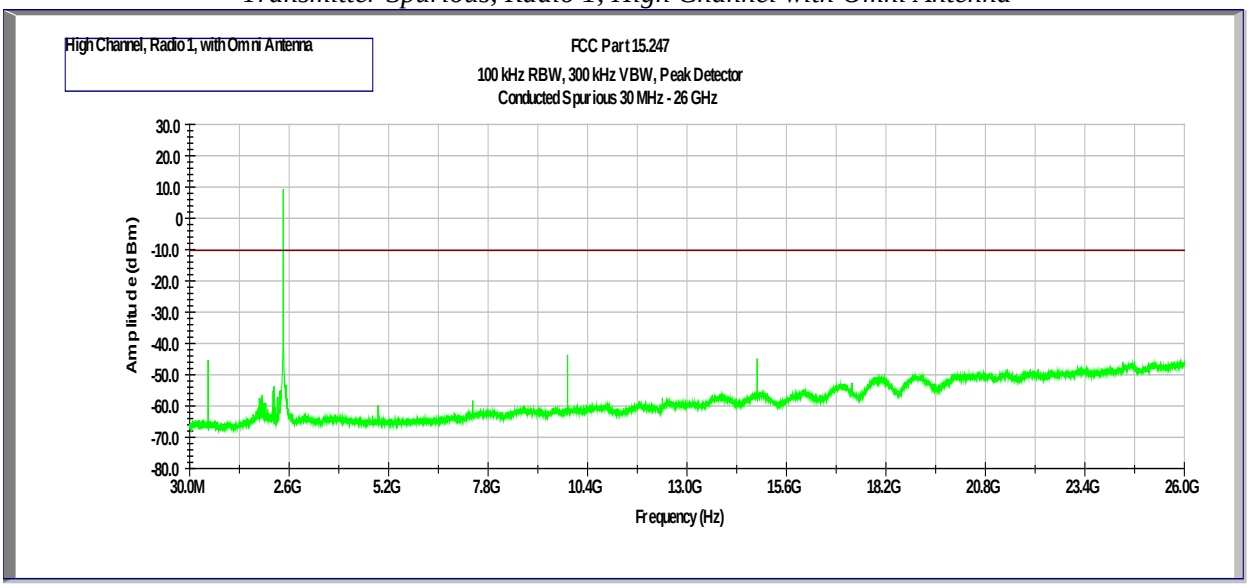
Plot 4.2

Transmitter Spurious, Radio 1, Middle Channel with Omni Antenna



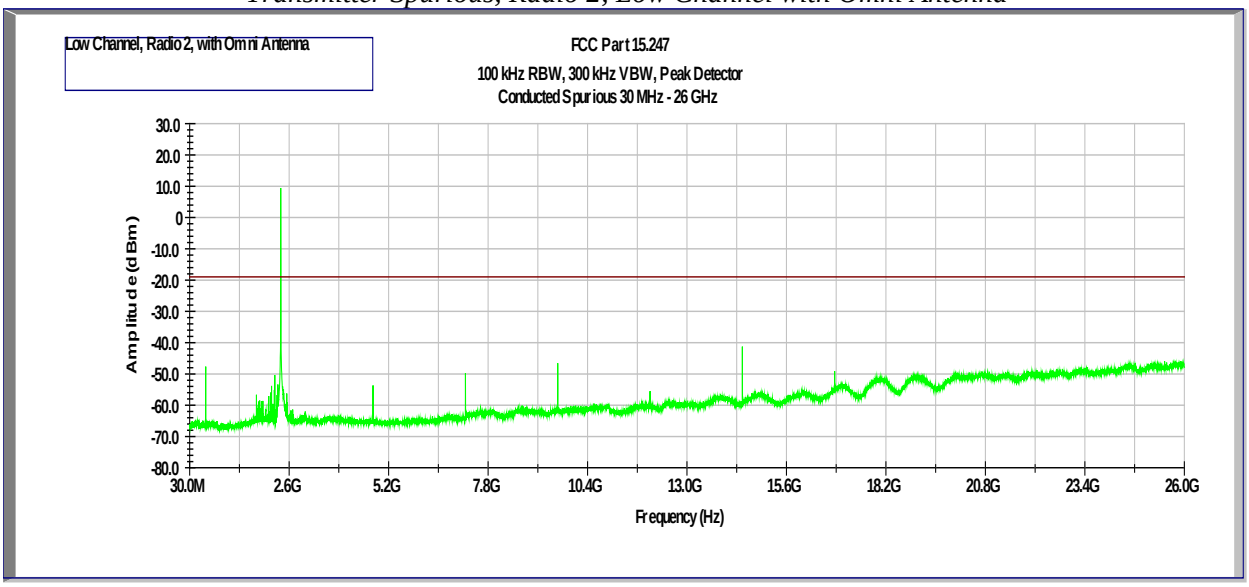
Plot 4.3

Transmitter Spurious, Radio 1, High Channel with Omni Antenna



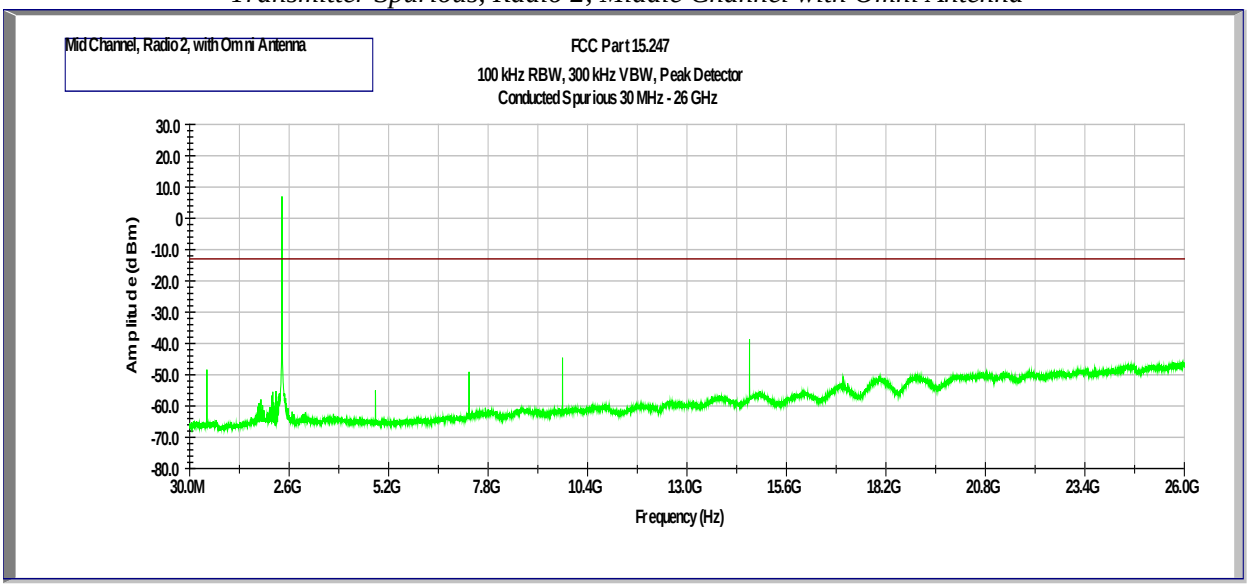
Plot 4.4

Transmitter Spurious, Radio 2, Low Channel with Omni Antenna



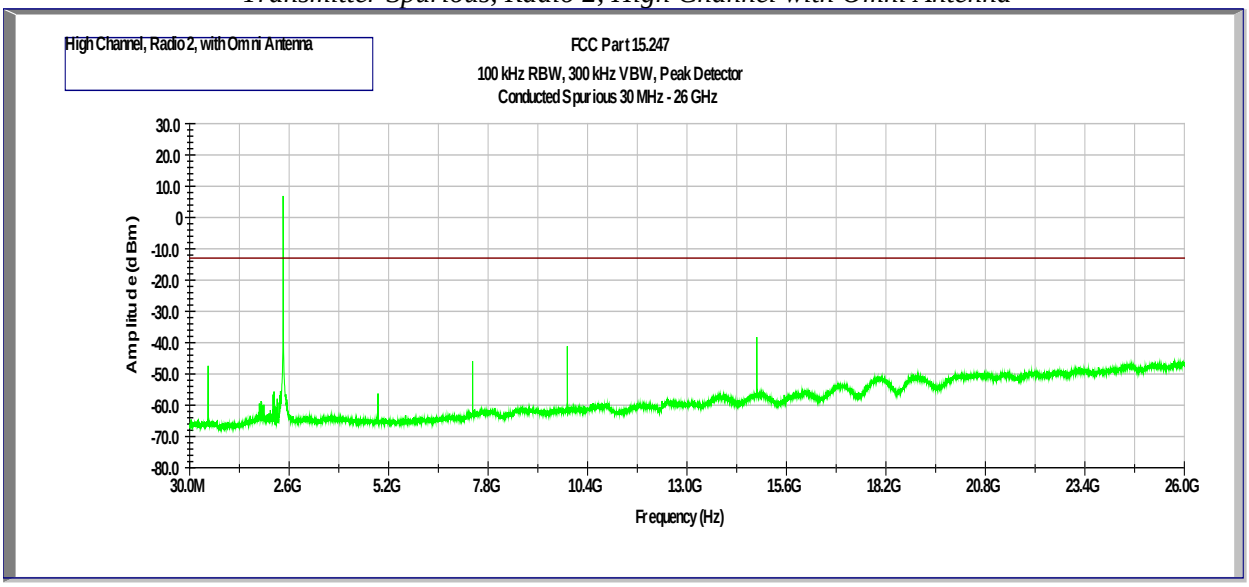
Plot 4.5

Transmitter Spurious, Radio 2, Middle Channel with Omni Antenna



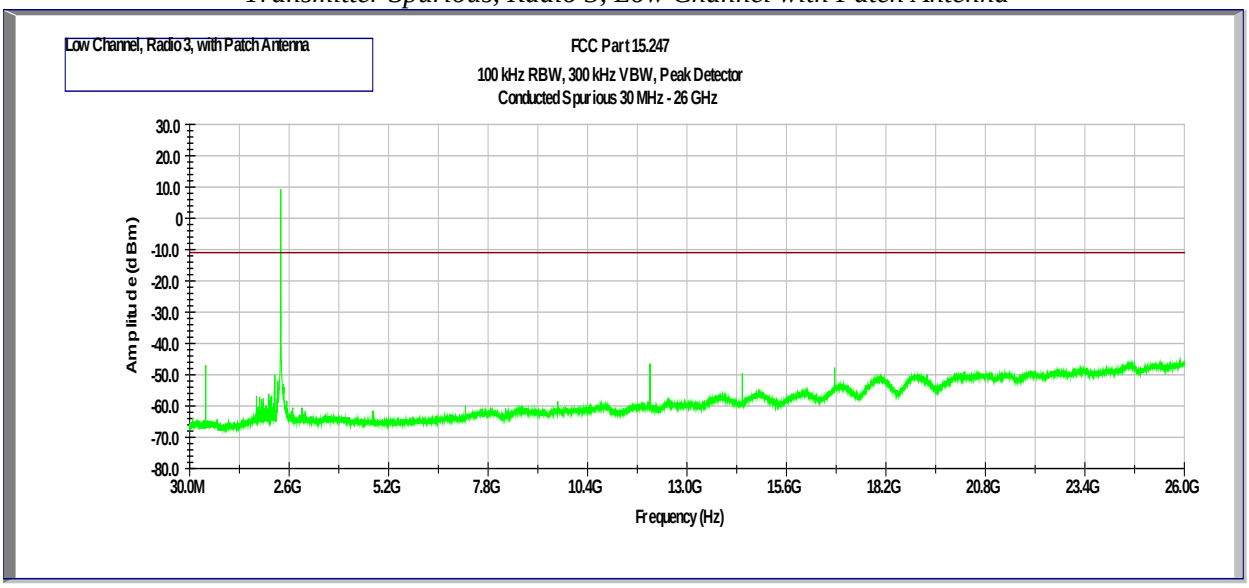
Plot 4.6

Transmitter Spurious, Radio 2, High Channel with Omni Antenna



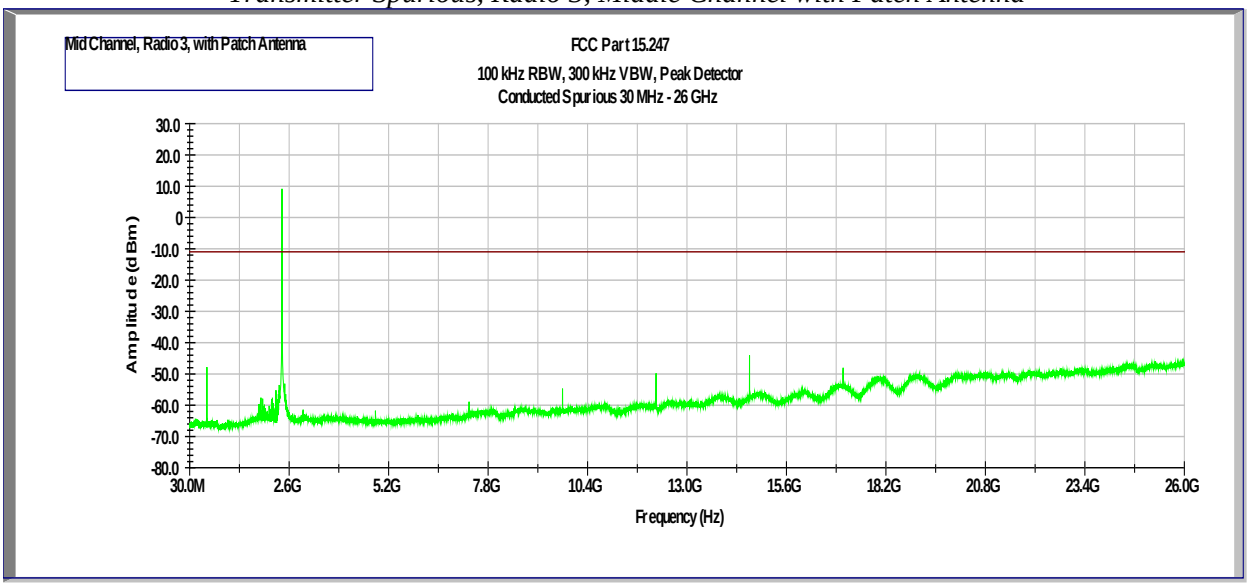
Plot 4.7

Transmitter Spurious, Radio 3, Low Channel with Patch Antenna



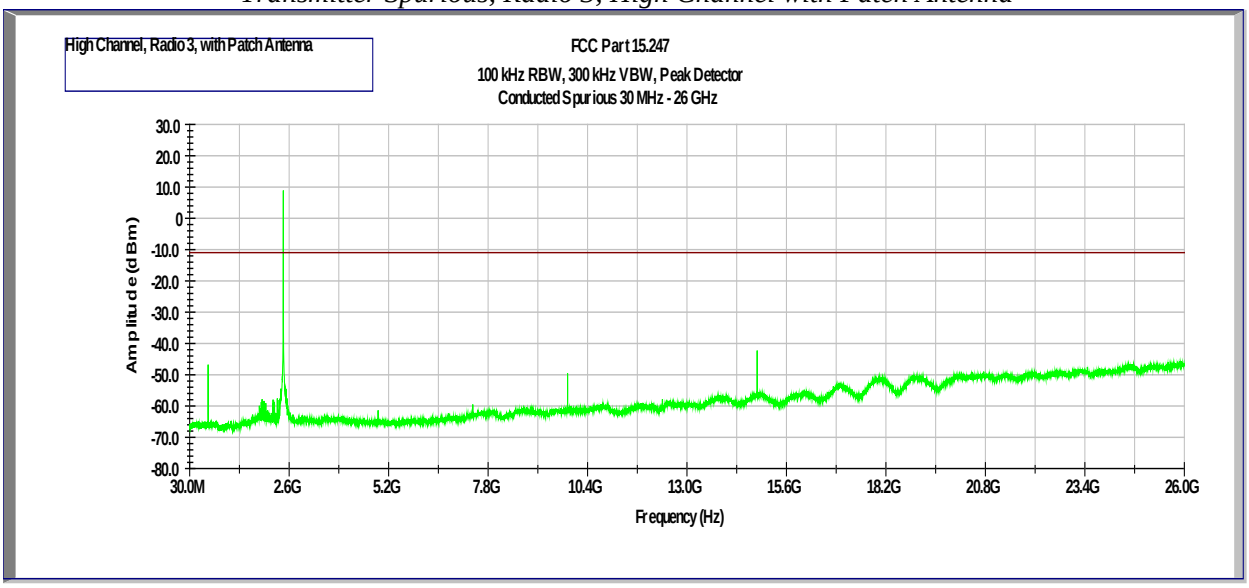
Plot 4.8

Transmitter Spurious, Radio 3, Middle Channel with Patch Antenna



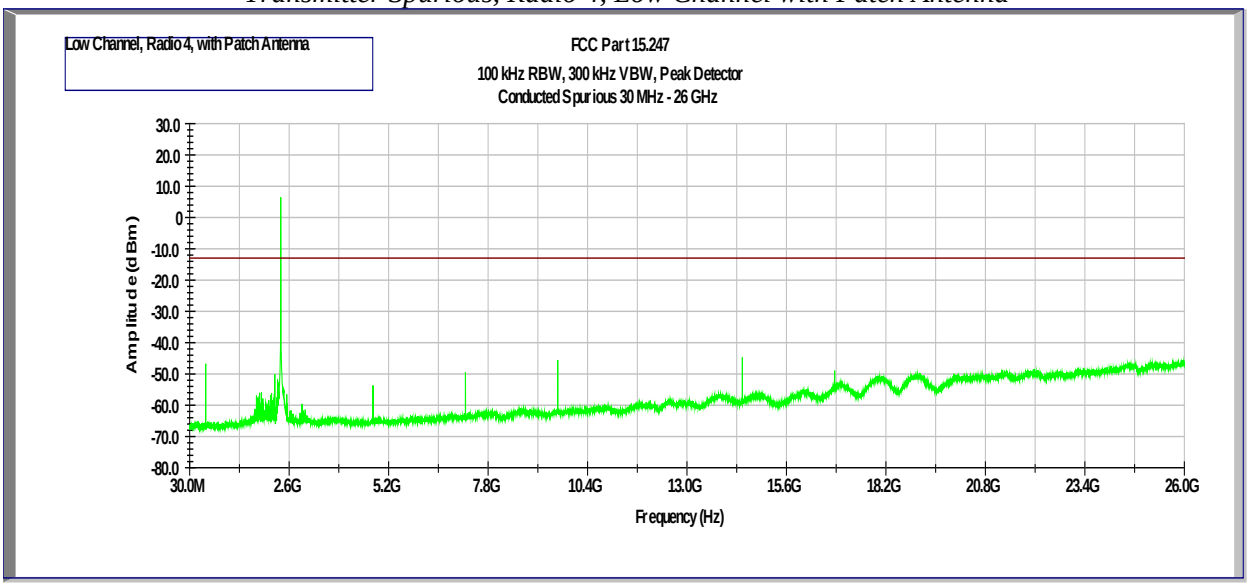
Plot 4.9

Transmitter Spurious, Radio 3, High Channel with Patch Antenna



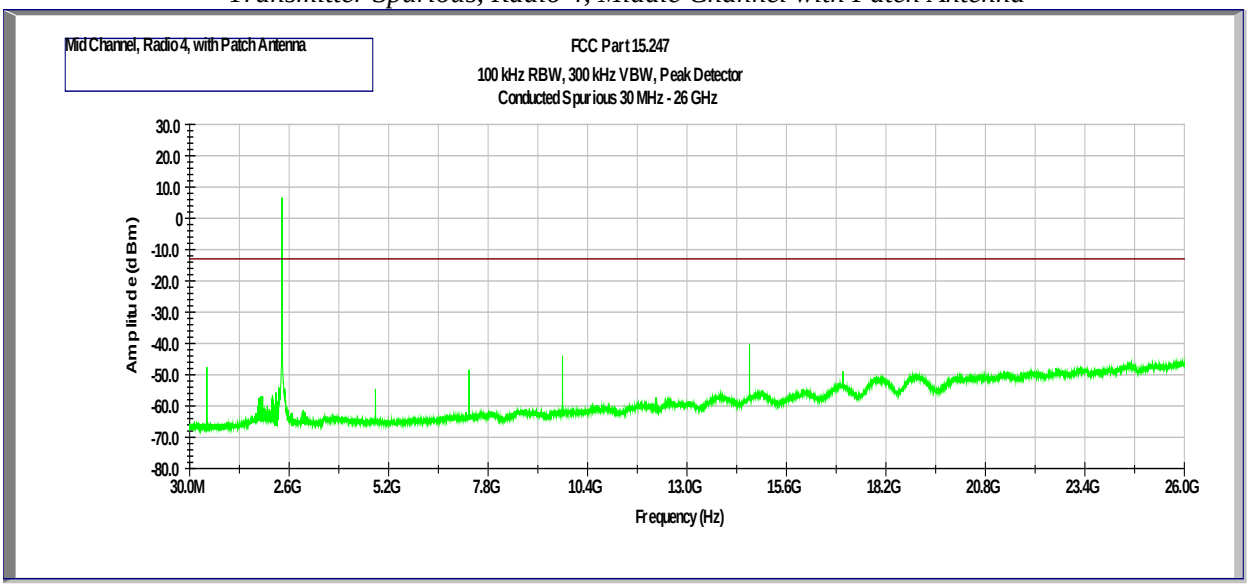
Plot 4.10

Transmitter Spurious, Radio 4, Low Channel with Patch Antenna



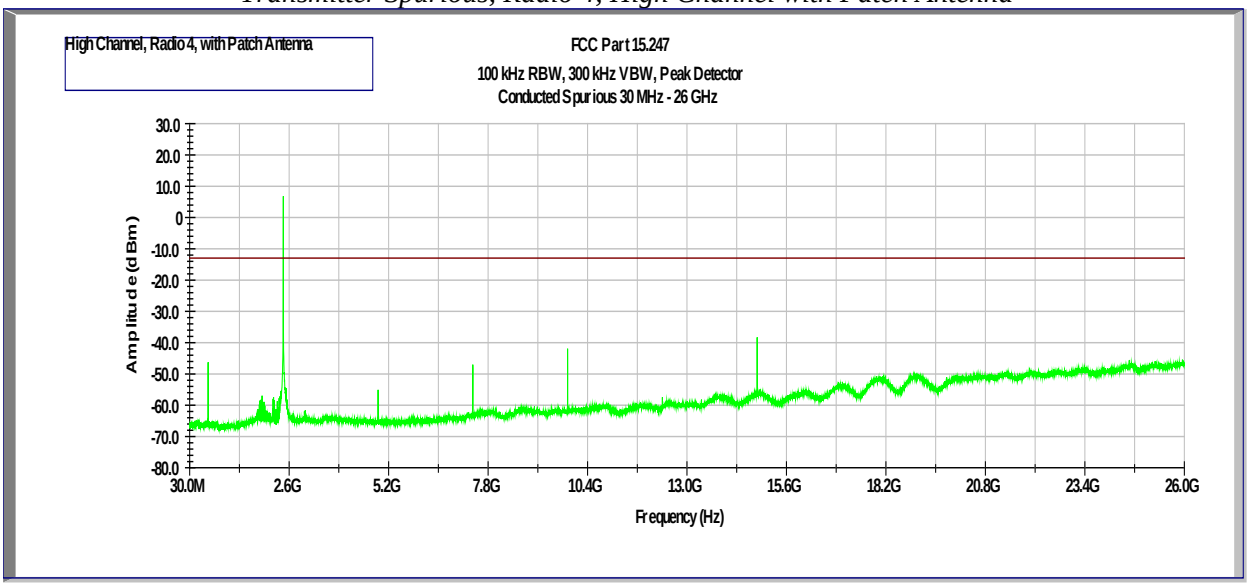
Plot 4.11

Transmitter Spurious, Radio 4, Middle Channel with Patch Antenna



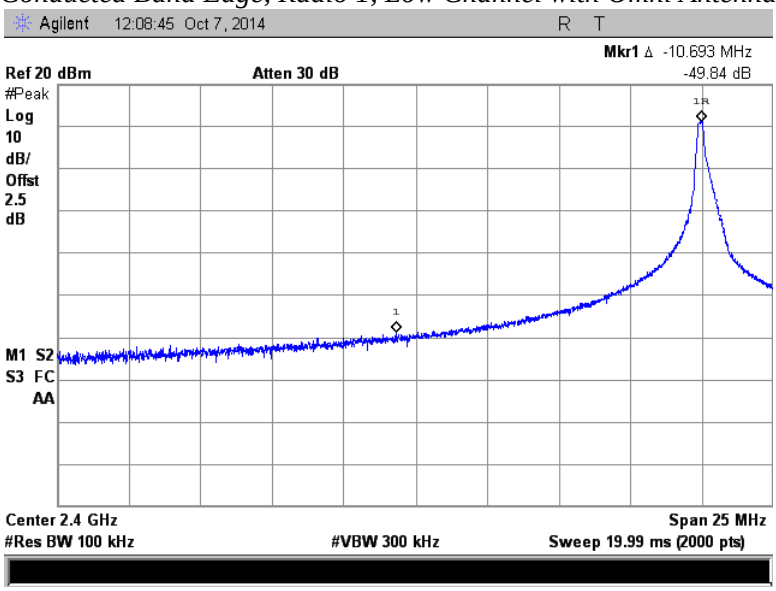
Plot 4.12

Transmitter Spurious, Radio 4, High Channel with Patch Antenna



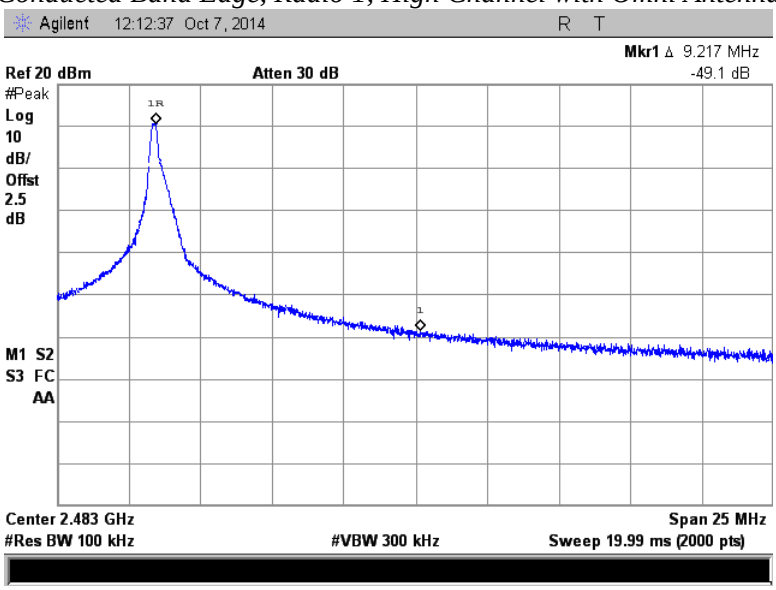
Plot 4.13

Conducted Band Edge, Radio 1, Low Channel with Omni Antenna



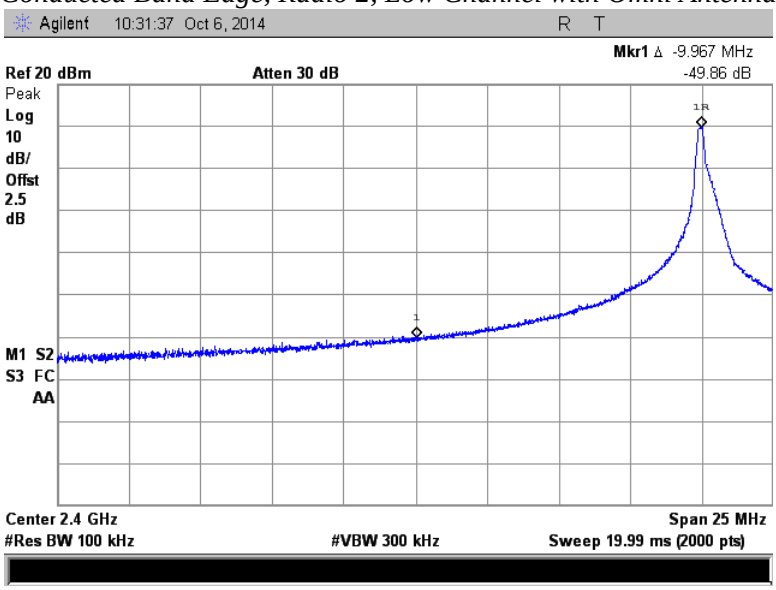
Plot 4.14

Conducted Band Edge, Radio 1, High Channel with Omni Antenna



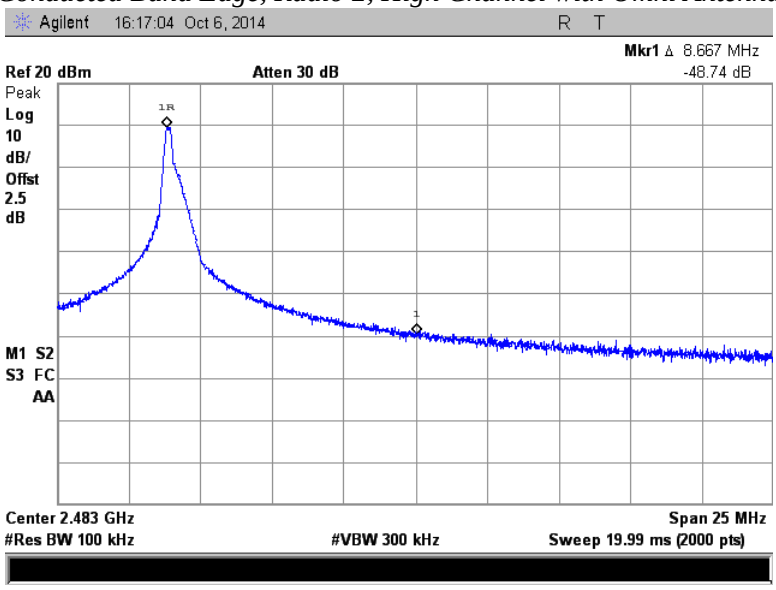
Plot 4.15

Conducted Band Edge, Radio 2, Low Channel with Omni Antenna



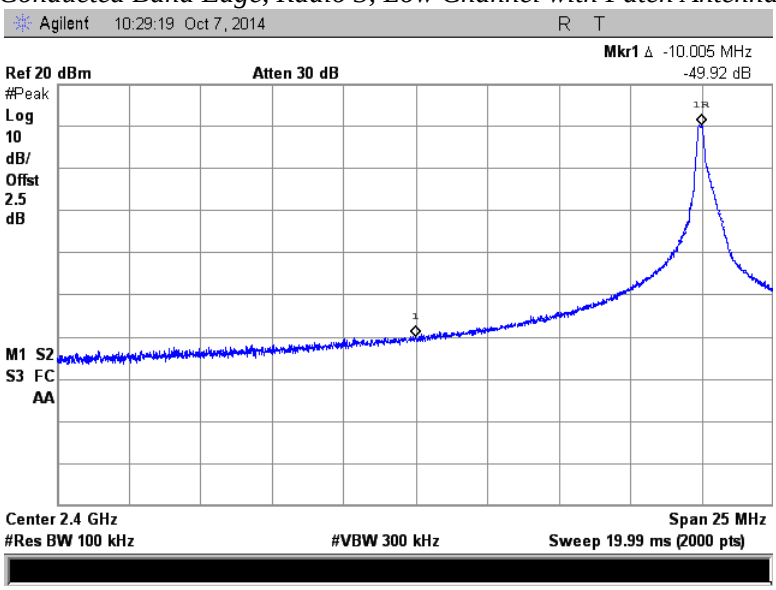
Plot 4.16

Conducted Band Edge, Radio 2, High Channel with Omni Antenna



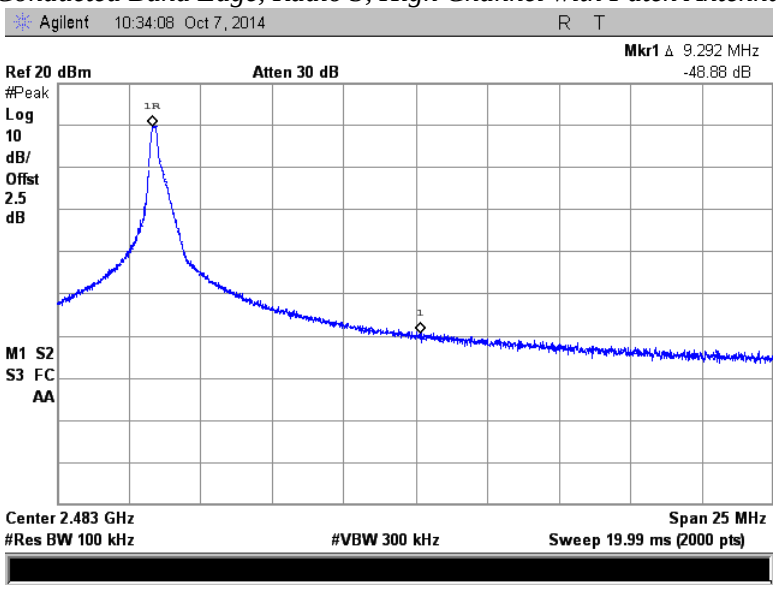
Plot 4.17

Conducted Band Edge, Radio 3, Low Channel with Patch Antenna



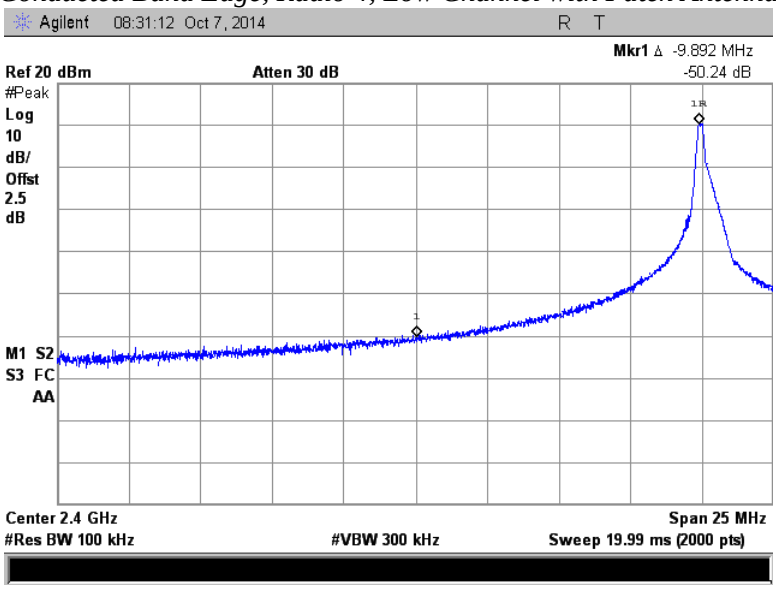
Plot 4.18

Conducted Band Edge, Radio 3, High Channel with Patch Antenna



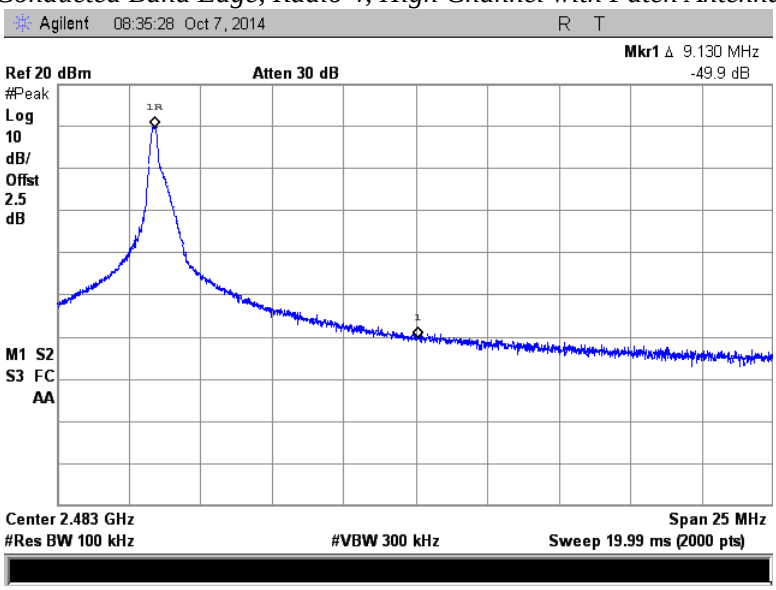
Plot 4.19

Conducted Band Edge, Radio 4, Low Channel with Patch Antenna



Plot 4.20

Conducted Band Edge, Radio 4, High Channel with Patch Antenna



4.7 Transmitter Radiated Emissions
FCC Rule 15.247(d), 15.209, 15.205

4.7.1 Requirement

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

For out of band radiated emissions (except for frequencies in restricted bands), in any 100 kHz bandwidths outside the EUT pass-band, the RF power shall be at least 20dB (peak) or 30 dB (average) below that of the maximum in-band 100 kHz emissions.

4.7.2 Procedure

Radiated emission measurements were performed from 30 MHz to 26,000 MHz. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz for frequencies above 1000 MHz.

The EUT is placed on a plastic turntable that is 80 cm in height. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing, all cables were manipulated to produce worst-case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at 3 meters

Measurements made from 1 GHz to 18GHz had a 2.4-2.5GHz notch filter in place. A preamp was used from 30MHz to 26GHz.

All measurements were made with a Peak Detector and compared to QP limits for 30MHz – 1GHz and Average or Peak limits for 1GHz – 26GHz where applicable.

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels).

4.7.3 Field Strength Calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF – AG; if measurement is performed at a distance other than specified in the rule, a Distance Correction Factor (DCF) shall be added.

Where FS = Field Strength in dB(μV/m)
RA = Receiver Amplitude (including preamplifier) in dB(μV); AF = Antenna Factor in dB(1/m)
CF = Cable Attenuation Factor in dB; AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB(μV) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μV/m). This value in dB(μV/m) was converted to its corresponding level in μV/m.
RA = 52.0 dB(μV)
AF = 7.4 dB(1/m)
CF = 1.6 dB
AG = 29.0 dB
FS = 52.0+7.4+1.6-29.0 = 32 dB(μV/m).
Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m.

4.7.4 Test Results

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Radiated emission measurements were performed up to 26GHz. No other emissions were detected above the noise floor which is at least 10 dB below the limit.

4.7.4 Test Results (Continued)

FCC 15.209, 30MHz to 1GHz

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
MHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg/ QP	FCC 15.209, dB(uV/m)	FCC 15.209, dB
Radio 1, With Omni Antenna, Low Channel									
169.952	V	51.5	27.7	12.1	0.9	36.8	Pk	43.5	-6.7
175.000	V	51.1	27.7	11.7	0.9	36.0	Pk	43.5	-7.5
181.490	V	51.4	27.6	11.4	0.9	36.1	Pk	43.5	-7.4
185.096	V	50.0	27.6	11.3	0.9	34.6	Pk	43.5	-8.9
186.539	V	50.0	27.6	11.3	0.9	34.6	Pk	43.5	-8.9
209.615	V	50.6	27.5	10.6	1.0	34.7	Pk	43.5	-8.8
213.221	V	51.3	27.5	10.5	1.0	35.3	Pk	43.5	-8.2
220.433	V	49.0	27.5	10.8	1.0	33.3	Pk	46	-12.7
224.760	V	54.5	27.5	11.0	1.0	39.0	Pk	46	-7.0
229.808	V	46.7	27.4	11.3	1.0	31.6	Pk	46	-14.4
562.981	V	36.4	28.8	18.3	1.6	27.5	Pk	46	-18.5
613.462	V	39.8	28.9	18.9	1.7	31.5	Pk	46	-14.5
938.702	V	33.5	27.8	22.4	2.1	30.2	Pk	46	-15.8
957.452	V	34.7	27.8	22.3	2.2	31.4	Pk	46	-14.6
Radio 1, With Omni Antenna, Mid Channel									
139.664	V	45.6	27.9	12.7	0.8	31.2	Pk	43.5	-12.3
169.952	V	50.8	27.7	12.1	0.9	36.1	Pk	43.5	-7.4
175.000	V	53.9	27.7	11.7	0.9	38.8	Pk	43.5	-4.7
180.048	V	48.5	27.7	11.4	0.9	33.1	Pk	43.5	-10.4
182.212	V	49.7	27.6	11.3	0.9	34.3	Pk	43.5	-9.2
183.654	V	50.1	27.6	11.3	0.9	34.7	Pk	43.5	-8.8
186.539	V	50.4	27.6	11.3	0.9	35.0	Pk	43.5	-8.5
193.029	V	46.1	27.6	11.5	0.9	30.9	Pk	43.5	-12.6
210.337	V	44.8	27.5	10.5	1.0	28.8	Pk	43.5	-14.7
220.433	V	49.7	27.5	10.8	1.0	34.0	Pk	46	-12.0
275.240	V	40.4	27.4	13.2	1.1	27.3	Pk	46	-18.7
525.481	V	37.5	28.6	18.5	1.6	29.0	Pk	46	-17.0
756.971	V	38.2	27.9	20.7	1.9	32.9	Pk	46	-13.1
818.269	V	35.9	27.6	21.3	2.0	31.6	Pk	46	-14.4
938.702	V	35.5	27.8	22.4	2.1	32.2	Pk	46	-13.8

Radio 1, With Omni Antenna, High Channel									
139.664	V	45.6	27.9	12.7	0.8	31.2	Pk	43.5	-12.3
159.856	V	53.2	27.8	12.7	0.9	39.0	Pk	43.5	-4.5
165.625	V	48.5	27.7	12.4	0.9	34.1	Pk	43.5	-9.4
169.952	V	50.6	27.7	12.1	0.9	35.9	Pk	43.5	-7.6
175.000	V	48.9	27.7	11.7	0.9	33.8	Pk	43.5	-9.7
181.490	V	50.7	27.6	11.4	0.9	35.4	Pk	43.5	-8.1
183.654	V	51.3	27.6	11.3	0.9	35.9	Pk	43.5	-7.6
185.096	V	50.3	27.6	11.3	0.9	34.9	Pk	43.5	-8.6
187.260	V	48.0	27.6	11.3	0.9	32.6	Pk	43.5	-10.9
190.144	V	44.8	27.6	11.3	0.9	29.4	Pk	43.5	-14.1
193.029	V	45.2	27.6	11.5	0.9	30.0	Pk	43.5	-13.5
198.077	V	49.0	27.6	12.0	0.9	34.3	Pk	43.5	-9.2
209.615	V	50.2	27.5	10.6	1.0	34.3	Pk	43.5	-9.2
220.433	V	49.1	27.5	10.8	1.0	33.4	Pk	46	-12.6
229.808	V	48.4	27.4	11.3	1.0	33.3	Pk	46	-12.7
275.240	V	39.5	27.4	13.2	1.1	26.4	Pk	46	-19.6
507.452	V	34.8	28.5	17.9	1.5	25.7	Pk	46	-20.3
684.135	V	34.6	28.5	20.0	1.8	27.9	Pk	46	-18.1
756.971	V	40.1	27.9	20.7	1.9	34.8	Pk	46	-11.2
818.269	V	33.6	27.6	21.3	2.0	29.3	Pk	46	-16.7
957.452	V	35.8	27.8	22.3	2.2	32.5	Pk	46	-13.5
995.673	V	35.0	27.7	22.7	2.2	32.2	Pk	54	-21.8
Radio 2, With Omni Antenna, Low Channel									
139.664	V	47.1	27.9	12.7	0.8	32.7	Pk	43.5	-10.8
165.625	V	50.3	27.7	12.4	0.9	35.9	Pk	43.5	-7.6
175.000	V	52.2	27.7	11.7	0.9	37.1	Pk	43.5	-6.4
180.048	V	46.7	27.7	11.4	0.9	31.3	Pk	43.5	-12.2
185.096	V	49.2	27.6	11.3	0.9	33.8	Pk	43.5	-9.7
188.702	V	47.7	27.6	11.3	0.9	32.3	Pk	43.5	-11.2
198.077	V	48.3	27.6	12.0	0.9	33.6	Pk	43.5	-9.9
210.337	V	50.5	27.5	10.5	1.0	34.5	Pk	43.5	-9.0
221.154	V	46.8	27.5	10.9	1.0	31.2	Pk	46	-14.8
229.808	V	47.1	27.4	11.3	1.0	32.0	Pk	46	-14.0
645.192	V	38.9	28.8	19.2	1.8	31.1	Pk	46	-14.9
756.971	V	39.6	27.9	20.7	1.9	34.3	Pk	46	-11.7
763.462	V	38.5	27.9	20.6	1.9	33.1	Pk	46	-12.9
957.452	V	35.3	27.8	22.3	2.2	32.0	Pk	46	-14.0

Radio 2, With Omni Antenna, Mid Channel									
165.625	V	51.5	27.7	12.4	0.9	37.1	Pk	43.5	-6.4
169.952	V	51.0	27.7	12.1	0.9	36.3	Pk	43.5	-7.2
175.000	V	52.8	27.7	11.7	0.9	37.7	Pk	43.5	-5.8
181.490	V	49.3	27.6	11.4	0.9	34.0	Pk	43.5	-9.5
186.539	V	50.0	27.6	11.3	0.9	34.6	Pk	43.5	-8.9
188.702	V	48.5	27.6	11.3	0.9	33.1	Pk	43.5	-10.4
193.750	V	44.5	27.6	11.6	0.9	29.4	Pk	43.5	-14.1
198.077	V	48.8	27.6	12.0	0.9	34.1	Pk	43.5	-9.4
210.337	V	50.2	27.5	10.5	1.0	34.2	Pk	43.5	-9.3
220.433	V	49.3	27.5	10.8	1.0	33.6	Pk	46	-12.4
231.250	V	43.8	27.4	11.4	1.0	28.8	Pk	46	-17.2
275.240	V	37.4	27.4	13.2	1.1	24.3	Pk	46	-21.7
613.462	V	40.6	28.9	18.9	1.7	32.3	Pk	46	-13.7
756.971	V	41.3	27.9	20.7	1.9	36.0	Pk	46	-10.0
763.462	V	37.8	27.9	20.6	1.9	32.4	Pk	46	-13.6
843.510	V	35.5	27.7	21.5	2.0	31.3	Pk	46	-14.7
938.702	V	36.3	27.8	22.4	2.1	33.0	Pk	46	-13.0
957.452	V	37.6	27.8	22.3	2.2	34.3	Pk	46	-11.7
Radio 2, With Omni Antenna, High Channel									
165.625	V	49.1	27.7	12.4	0.9	34.7	Pk	43.5	-8.8
169.952	V	51.0	27.7	12.1	0.9	36.3	Pk	43.5	-7.2
175.000	V	51.9	27.7	11.7	0.9	36.8	Pk	43.5	-6.7
180.769	V	49.0	27.7	11.4	0.9	33.6	Pk	43.5	-9.9
183.654	V	51.4	27.6	11.3	0.9	36.0	Pk	43.5	-7.5
186.539	V	48.1	27.6	11.3	0.9	32.7	Pk	43.5	-10.8
188.702	V	47.7	27.6	11.3	0.9	32.3	Pk	43.5	-11.2
209.615	V	48.2	27.5	10.6	1.0	32.3	Pk	43.5	-11.2
229.808	V	46.0	27.4	11.3	1.0	30.9	Pk	46	-15.1
526.202	V	35.4	28.6	18.6	1.6	27.0	Pk	46	-19.0
756.971	V	39.8	27.9	20.7	1.9	34.5	Pk	46	-11.5
851.442	V	36.8	27.7	21.4	2.0	32.5	Pk	46	-13.5
938.702	V	36.2	27.8	22.4	2.1	32.9	Pk	46	-13.1
957.452	V	38.5	27.8	22.3	2.2	35.2	Pk	46	-10.8
Radio 3, With Patch Antenna, Low Channel									
169.952	V	51.5	27.7	12.1	0.9	36.8	Pk	43.5	-6.7
175.000	V	52.2	27.7	11.7	0.9	37.1	Pk	43.5	-6.4
182.212	V	49.5	27.6	11.3	0.9	34.1	Pk	43.5	-9.4
193.750	V	46.9	27.6	11.6	0.9	31.8	Pk	43.5	-11.7
400.000	V	51.6	28.0	15.9	1.4	40.9	Pk	46	-5.1

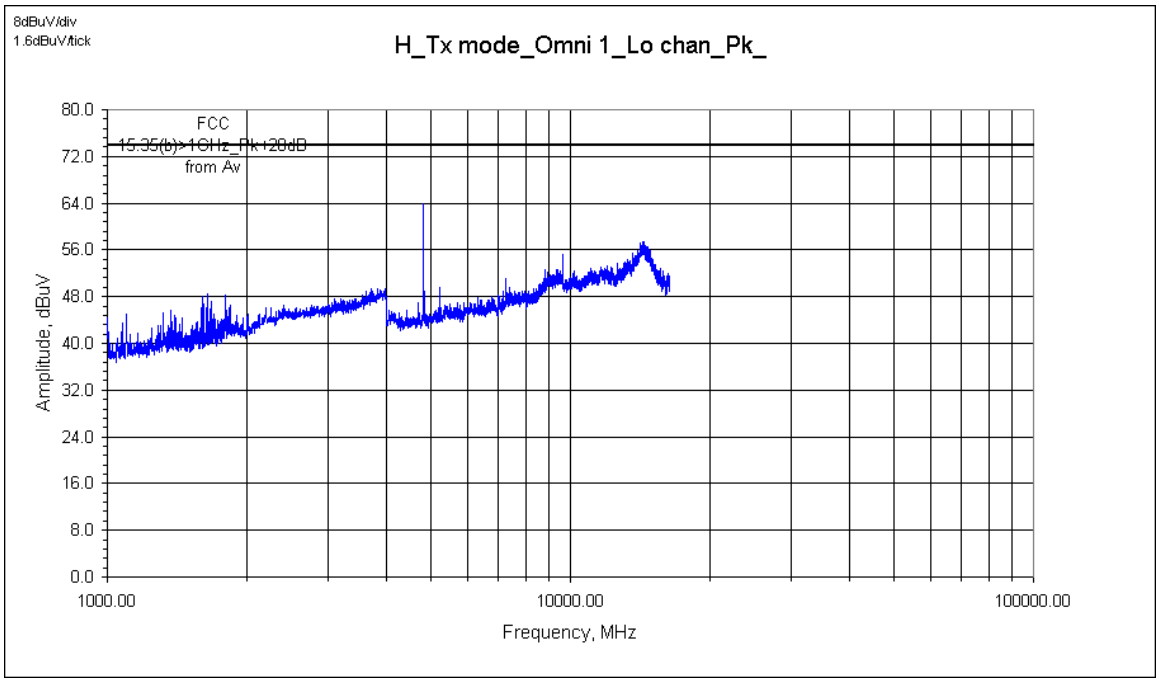
Radio 3, With Patch Antenna, Mid Channel									
165.625	V	51.9	27.7	12.4	0.9	37.5	Pk	43.5	-6.0
175.000	V	55.5	27.7	11.7	0.9	40.4	Pk	43.5	-3.1
183.654	V	49.7	27.6	11.3	0.9	34.3	Pk	43.5	-9.2
186.539	V	51.5	27.6	11.3	0.9	36.1	Pk	43.5	-7.4
475.721	V	46.9	28.3	17.2	1.5	37.3	Pk	46	-8.7
619.952	V	37.2	28.9	18.8	1.7	28.8	Pk	46	-17.2
Radio 3, With Patch Antenna, High Channel									
159.856	V	53.4	27.8	12.7	0.9	39.2	Pk	43.5	-4.3
165.625	V	48.7	27.7	12.4	0.9	34.3	Pk	43.5	-9.2
169.952	V	50.7	27.7	12.1	0.9	36.0	Pk	43.5	-7.5
175.000	V	52.4	27.7	11.7	0.9	37.3	Pk	43.5	-6.2
185.096	V	49.2	27.6	11.3	0.9	33.8	Pk	43.5	-9.7
220.433	V	50.2	27.5	10.8	1.0	34.5	Pk	46	-11.5
938.702	V	36.0	27.8	22.4	2.1	32.7	Pk	46	-13.3
Radio 4, With Patch Antenna, Low Channel									
139.664	V	47.0	27.9	12.7	0.8	32.6	Pk	43.5	-10.9
165.625	V	49.7	27.7	12.4	0.9	35.3	Pk	43.5	-8.2
175.000	V	50.6	27.7	11.7	0.9	35.5	Pk	43.5	-8.0
183.654	V	52.4	27.6	11.3	0.9	37.0	Pk	43.5	-6.5
198.077	V	48.2	27.6	12.0	0.9	33.5	Pk	43.5	-10.0
229.808	V	47.7	27.4	11.3	1.0	32.6	Pk	46	-13.4
475.721	V	43.6	28.3	17.2	1.5	34.0	Pk	46	-12.0
763.462	V	35.9	27.9	20.6	1.9	30.5	Pk	46	-15.5
818.269	V	34.2	27.6	21.3	2.0	29.9	Pk	46	-16.1
938.702	V	36.9	27.8	22.4	2.1	33.6	Pk	46	-12.4
Radio 4, With Patch Antenna, Mid Channel									
139.664	V	44.6	27.9	12.7	0.8	30.2	Pk	43.5	-13.3
159.856	V	53.7	27.8	12.7	0.9	39.5	Pk	43.5	-4.0
165.625	V	50.1	27.7	12.4	0.9	35.7	Pk	43.5	-7.8
169.952	V	51.1	27.7	12.1	0.9	36.4	Pk	43.5	-7.1
175.000	V	54.6	27.7	11.7	0.9	39.5	Pk	43.5	-4.0
186.539	V	49.7	27.6	11.3	0.9	34.3	Pk	43.5	-9.2
198.077	V	49.0	27.6	12.0	0.9	34.3	Pk	43.5	-9.2
229.808	V	46.6	27.4	11.3	1.0	31.5	Pk	46	-14.5
213.221	V	50.2	27.5	10.5	1.0	34.2	Pk	43.5	-9.3
602.644	V	38.6	28.9	18.9	1.7	30.3	Pk	46	-15.7
763.462	V	36.2	27.9	20.6	1.9	30.8	Pk	46	-15.2
938.702	V	35.1	27.8	22.4	2.1	31.8	Pk	46	-14.2
957.452	V	37.1	27.8	22.3	2.2	33.8	Pk	46	-12.2

Radio 4, With Patch Antenna, High Channel									
124.519	V	43.1	28.0	13.8	0.8	29.7	Pk	43.5	-13.8
139.664	V	45.6	27.9	12.7	0.8	31.2	Pk	43.5	-12.3
165.625	V	50.1	27.7	12.4	0.9	35.7	Pk	43.5	-7.8
169.952	V	51.9	27.7	12.1	0.9	37.2	Pk	43.5	-6.3
175.000	V	52.1	27.7	11.7	0.9	37.0	Pk	43.5	-6.5
182.212	V	52.2	27.6	11.3	0.9	36.8	Pk	43.5	-6.7
195.914	V	51.7	27.6	11.7	0.9	36.7	Pk	43.5	-6.8
209.615	V	49.6	27.5	10.6	1.0	33.7	Pk	43.5	-9.8
493.750	V	38.5	28.4	17.8	1.5	29.4	Pk	46	-16.6
525.481	V	36.0	28.6	18.5	1.6	27.5	Pk	46	-18.5
613.462	V	42.1	28.9	18.9	1.7	33.8	Pk	46	-12.2
868.750	V	35.0	27.7	22.0	2.1	31.4	Pk	46	-14.6
938.702	V	36.5	27.8	22.4	2.1	33.2	Pk	46	-12.8

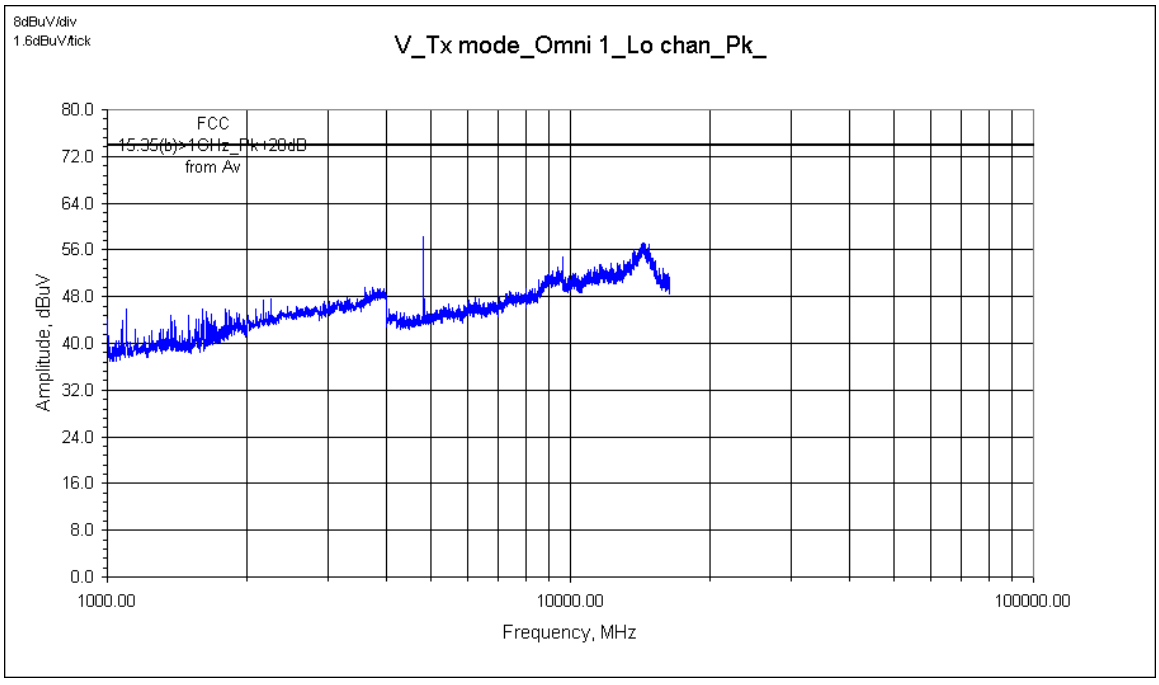
FCC 15.209, 1GHz to 26GHz

Transmitter Spurious, Radio 1, Low Channel with Omni Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 1, Low Channel with Omni Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 1, With Omni Antenna, Low Channel									
4819.8930	V	59.16	38.65	32.86	5.17	58.53	Pk	74	- 15.47
9639.7850	V	59.90	47.96	38.18	7.61	57.73	Pk	74	- 16.27
4819.8930	H	65.15	38.65	32.86	5.17	64.52	Pk	74	- 9.48
9641.0250	H	55.97	47.96	38.17	7.61	53.79	Pk	74	- 20.21
4819.8930	V	53.06	38.65	32.86	5.17	38.53	Av	54	- 15.47
9639.7850	V	51.60	47.96	38.18	7.61	37.73	Av	54	- 16.27
4819.8930	H	59.56	38.65	32.86	5.17	44.52	Av	54	- 9.48
9641.0250	H	39.63	47.96	38.17	7.61	33.79	Av	54	- 20.21

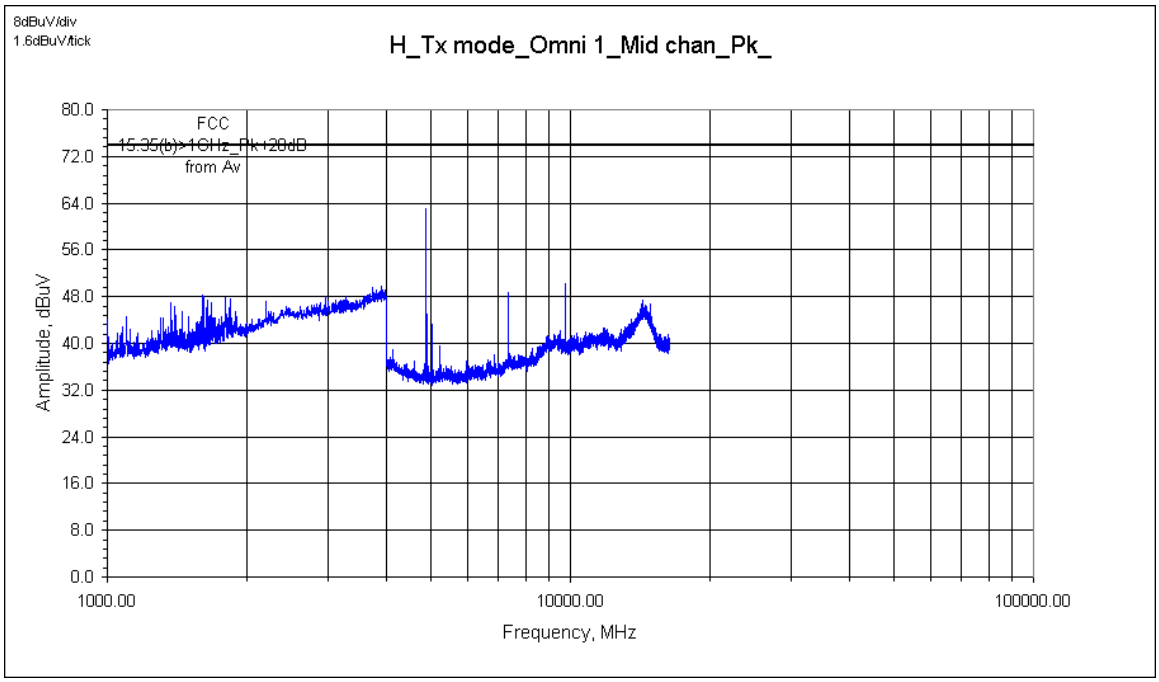
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

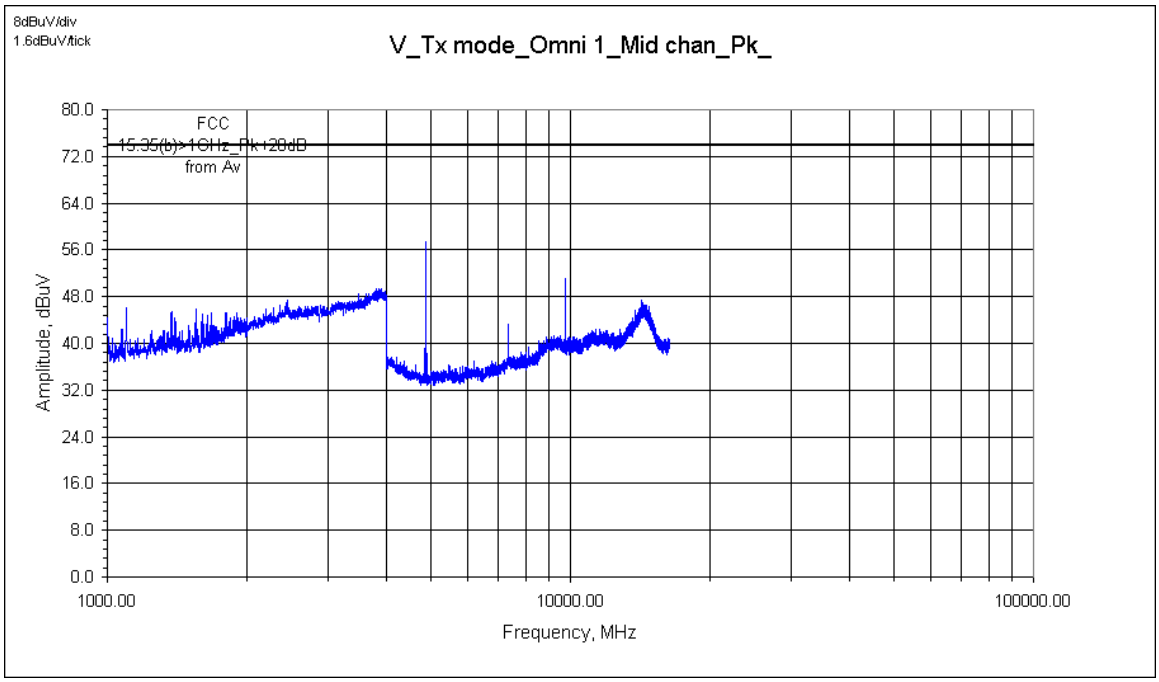
Results	**Complies**

Transmitter Spurious, Radio 1, Middle Channel with Omni Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 1, Middle Channel with Omni Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 1, With Omni Antenna, Mid Channel									
4882.5600	V	61.55	39.30	32.96	5.20	60.41	Pk	74	- 13.59
9765.1250	V	58.74	47.97	38.07	7.66	56.49	Pk	74	- 17.51
4882.5600	H	65.42	39.30	32.96	5.20	64.28	Pk	74	- 9.72
9765.1250	H	59.83	47.97	38.07	7.66	57.58	Pk	74	- 16.42
4882.5600	V	55.65	39.30	32.96	5.20	40.41	Av	54	- 13.59
9765.1250	V	50.08	47.97	38.07	7.66	36.49	Av	54	- 17.51
4882.5600	H	60.00	39.30	32.96	5.20	44.28	Av	54	- 9.72
9765.1250	H	51.80	47.97	38.07	7.66	37.58	Av	54	- 16.42

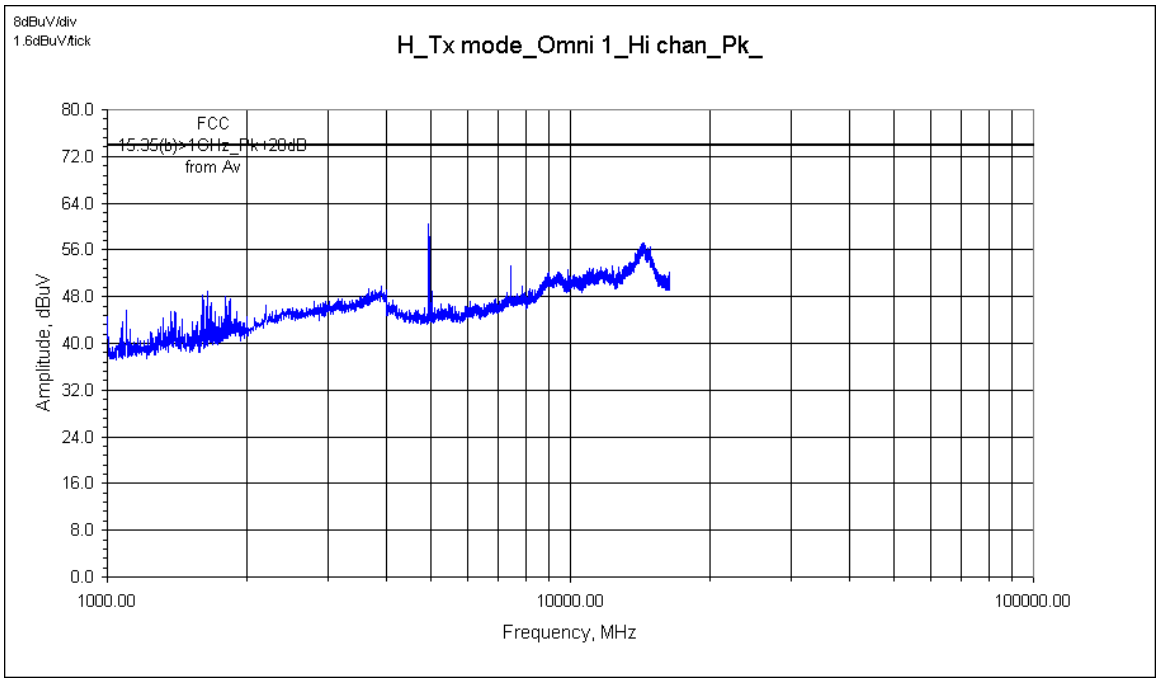
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

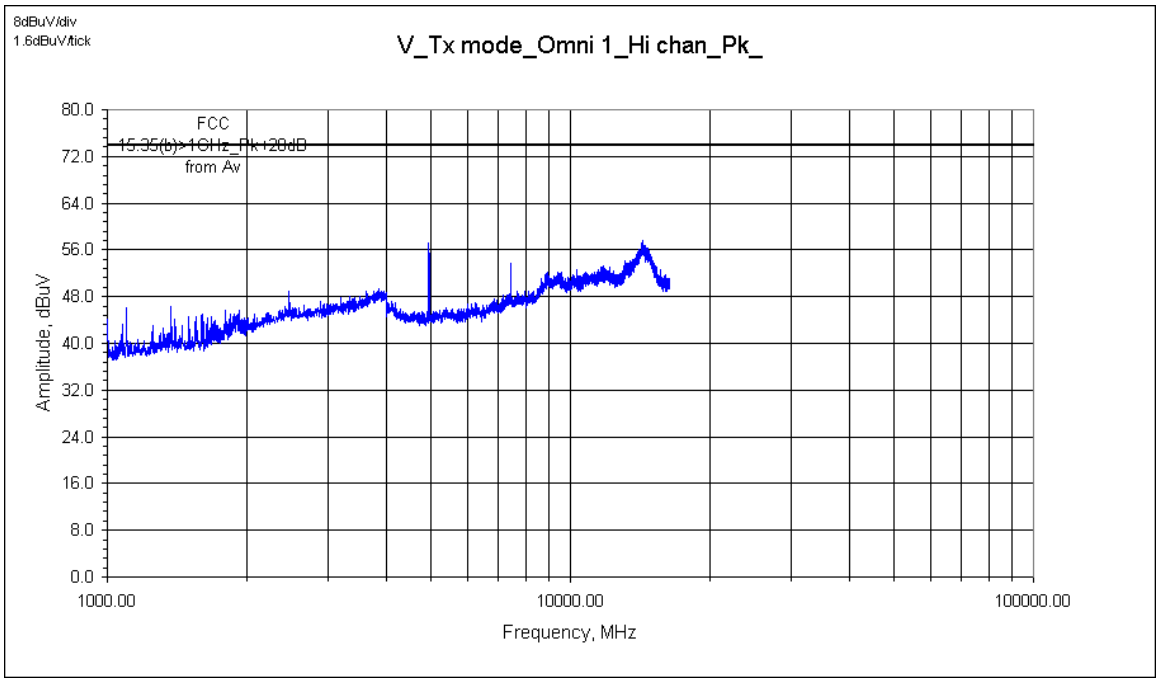
Results	**Complies**

Transmitter Spurious, Radio 1, High Channel with Omni Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 1, High Channel with Omni Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 1, With Omni Antenna, High Channel									
4948.7180	V	61.30	39.98	33.08	5.24	59.63	Pk	74	- 14.37
7423.1270	V	56.74	47.40	36.56	6.52	52.42	Pk	74	- 21.58
4948.7180	H	62.95	39.98	33.08	5.24	61.28	Pk	74	- 12.72
7423.1270	H	61.89	47.40	36.56	6.52	57.57	Pk	74	- 16.43
4948.7180	V	55.18	39.98	33.08	5.24	39.63	Av	54	- 14.37
7423.1270	V	48.29	47.40	36.56	6.52	32.42	Av	54	- 21.58
4948.7180	H	57.17	39.98	33.08	5.24	41.28	Av	54	- 12.72
7423.1270	H	54.96	47.40	36.56	6.52	37.57	Av	54	- 16.43

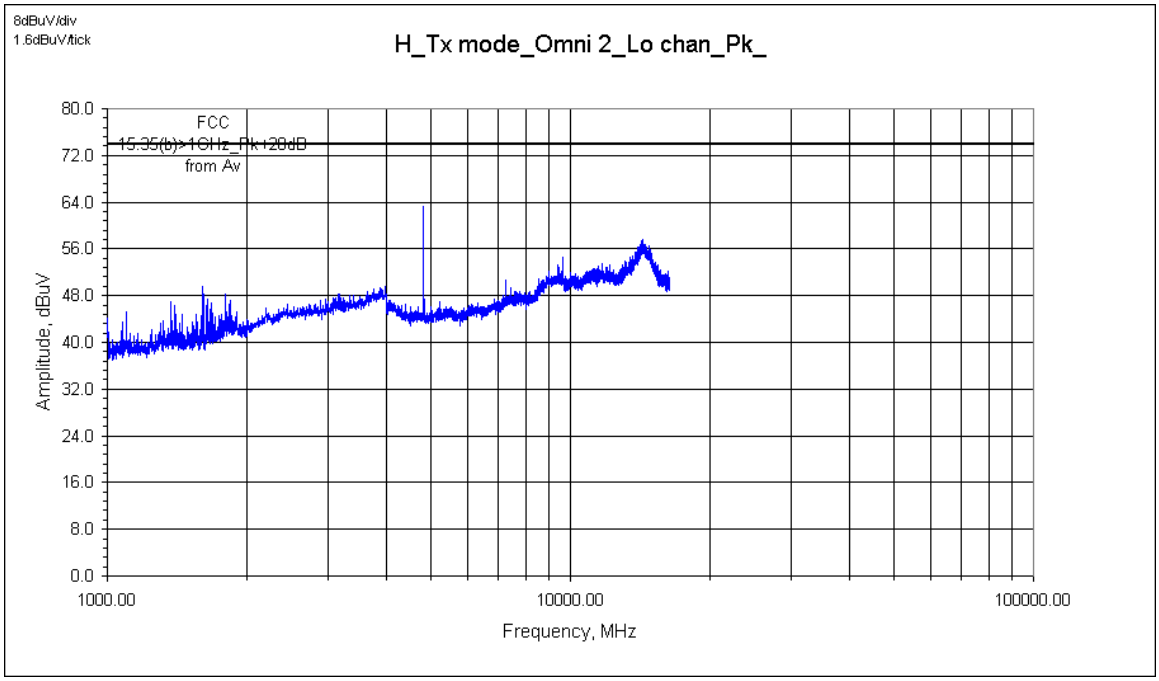
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

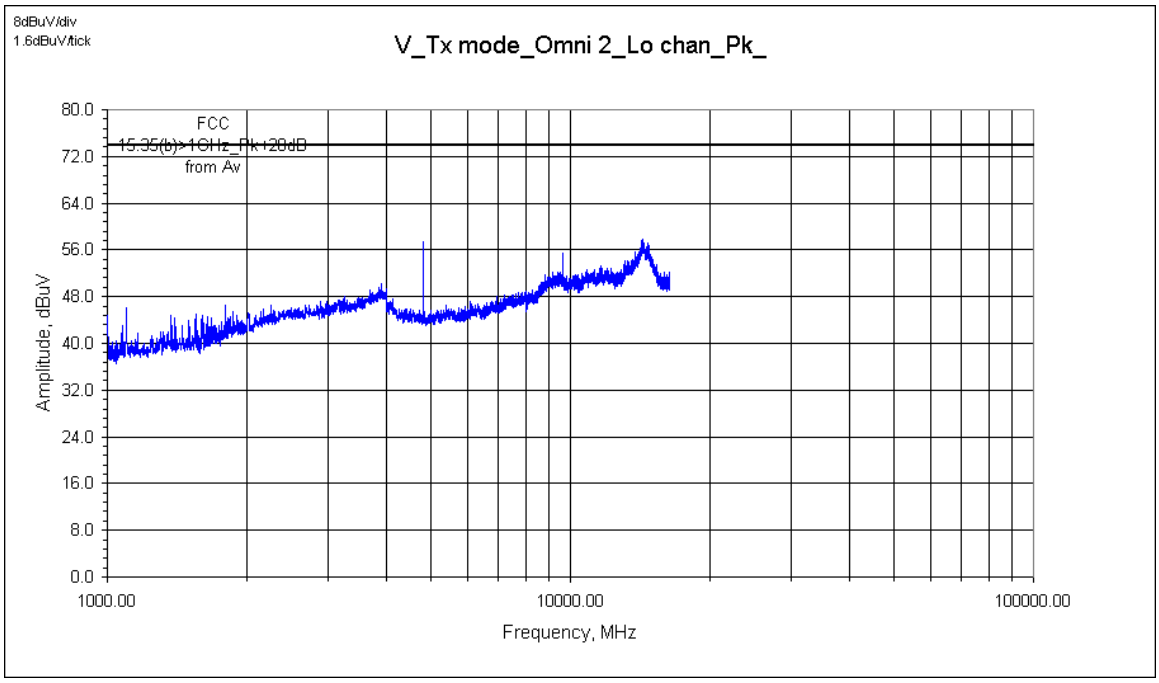
Results	**Complies**

Transmitter Spurious, Radio 2, Low Channel with Omni Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 2, Low Channel with Omni Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 2, With Omni Antenna, Low Channel									
4819.8130	V	59.55	38.65	32.86	5.17	58.92	Pk	74	- 15.08
9639.7814	V	59.92	47.96	38.18	7.61	57.75	Pk	74	- 16.25
4819.9130	H	65.19	38.65	32.86	5.17	64.56	Pk	74	- 9.44
9639.7814	H	59.58	47.96	38.18	7.61	57.41	Pk	74	- 16.59
4819.8130	V	52.95	38.65	32.86	5.17	38.92	Av	54	- 15.08
9639.7814	V	51.75	47.96	38.18	7.61	37.75	Av	54	- 16.25
4819.9130	H	59.48	38.65	32.86	5.17	44.56	Av	54	- 9.44
9639.7814	H	50.81	47.96	38.18	7.61	37.41	Av	54	- 16.59

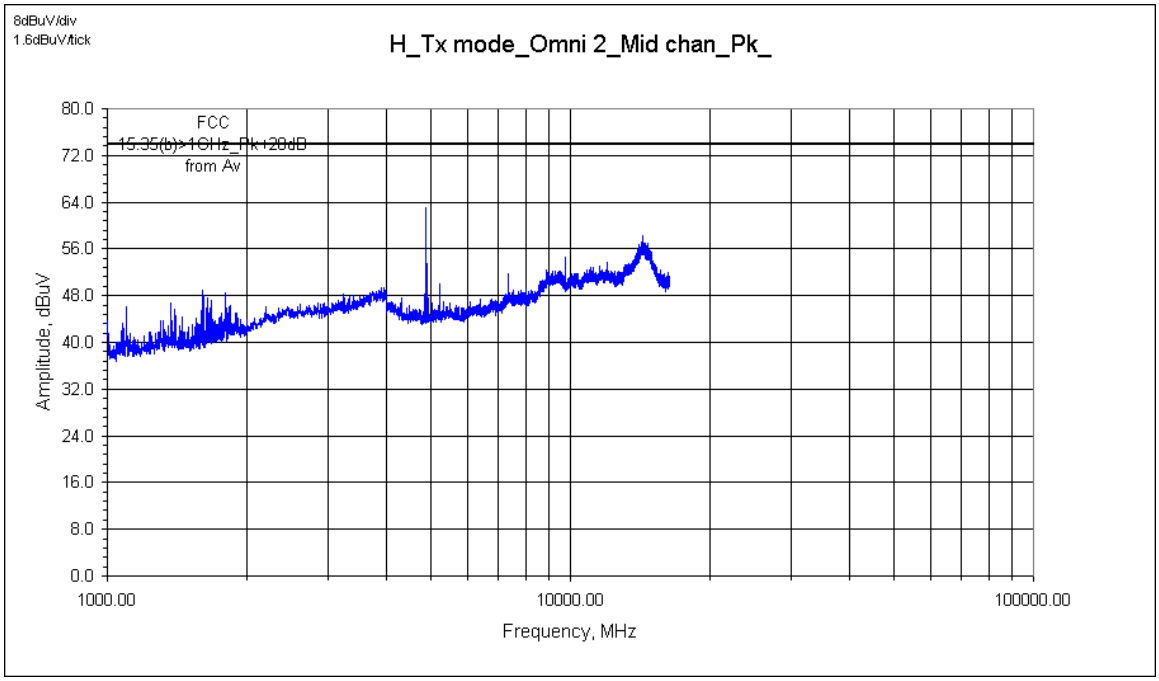
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

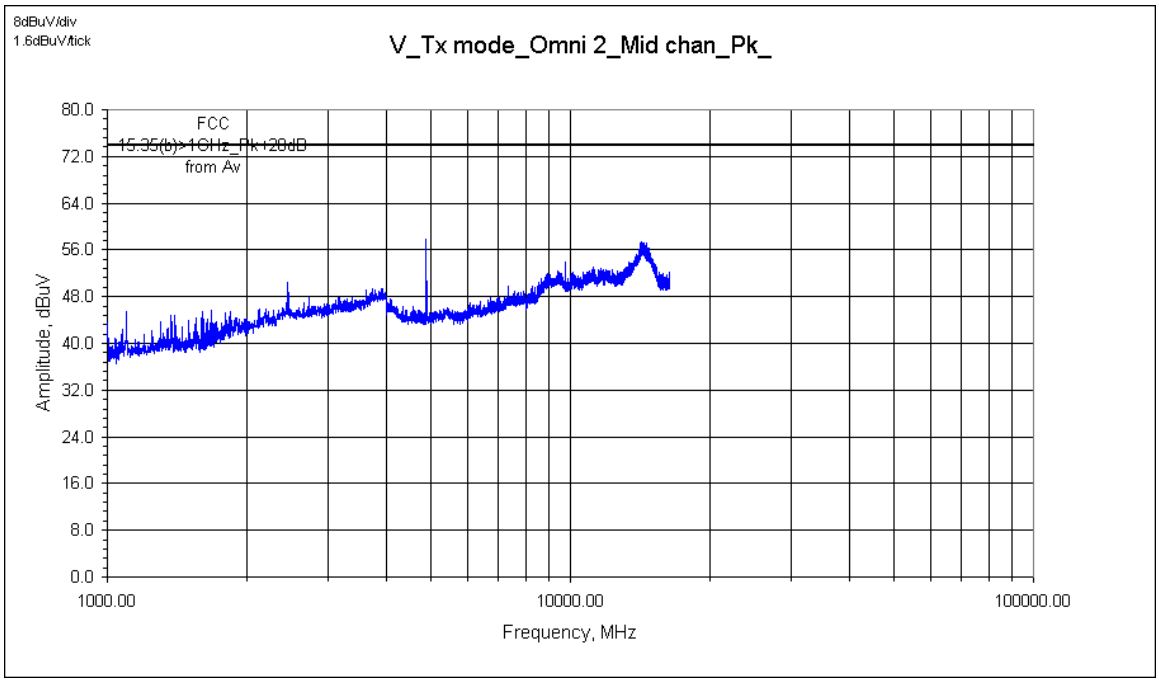
Results	**Complies**

Transmitter Spurious, Radio 2, Middle Channel with Omni Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 2, Middle Channel with Omni Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 2, With Omni Antenna, Mid Channel									
4882.6150	V	61.05	39.30	32.96	5.20	59.91	Pk	74	- 14.09
9765.1250	V	58.61	47.97	38.07	7.66	56.36	Pk	74	- 17.64
4882.6150	H	65.68	39.30	32.96	5.20	64.54	Pk	74	- 9.46
9765.1250	H	60.17	47.97	38.07	7.66	57.92	Pk	74	- 16.08
4882.6150	V	54.86	39.30	32.96	5.20	39.91	Av	54	- 14.09
9765.1250	V	49.90	47.97	38.07	7.66	36.36	Av	54	- 17.64
4882.6150	H	60.08	39.30	32.96	5.20	44.54	Av	54	- 9.46
9765.1250	H	52.22	47.97	38.07	7.66	37.92	Av	54	- 16.08

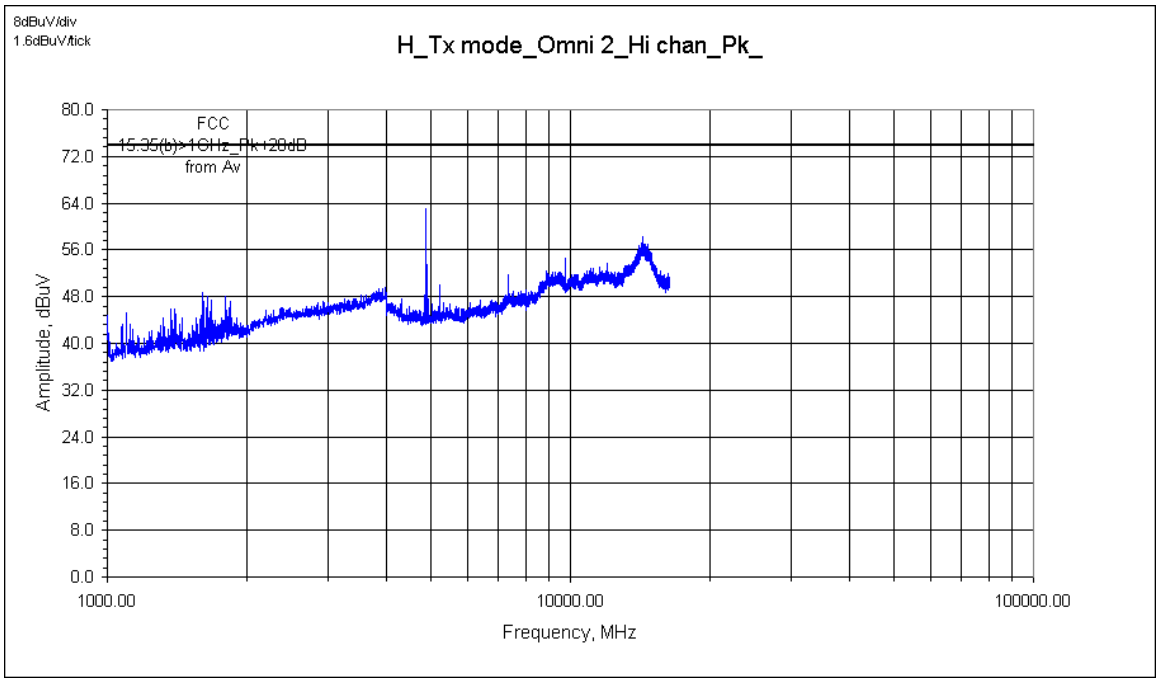
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

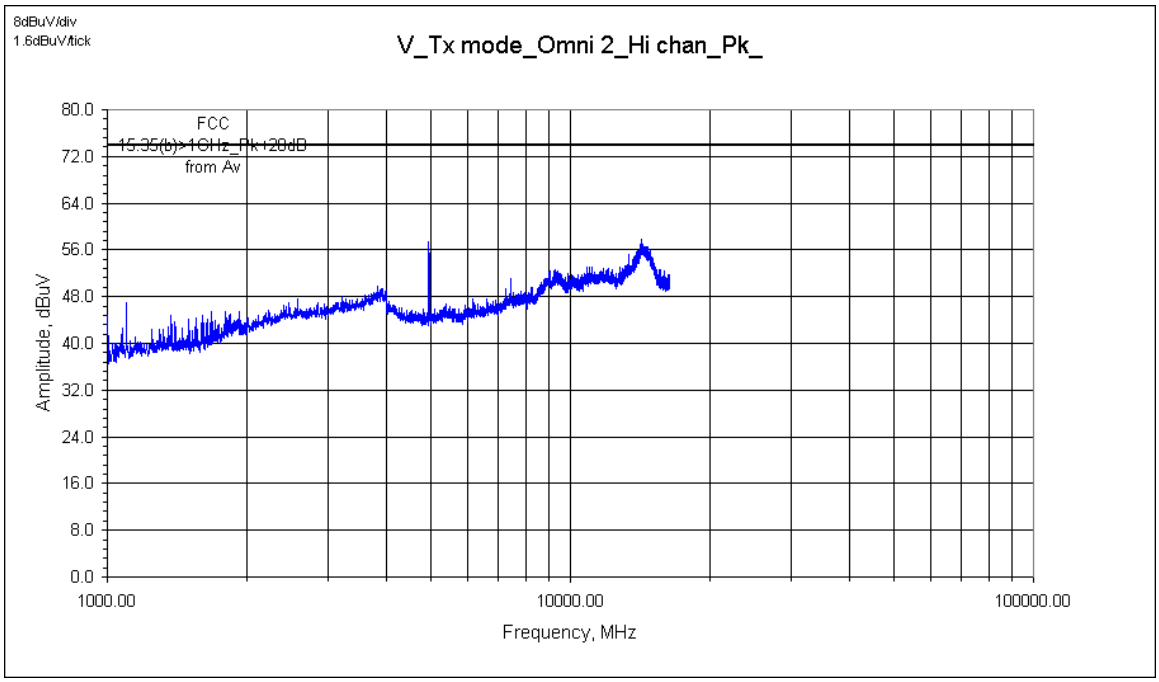
Results	**Complies**

Transmitter Spurious, Radio 2, High Channel with Omni Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 2, High Channel with Omni Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 2, With Omni Antenna, High Channel									
4948.7180	V	61.35	39.98	33.08	5.24	59.68	Pk	74	- 14.32
7423.1770	V	58.62	47.40	36.56	6.52	54.30	Pk	74	- 19.70
4948.8180	H	63.59	39.99	33.08	5.24	61.92	Pk	74	- 12.08
9897.5410	H	58.42	47.97	38.15	7.73	56.32	Pk	74	- 17.68
4948.7180	V	55.18	39.98	33.08	5.24	39.68	Av	54	- 14.32
7423.1770	V	49.98	47.40	36.56	6.52	34.30	Av	54	- 19.70
4948.8180	H	57.80	39.99	33.08	5.24	41.92	Av	54	- 12.08
9897.5410	H	49.85	47.97	38.15	7.73	36.32	Av	54	- 17.68

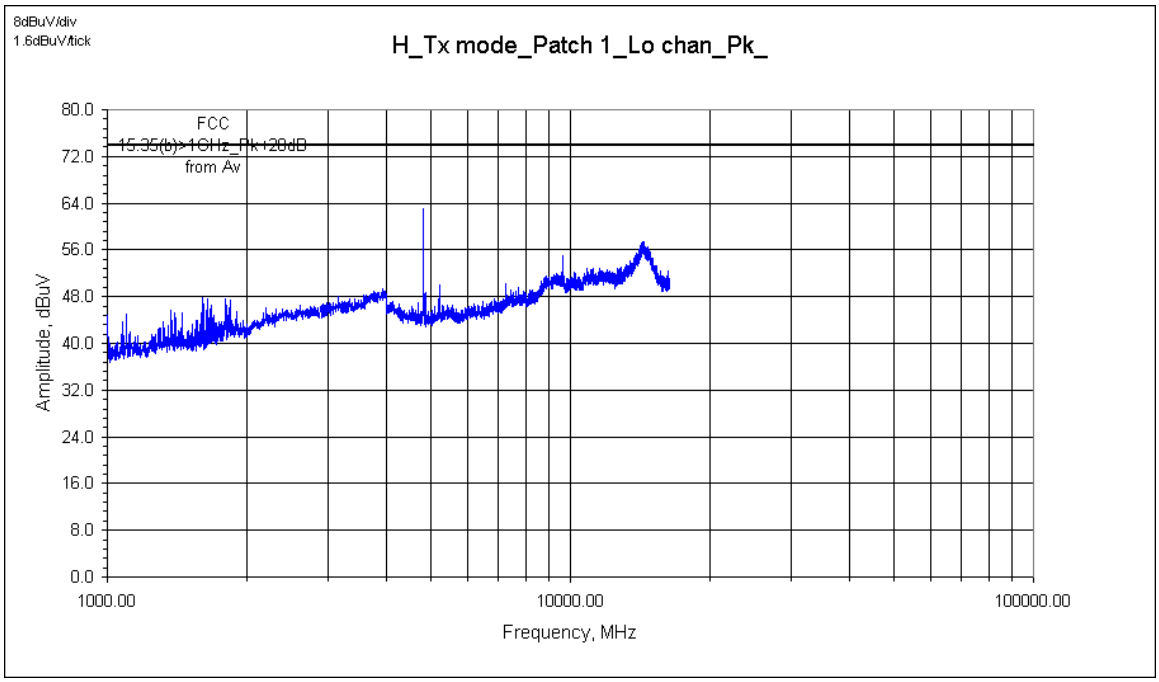
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

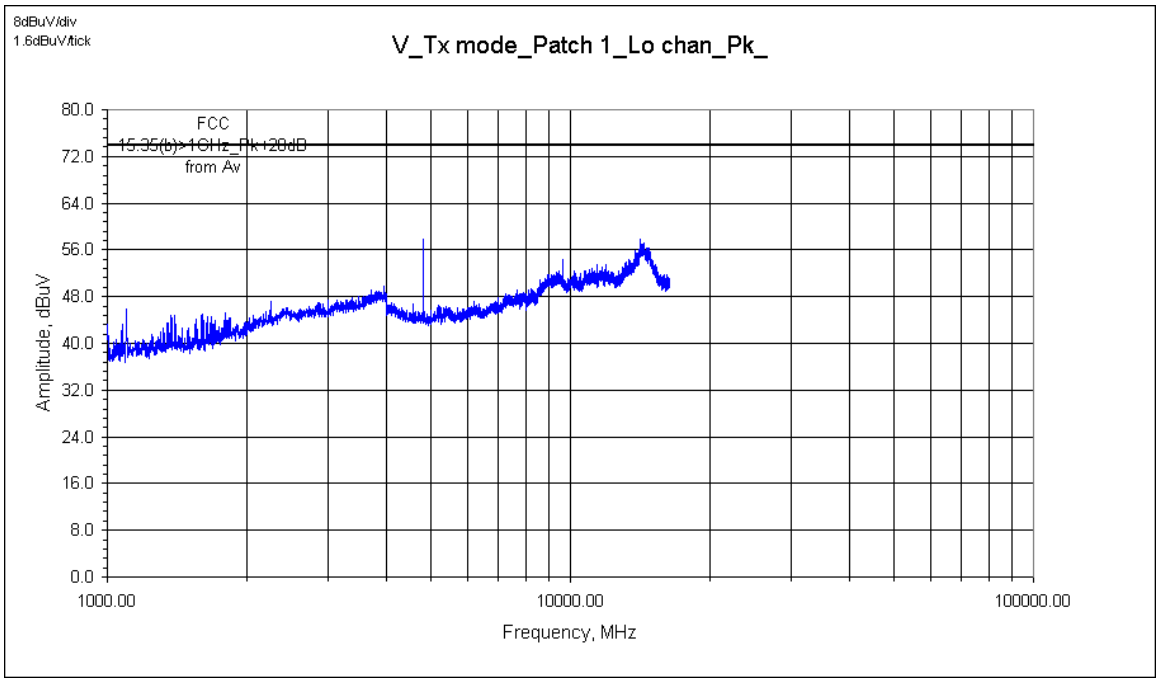
Results	**Complies**

Transmitter Spurious, Radio 3, Low Channel with Patch Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 3, Low Channel with Patch Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 3, With Omni Antenna, Low Channel									
4819.9130	V	59.77	38.65	32.86	5.17	59.14	Pk	74	- 14.86
9639.8250	V	60.18	47.96	38.18	7.61	58.01	Pk	74	- 15.99
4819.9130	H	65.23	38.65	32.86	5.17	64.60	Pk	74	- 9.40
9639.9250	H	59.85	47.96	38.18	7.61	57.67	Pk	74	- 16.33
4819.9130	V	53.74	38.65	32.86	5.17	39.14	Av	54	- 14.86
9639.8250	V	51.83	47.96	38.18	7.61	38.01	Av	54	- 15.99
4819.9130	H	59.61	38.65	32.86	5.17	44.60	Av	54	- 9.40
9639.9250	H	50.72	47.96	38.18	7.61	37.67	Av	54	- 16.33

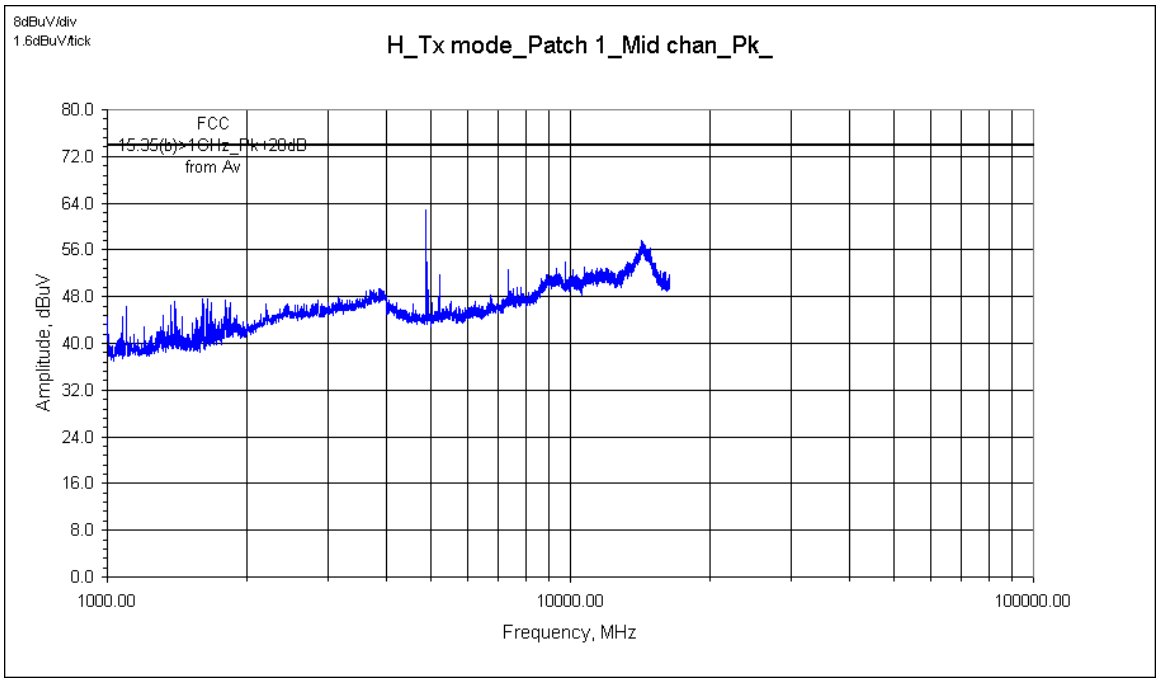
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

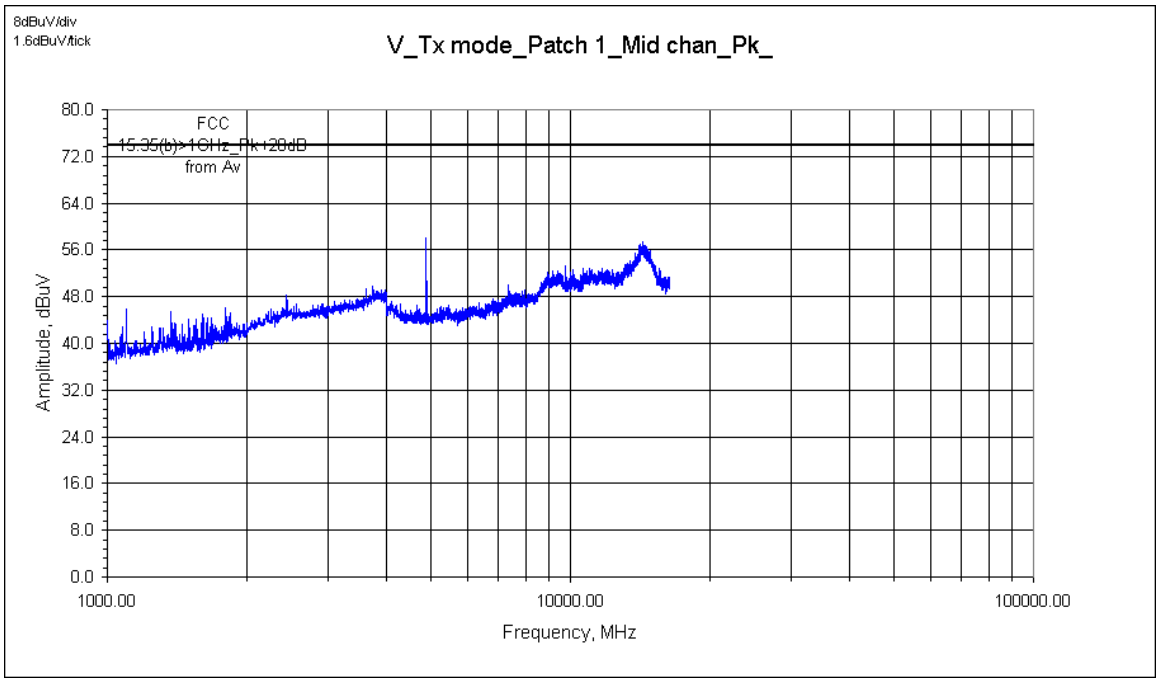
Results	**Complies**

Transmitter Spurious, Radio 3, Middle Channel with Patch Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 3, Middle Channel with Patch Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 3, With Patch Antenna, Mid Channel									
4882.6150	V	60.78	39.30	32.96	5.20	59.64	Pk	74	- 14.36
9765.1250	V	58.98	47.97	38.07	7.66	56.73	Pk	74	- 17.27
4882.5150	H	65.70	39.30	32.96	5.20	64.56	Pk	74	- 9.44
9765.1250	H	59.83	47.97	38.07	7.66	57.58	Pk	74	- 16.42
4882.6150	V	54.95	39.30	32.96	5.20	39.64	Av	54	- 14.36
9765.1250	V	50.11	47.97	38.07	7.66	36.73	Av	54	- 17.27
4882.5150	H	60.32	39.30	32.96	5.20	44.56	Av	54	- 9.44
9765.1250	H	51.68	47.97	38.07	7.66	37.58	Av	54	- 16.42

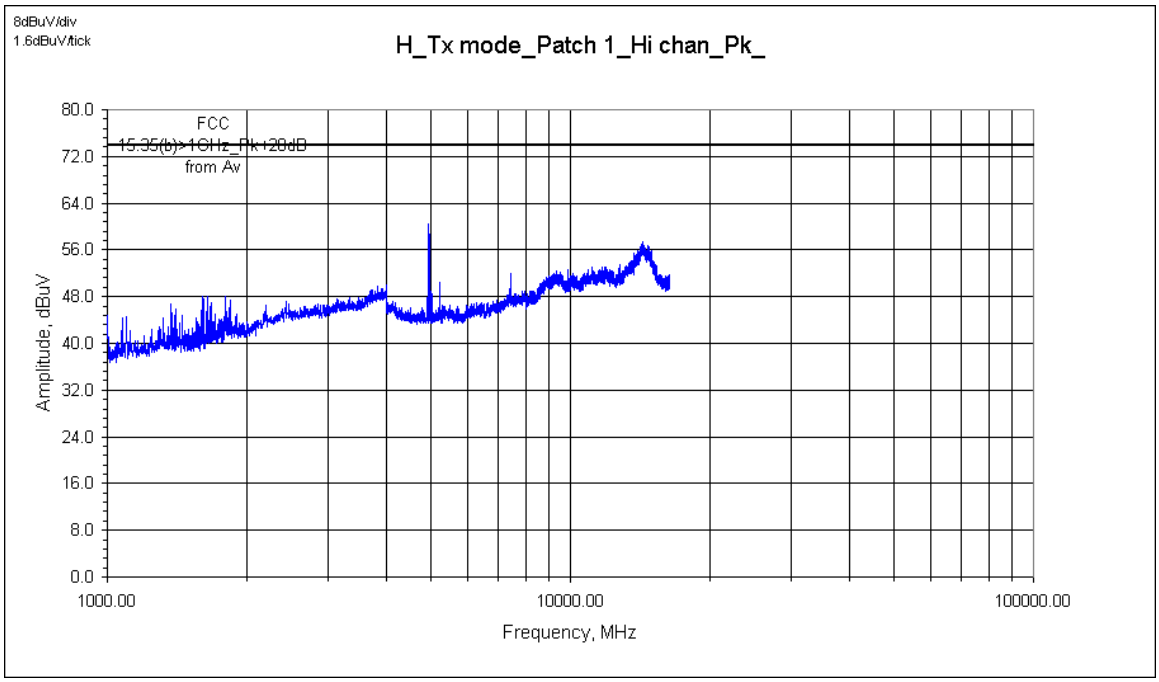
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

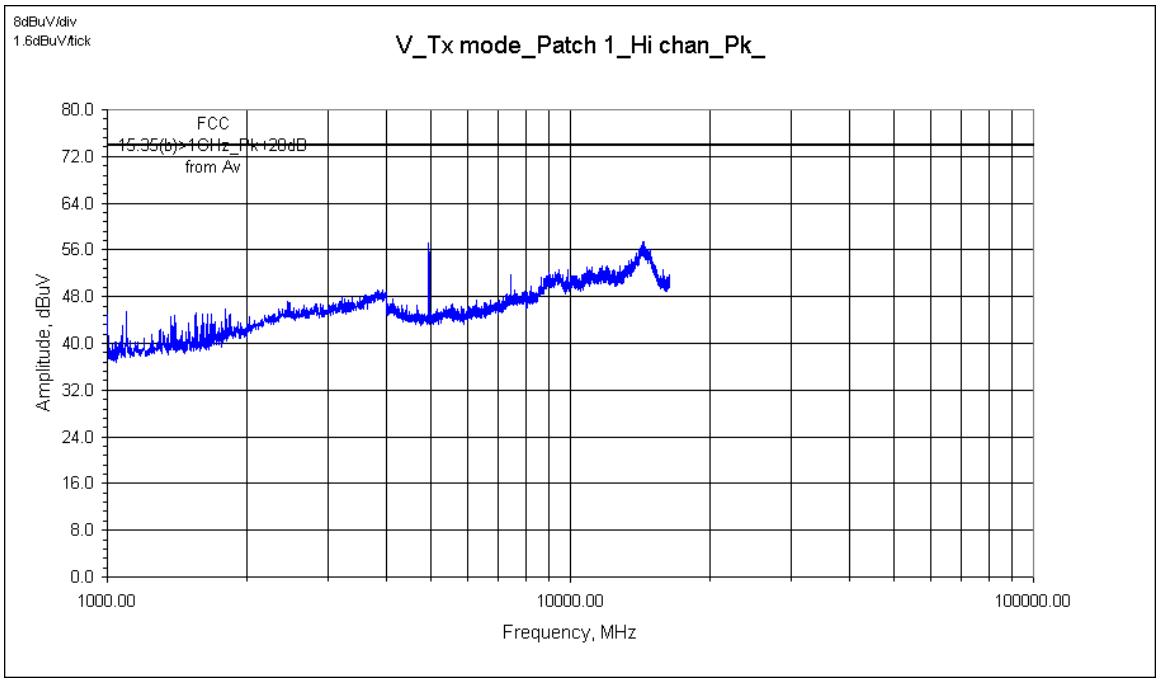
Results	**Complies**

Transmitter Spurious, Radio 3, High Channel with Patch Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 3, High Channel with Patch Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 3, With Patch Antenna, High Channel									
4948.7180	V	61.44	39.98	33.08	5.24	59.77	Pk	74	- 14.23
7423.0770	V	58.47	47.40	36.56	6.52	54.15	Pk	74	- 19.85
4948.7180	H	63.00	39.98	33.08	5.24	61.33	Pk	74	- 12.67
7423.0770	H	60.40	47.40	36.56	6.52	56.08	Pk	74	- 17.92
4948.7180	V	55.40	39.98	33.08	5.24	39.77	Av	54	- 14.23
7423.0770	V	49.98	47.40	36.56	6.52	34.15	Av	54	- 19.85
4948.7180	H	57.21	39.98	33.08	5.24	41.33	Av	54	- 12.67
7423.0770	H	52.90	47.40	36.56	6.52	36.08	Av	54	- 17.92

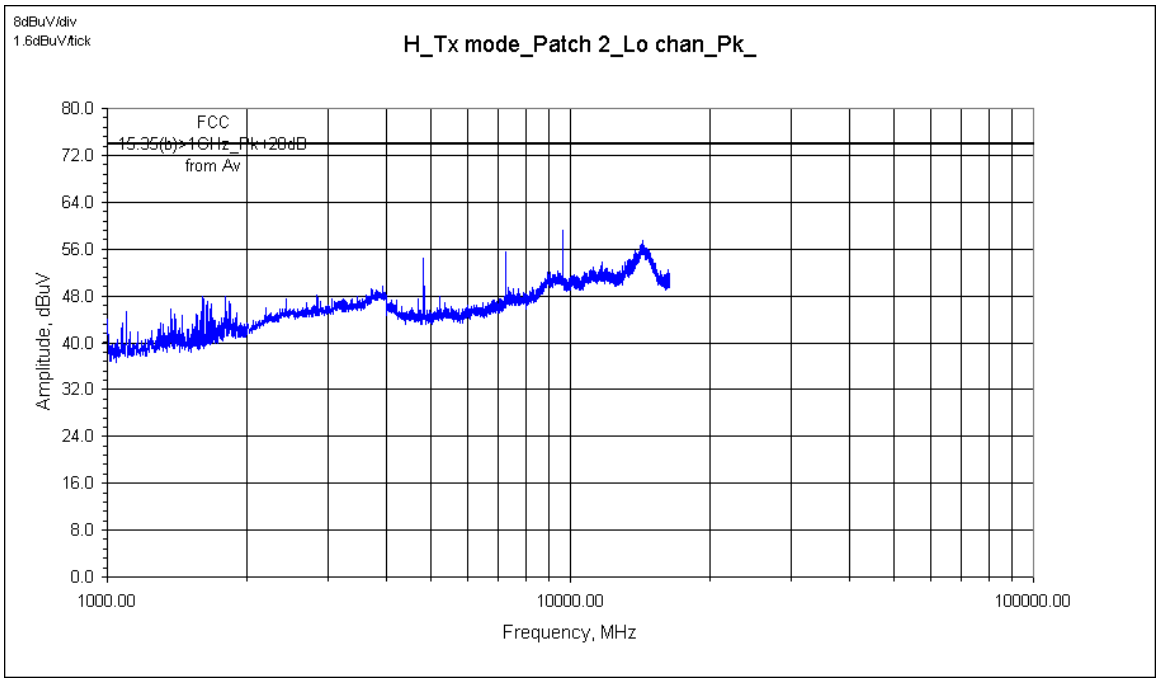
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

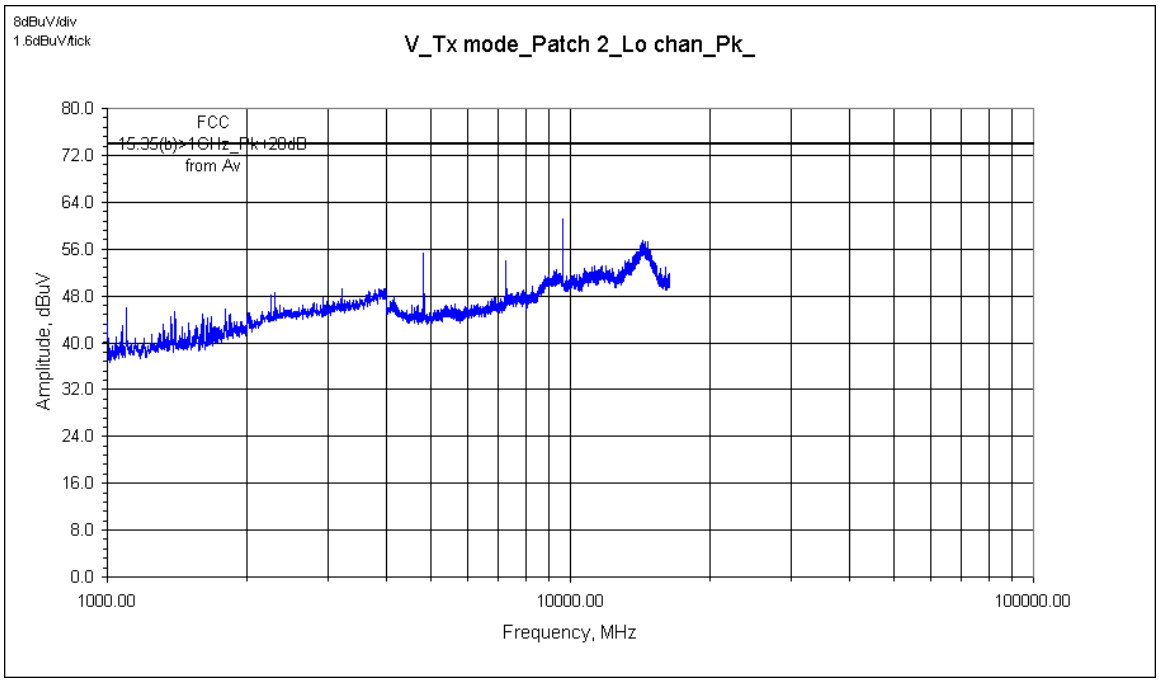
Results	**Complies**

Transmitter Spurious, Radio 4, Low Channel with Patch Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 4, Low Channel with Patch Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 4, With Patch Antenna, Low Channel									
4819.8630	V	57.62	38.65	32.86	5.17	56.99	Pk	74	- 17.01
9639.8250	V	64.36	47.96	38.18	7.61	62.19	Pk	74	- 11.81
4819.9130	H	56.08	38.65	32.86	5.17	55.45	Pk	74	- 18.55
9639.7750	H	62.39	47.96	38.18	7.61	60.22	Pk	74	- 13.78
4819.8630	V	51.19	38.65	32.86	5.17	36.99	Av	54	- 17.01
9639.8250	V	57.59	47.96	38.18	7.61	42.19	Av	54	- 11.81
4819.9130	H	49.69	38.65	32.86	5.17	35.45	Av	54	- 18.55
9639.7750	H	55.18	47.96	38.18	7.61	40.22	Av	54	- 13.78

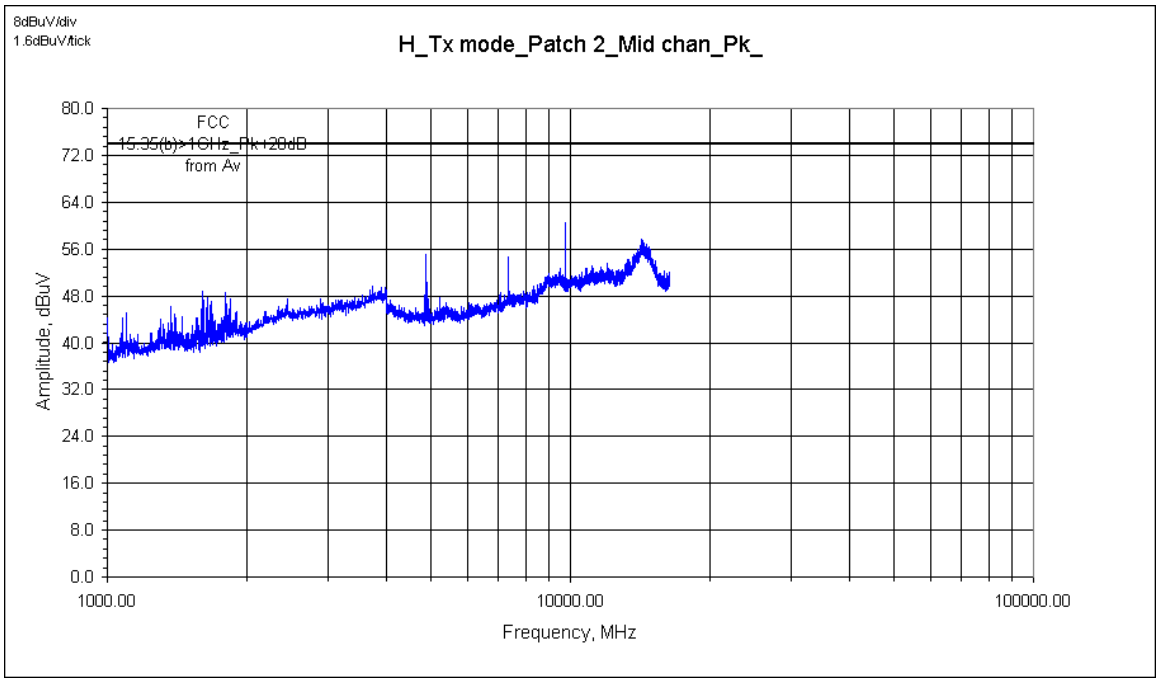
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

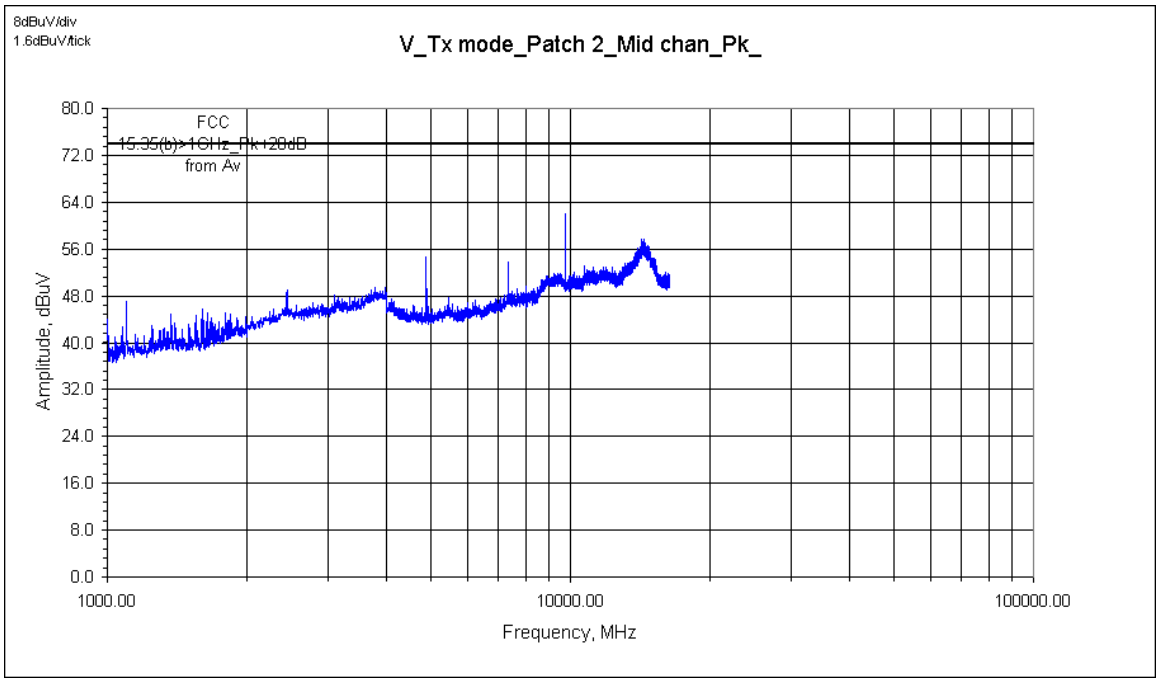
Results	**Complies**

Transmitter Spurious, Radio 4, Middle Channel with Patch Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 4, Middle Channel with Patch Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 4, With Patch Antenna, Mid Channel									
4882.6150	V	56.61	39.30	32.96	5.20	55.47	Pk	74	- 18.53
9765.1250	V	65.85	47.97	38.07	7.66	63.60	Pk	74	- 10.40
4882.5150	H	56.92	39.30	32.96	5.20	55.78	Pk	74	- 18.22
9765.1250	H	64.40	47.97	38.07	7.66	62.15	Pk	74	- 11.85
4882.6150	V	50.14	39.30	32.96	5.20	35.47	Av	54	- 18.53
9765.1250	V	59.39	47.97	38.07	7.66	43.60	Av	54	- 10.40
4882.5150	H	50.18	39.30	32.96	5.20	35.78	Av	54	- 18.22
9765.1250	H	58.03	47.97	38.07	7.66	42.15	Av	54	- 11.85

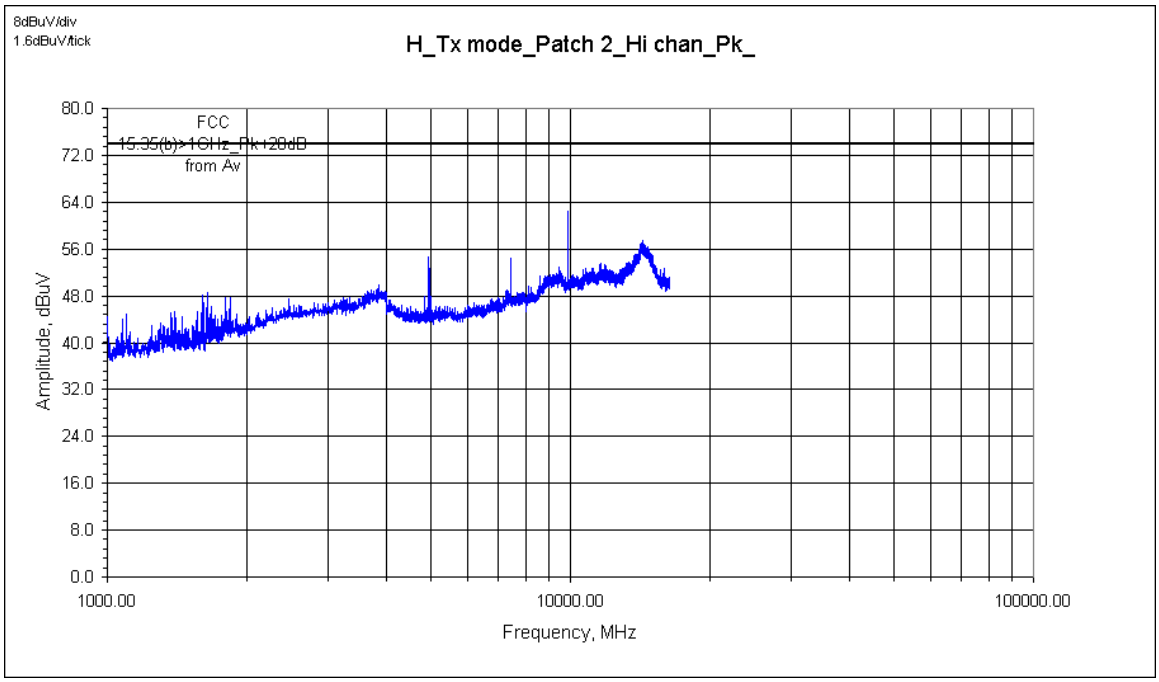
Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

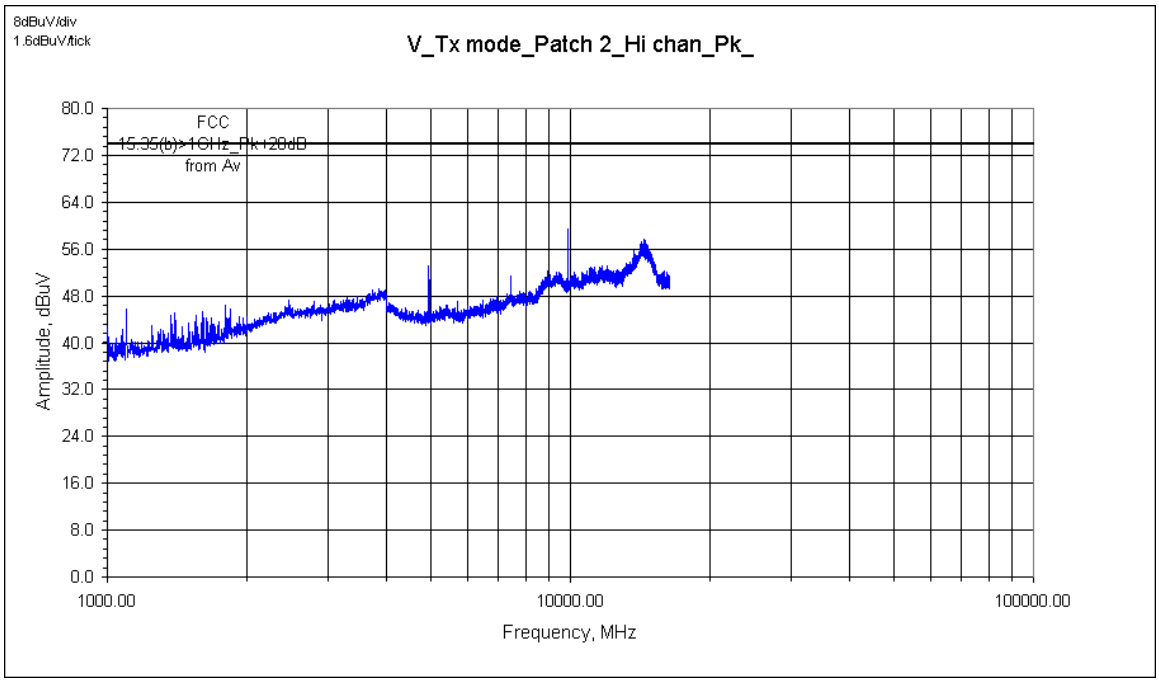
Results	**Complies**

Transmitter Spurious, Radio 4, High Channel with Patch Antenna

Horizontal Scan



Vertical Scan



Transmitter Spurious, Radio 4, High Channel with Patch Antenna

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS @ 3 m	Detector	FS Limit @ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
Radio 4, With Patch Antenna, High Channel									
4948.7180	V	56.71	39.98	33.08	5.24	55.04	Pk	74	- 18.96
9897.4410	V	63.27	47.97	38.15	7.73	61.17	Pk	74	- 12.83
4948.7180	H	57.76	39.98	33.08	5.24	56.09	Pk	74	- 17.91
9897.5410	H	66.06	47.97	38.15	7.73	63.96	Pk	74	- 10.04
4948.7180	V	49.95	39.98	33.08	5.24	35.04	Av	54	- 18.96
9897.4410	V	56.17	47.97	38.15	7.73	41.17	Av	54	- 12.83
4948.7180	H	51.38	39.98	33.08	5.24	36.09	Av	54	- 17.91
9897.5410	H	59.92	47.97	38.15	7.73	43.96	Av	54	- 10.04

Note:

1. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB.
2. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

Results	**Complies**

Out-of-Band Radiated spurious emissions at the Band-edge
2310–2390 MHz

Radio	Detector	EUT Channel	Frequency	Raw Amplitude at 3m	Corr. Factor	FS Peak at 3m	Peak Limit	FS Average at 3m	Average Limit	Results
			MHz	dB(uV)	dB	dB(uV/m)	dB(uV/m)	dB(uV/m)	dB(uV/m)	
Radio 1 with Omni	Peak	0	2390	38.5	31.9	70.4	74	50.4	54	Pass
Radio 2 with Omni	Peak	0	2390	31.7	31.9	63.6	74	43.8	54	Pass
Radio 3 with Patch	Peak	0	2390	35.9	31.9	67.8	74	47.8	54	Pass
Radio 4 with Patch	Peak	0	2390	35.2	31.9	67.1	74	47.1	54	Pass

Radio	Detector	EUT Channel	Frequency	Raw Amplitude at 3m	Corr. Factor	FS Peak at 3m	Peak Limit	FS Average at 3m	Average Limit	Results
			MHz	dB(uV)	dB	dB(uV/m)	dB(uV/m)	dB(uV/m)	dB(uV/m)	
Radio 1 with Omni	Peak	Hopping Enabled	2390	27.6	31.9	59.5	74	39.5	54	Pass
Radio 2 with Omni	Peak	Hopping Enabled	2390	29.8	31.9	61.7	74	41.7	54	Pass
Radio 3 with Patch	Peak	Hopping Enabled	2390	30.2	31.9	62.1	74	42.1	54	Pass
Radio 4 with Patch	Peak	Hopping Enabled	2390	34.3	31.9	66.2	74	46.2	54	Pass

Note:

1. Correction Factor @ 2390MHz: Cable loss + Antenna factor
2. FS Peak at 3m = SA reading + Correction Factor
3. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB
4. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

Out-of-Band Radiated spurious emissions at the Band-edge
2483.5–2500 MHz

Radio	Detector	EUT Channel	Frequency	Raw Amplitude at 3m	Corr. Factor	FS Peak at 3m	Peak Limit	FS Average at 3m	Average Limit	Results
			MHz	dB(uV)	dB	dB(uV/m)	dB(uV/m)	dB(uV/m)	dB(uV/m)	
Radio 1 with Omni	Peak	255	2483.5	37.9	32.2	70.1	74	50.1	54	Pass
Radio 2 with Omni	Peak	255	2483.5	39.6	32.2	71.8	74	51.8	54	Pass
Radio 3 with Patch	Peak	255	2483.5	37.3	32.2	69.5	74	49.5	54	Pass
Radio 4 with Patch	Peak	255	2483.5	35.8	32.2	68.0	74	48.0	54	Pass

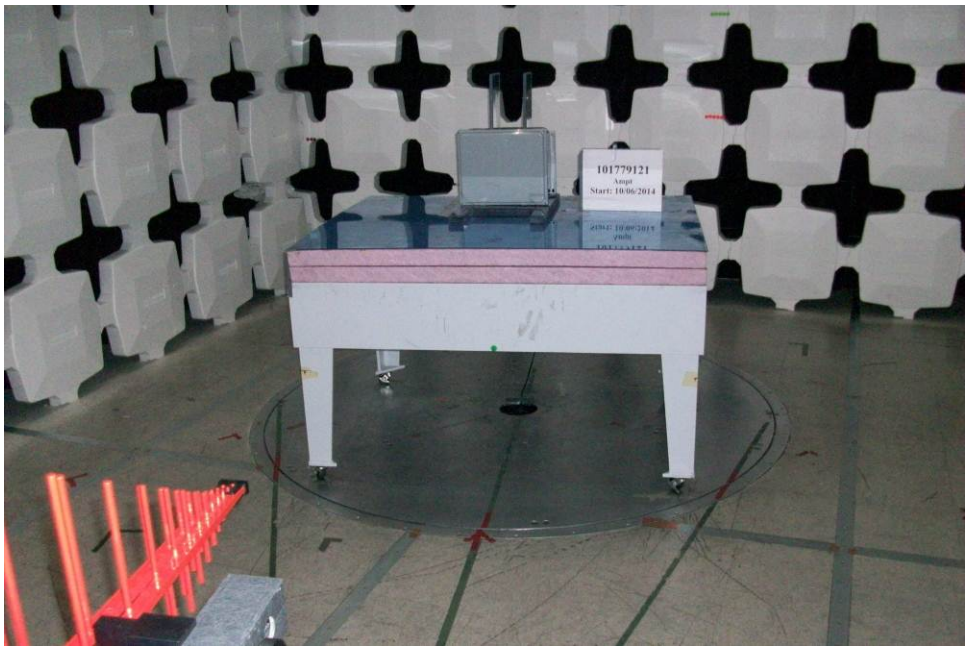
Radio	Detector	EUT Channel	Frequency	Raw Amplitude at 3m	Corr. Factor	FS Peak at 3m	Peak Limit	FS Average at 3m	Average Limit	Results
			MHz	dB(uV)	dB	dB(uV/m)	dB(uV/m)	dB(uV/m)	dB(uV/m)	
Radio 1 with Omni	Peak	Hopping Enabled	2483.5	31.0	32.2	63.2	74	43.2	54	Pass
Radio 2 with Omni	Peak	Hopping Enabled	2483.5	36.1	32.2	68.3	74	48.3	54	Pass
Radio 3 with Patch	Peak	Hopping Enabled	2483.5	31.9	32.2	64.1	74	44.1	54	Pass
Radio 4 with Patch	Peak	Hopping Enabled	2483.5	30.7	32.2	62.9	74	42.9	54	Pass

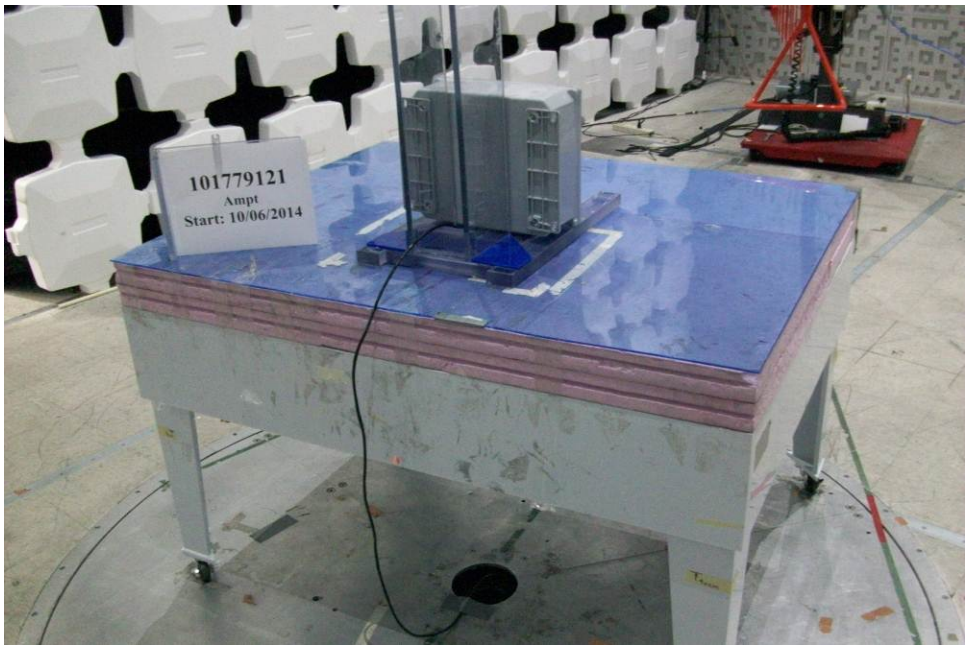
Note:

1. Correction Factor @ 2483.5MHz: Cable loss + Antenna factor
2. FS Peak at 3m = SA reading + Correction Factor
3. Duty Cycle Factor is calculated as δ (dB) = 20log(δ), where δ = 0.025 (2.5% on time). The Duty Cycle Factor is 32dB
4. Average at 3m is calculated as Peak – Duty Cycle Factor or 20dB (whichever is less)

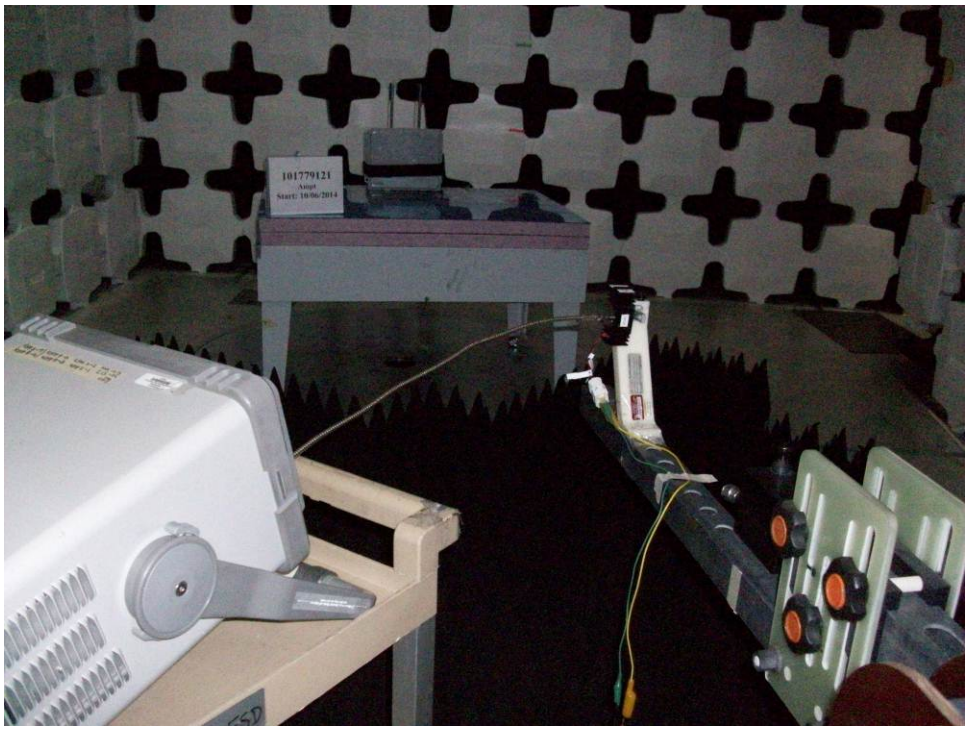
4.7.5 Test Setup Photographs

The following photographs show the testing configurations used.






101779121
Ampt
Start: 10/06/2014


101779121
Ampt
Start: 10/06/2014

4.8 AC Line Conducted Emission
FCC 15.207

4.8.1 Requirement

Frequency Band MHz	Class B Limit dB (μV)	
	Quasi-Peak	Average
0.15-0.50	66 to 56 Decreases linearly with the logarithm of the frequency	56 to 46 Decreases linearly with the logarithm of the frequency
0.50-5.00	56	46
5.00-30.00	60	50

Note: At the transition frequency the lower limit applies.

4.8.2 Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

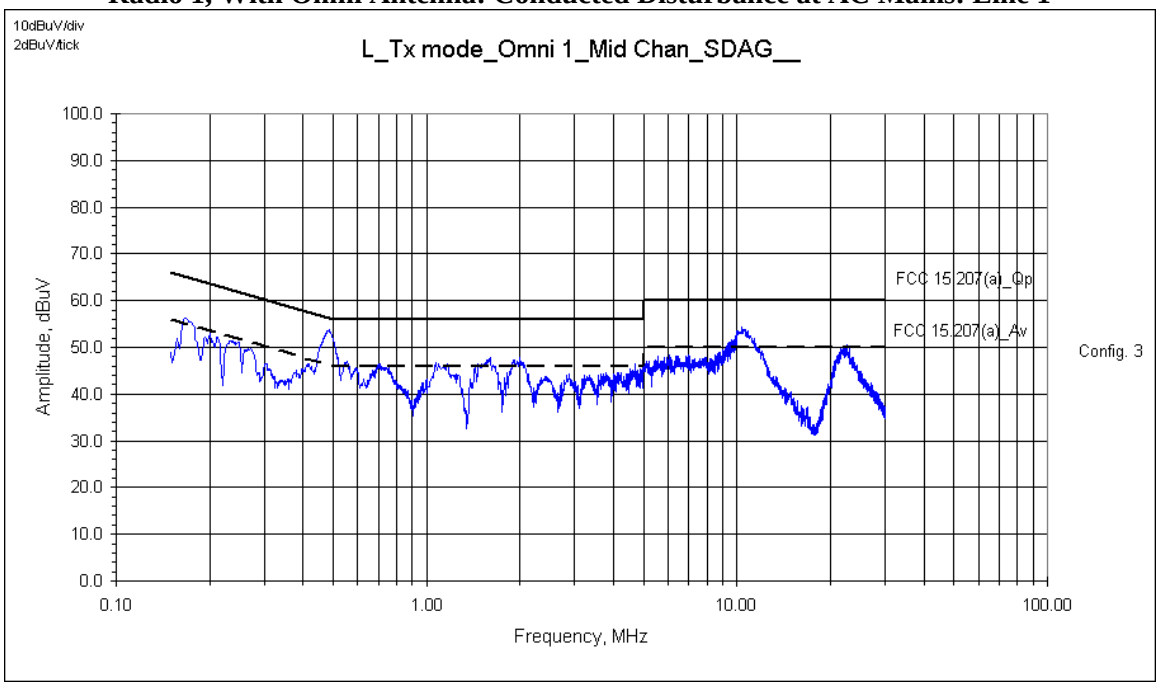
The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4.

4.8.3 Test Result

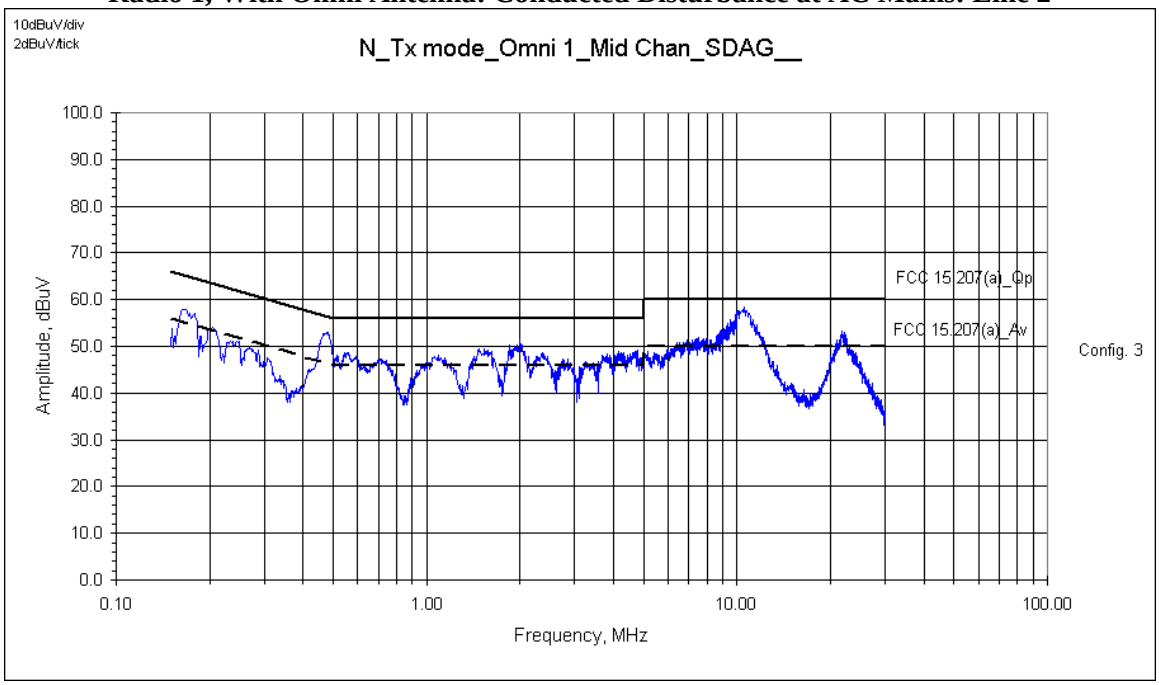
Radio 1, With Omni Antenna: Conducted Disturbance at AC Mains: Line 1



Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC 15.207 (Line 1)

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
MHz	dBuV	dBuV	dBuV	dBuV	dB	dB
0.176	39.6	52.7	54.7	64.7	- 15.1	- 11.9
0.214	33.9	46.9	53.1	63.1	- 19.2	- 16.2
0.486	45.7	52.5	46.2	56.2	- 0.6	- 3.7
0.567	35.3	42.6	46.0	56.0	- 10.7	- 13.4
0.734	37.1	43.9	46.0	56.0	- 8.9	- 12.1
1.115	38.5	44.3	46.0	56.0	- 7.5	- 11.7
1.596	39.0	44.4	46.0	56.0	- 7.0	- 11.6
2.006	38.8	44.2	46.0	56.0	- 7.2	- 11.8
2.500	34.4	39.8	46.0	56.0	- 11.7	- 16.2
2.917	34.0	39.5	46.0	56.0	- 12.0	- 16.5
3.423	32.1	38.5	46.0	56.0	- 14.0	- 17.6
3.878	31.4	38.3	46.0	56.0	- 14.6	- 17.7
4.340	31.1	38.5	46.0	56.0	- 14.9	- 17.6
4.718	33.7	40.6	46.0	56.0	- 12.4	- 15.4
7.428	37.2	42.9	50.0	60.0	- 12.8	- 17.2
10.544	45.6	50.4	50.0	60.0	- 4.5	- 9.6
21.872	40.6	46.0	50.0	60.0	- 9.4	- 14.0

Radio 1, With Omni Antenna: Conducted Disturbance at AC Mains: Line 2

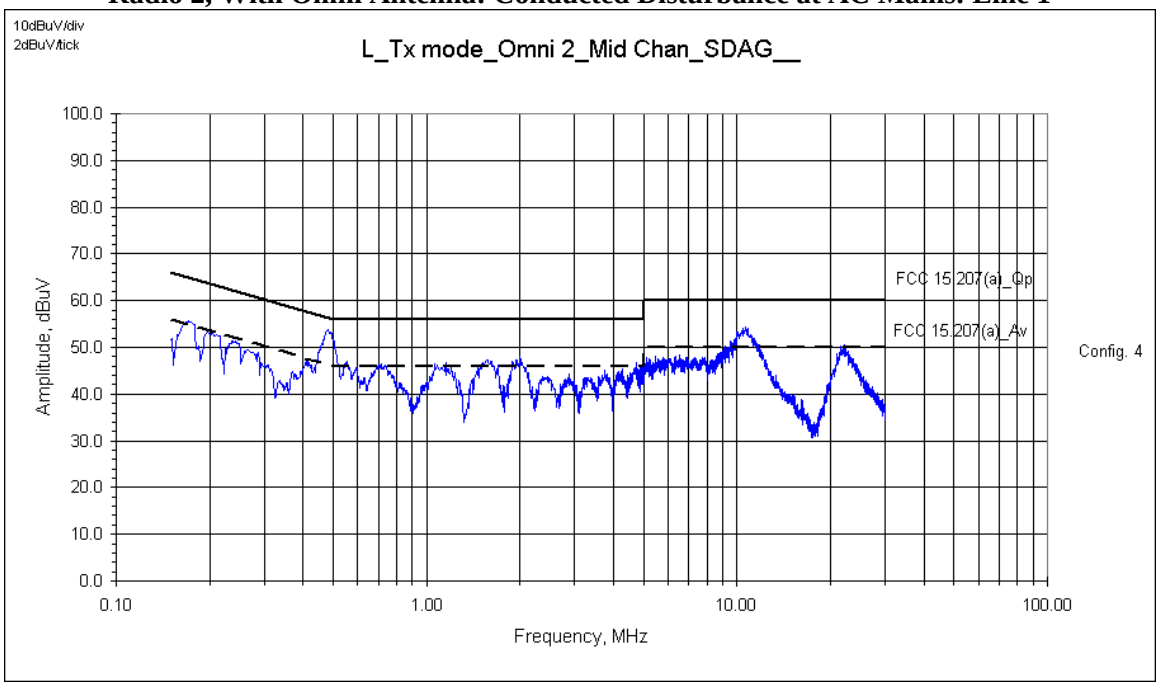


Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC 15.207 (Line 2)

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
MHz	dBuV	dBuV	dBuV	dBuV	dB	dB
0.176	43.1	54.2	54.7	64.7	- 11.6	- 10.5
0.214	36.3	48.4	53.1	63.1	- 16.8	- 14.7
0.486	43.9	50.8	46.2	56.2	- 2.3	- 5.4
0.567	38.2	45.6	46.0	56.0	- 7.8	- 10.4
0.734	37.9	44.7	46.0	56.0	- 8.1	- 11.3
1.115	40.3	45.9	46.0	56.0	- 5.8	- 10.1
1.596	40.8	46.3	46.0	56.0	- 5.2	- 9.7
2.006	42.0	47.5	46.0	56.0	- 4.0	- 8.5
2.500	37.0	43.0	46.0	56.0	- 9.0	- 13.0
2.917	36.4	42.2	46.0	56.0	- 9.6	- 13.8
3.423	36.1	42.4	46.0	56.0	- 9.9	- 13.6
3.878	36.8	43.4	46.0	56.0	- 9.2	- 12.6
4.340	36.1	43.3	46.0	56.0	- 9.9	- 12.7
4.718	37.7	44.1	46.0	56.0	- 8.3	- 11.9
7.428	40.6	46.5	50.0	60.0	- 9.4	- 13.5
10.544	49.2	54.1	50.0	60.0	- 0.8	- 5.9
21.872	43.8	49.5	50.0	60.0	- 6.2	- 10.6

Results	Complies by 0.6 dB

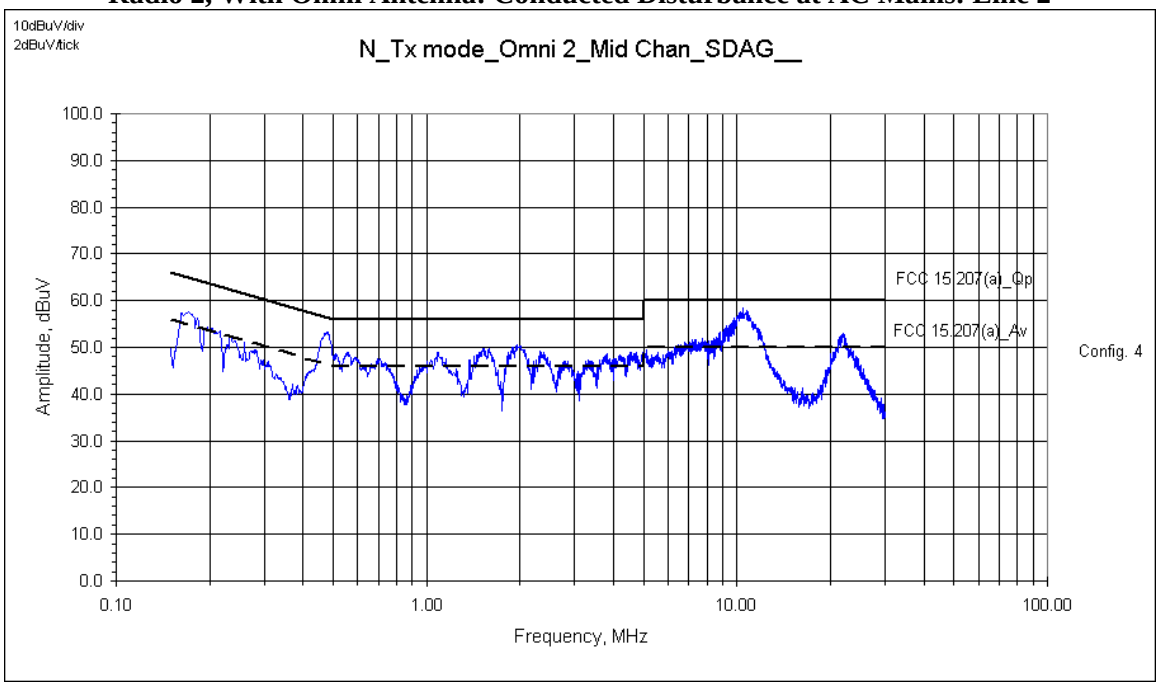
Radio 2, With Omni Antenna: Conducted Disturbance at AC Mains: Line 1



Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC 15.207 (Line 1)

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
MHz	dBuV	dBuV	dBuV	dBuV	dB	dB
0.176	39.3	52.6	54.7	64.7	- 15.4	- 12.1
0.214	33.0	46.8	53.1	63.1	- 20.1	- 16.3
0.486	45.7	52.5	46.2	56.2	- 0.5	- 3.7
0.567	35.3	42.6	46.0	56.0	- 10.7	- 13.4
0.734	37.2	44.0	46.0	56.0	- 8.8	- 12.0
1.115	38.4	44.3	46.0	56.0	- 7.6	- 11.7
1.596	39.1	44.4	46.0	56.0	- 6.9	- 11.6
2.006	38.9	44.3	46.0	56.0	- 7.1	- 11.7
2.500	34.4	39.9	46.0	56.0	- 11.6	- 16.1
2.917	34.3	39.7	46.0	56.0	- 11.7	- 16.3
3.423	32.4	38.6	46.0	56.0	- 13.6	- 17.4
3.878	32.0	39.0	46.0	56.0	- 14.0	- 17.0
4.340	31.8	39.0	46.0	56.0	- 14.2	- 17.0
4.718	34.0	41.0	46.0	56.0	- 12.0	- 15.0
7.428	37.5	43.1	50.0	60.0	- 12.5	- 16.9
10.544	45.5	50.4	50.0	60.0	- 4.6	- 9.6
21.872	40.5	46.0	50.0	60.0	- 9.5	- 14.0

Radio 2, With Omni Antenna: Conducted Disturbance at AC Mains: Line 2

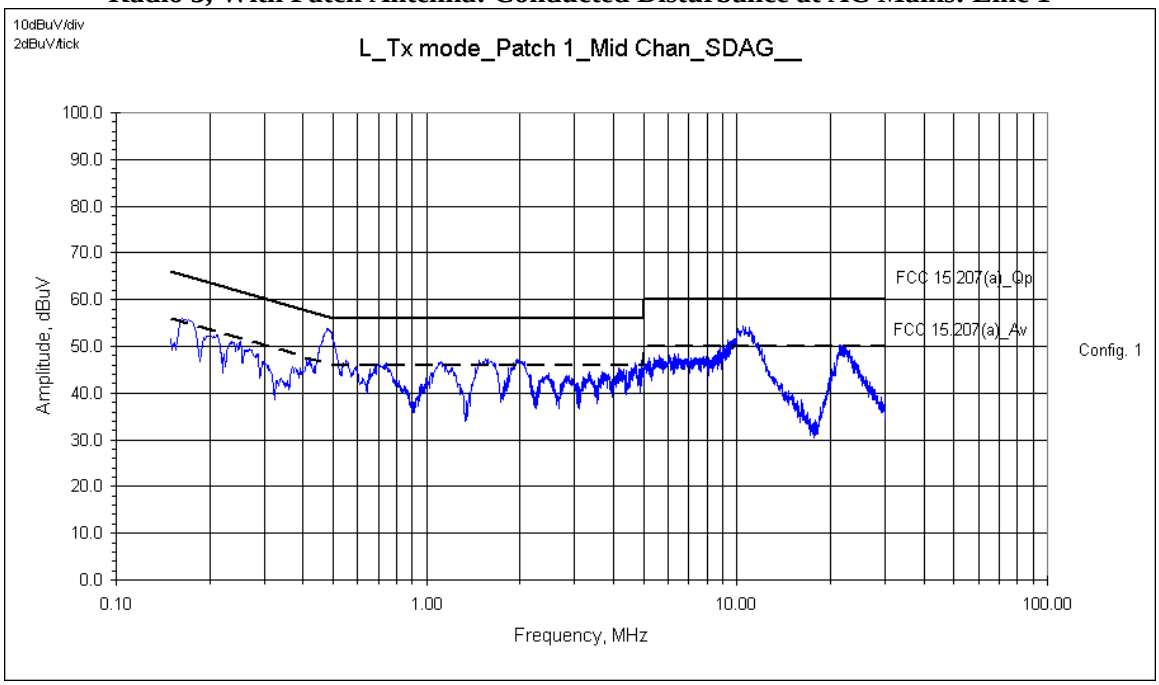


Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC 15.207 (Line 2)

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
MHz	dBuV	dBuV	dBuV	dBuV	dB	dB
0.176	43.2	54.0	54.7	64.7	- 11.5	- 10.7
0.214	35.8	47.9	53.1	63.1	- 17.3	- 15.1
0.486	43.9	50.8	46.2	56.2	- 2.4	- 5.4
0.567	38.1	45.7	46.0	56.0	- 7.9	- 10.4
0.734	38.0	44.7	46.0	56.0	- 8.0	- 11.3
1.115	40.1	45.9	46.0	56.0	- 5.9	- 10.1
1.596	40.6	46.3	46.0	56.0	- 5.4	- 9.8
2.006	42.1	47.5	46.0	56.0	- 3.9	- 8.5
2.500	37.1	43.0	46.0	56.0	- 8.9	- 13.0
2.917	36.5	42.2	46.0	56.0	- 9.5	- 13.8
3.423	35.9	42.2	46.0	56.0	- 10.1	- 13.9
3.878	36.6	43.3	46.0	56.0	- 9.5	- 12.8
4.718	37.5	44.0	46.0	56.0	- 8.5	- 12.0
7.428	40.4	46.5	50.0	60.0	- 9.6	- 13.5
10.544	49.4	54.2	50.0	60.0	- 0.6	- 5.8
21.872	43.9	49.4	50.0	60.0	- 6.1	- 10.6

Results	Complies by 0.5 dB

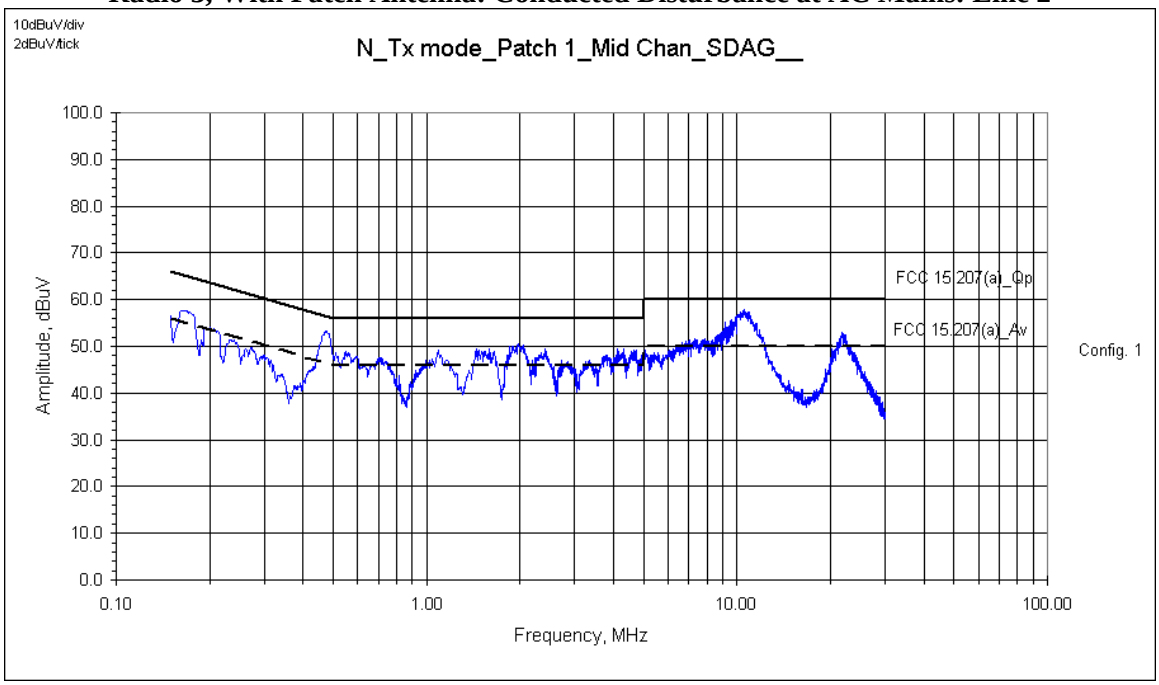
Radio 3, With Patch Antenna: Conducted Disturbance at AC Mains: Line 1



Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC 15.207 (Line 1)

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
MHz	dBuV	dBuV	dBuV	dBuV	dB	dB
0.176	39.3	52.5	54.7	64.7	- 15.4	- 12.2
0.214	33.4	46.9	53.1	63.1	- 19.7	- 16.1
0.486	45.9	52.5	46.2	56.2	- 0.4	- 3.7
0.567	35.2	42.5	46.0	56.0	- 10.9	- 13.5
0.734	37.2	43.9	46.0	56.0	- 8.8	- 12.1
1.115	38.3	44.2	46.0	56.0	- 7.7	- 11.8
1.596	39.0	44.5	46.0	56.0	- 7.0	- 11.5
2.006	38.9	44.2	46.0	56.0	- 7.1	- 11.8
2.449	35.2	40.5	46.0	56.0	- 10.8	- 15.5
2.917	34.3	39.6	46.0	56.0	- 11.7	- 16.4
3.423	32.2	38.7	46.0	56.0	- 13.8	- 17.3
3.878	31.7	38.6	46.0	56.0	- 14.3	- 17.4
4.340	31.3	38.8	46.0	56.0	- 14.7	- 17.2
4.718	33.8	40.9	46.0	56.0	- 12.2	- 15.1
7.428	37.4	43.2	50.0	60.0	- 12.6	- 16.8
10.994	44.5	49.6	50.0	60.0	- 5.5	- 10.5
22.122	40.7	46.2	50.0	60.0	- 9.3	- 13.8

Radio 3, With Patch Antenna: Conducted Disturbance at AC Mains: Line 2

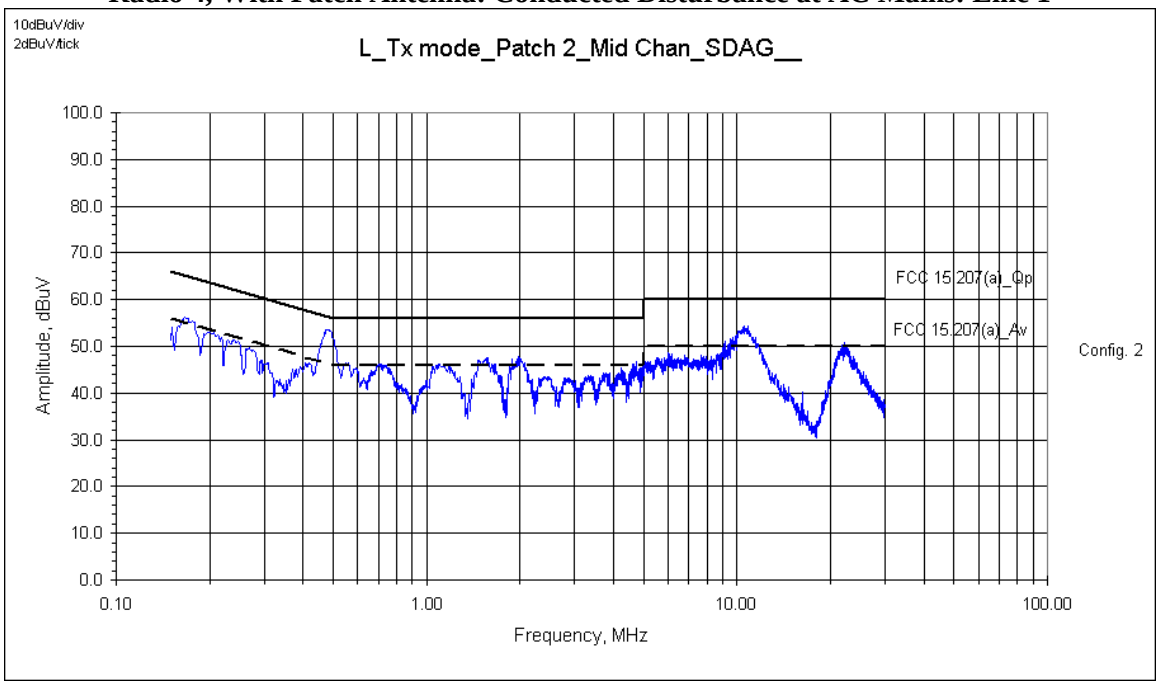


Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC 15.207 (Line 2)

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
MHz	dBuV	dBuV	dBuV	dBuV	dB	dB
0.176	43.3	54.1	54.7	64.7	- 11.4	- 10.6
0.214	36.3	48.3	53.1	63.1	- 16.8	- 14.7
0.486	44.0	50.8	46.2	56.2	- 2.2	- 5.5
0.567	38.3	45.8	46.0	56.0	- 7.7	- 10.2
0.734	38.0	44.6	46.0	56.0	- 8.0	- 11.4
1.115	40.2	45.9	46.0	56.0	- 5.8	- 10.1
1.596	40.6	46.1	46.0	56.0	- 5.4	- 9.9
2.006	42.0	47.5	46.0	56.0	- 4.0	- 8.5
2.500	36.9	42.9	46.0	56.0	- 9.1	- 13.1
2.917	36.3	42.1	46.0	56.0	- 9.7	- 13.9
3.423	35.6	42.2	46.0	56.0	- 10.4	- 13.9
3.878	36.5	43.3	46.0	56.0	- 9.5	- 12.7
4.340	35.5	42.8	46.0	56.0	- 10.5	- 13.2
4.718	37.4	44.1	46.0	56.0	- 8.6	- 11.9
4.718	37.4	44.1	46.0	56.0	- 8.6	- 11.9
10.544	49.4	54.1	50.0	60.0	- 0.6	- 5.9
21.872	43.9	49.3	50.0	60.0	- 6.1	- 10.7

Results	Complies by 0.4 dB

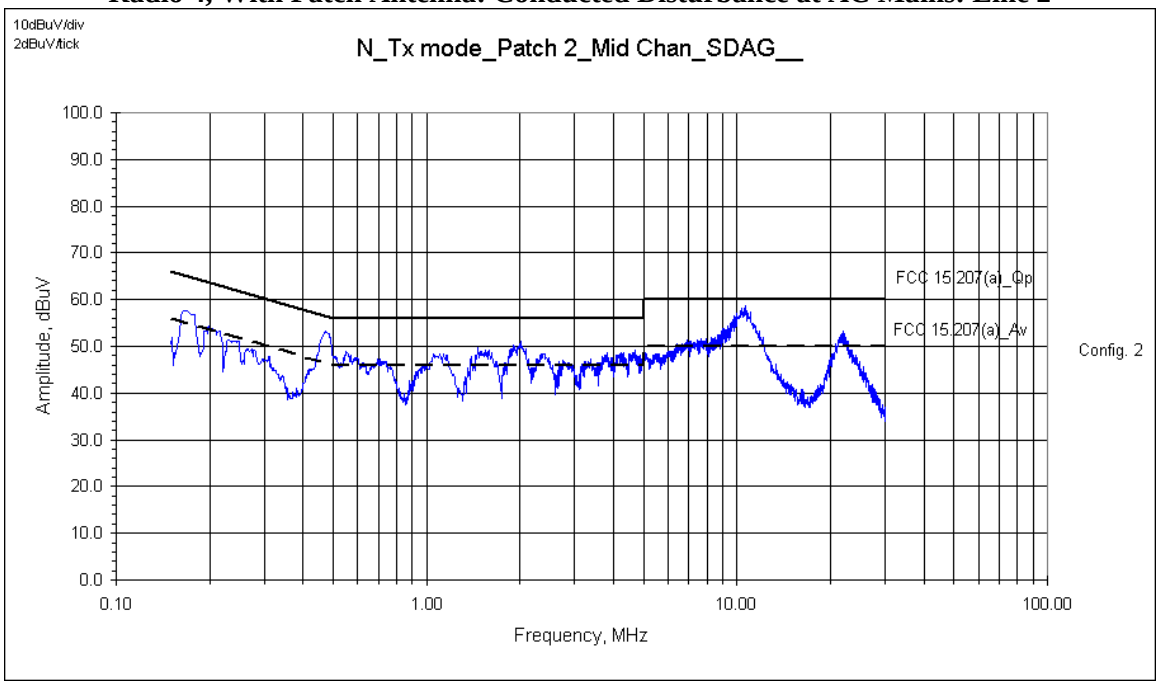
Radio 4, With Patch Antenna: Conducted Disturbance at AC Mains: Line 1



Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC 15.207 (Line 1)

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
MHz	dBuV	dBuV	dBuV	dBuV	dB	dB
0.176	39.5	52.6	54.7	64.7	- 15.2	- 12.1
0.214	33.3	47.0	53.1	63.1	- 19.8	- 16.1
0.486	45.8	52.5	46.2	56.2	- 0.4	- 3.7
0.567	35.2	42.6	46.0	56.0	- 10.8	- 13.4
0.734	37.3	43.9	46.0	56.0	- 8.7	- 12.1
1.115	38.4	44.3	46.0	56.0	- 7.6	- 11.7
1.596	39.1	44.5	46.0	56.0	- 6.9	- 11.5
2.006	38.9	44.2	46.0	56.0	- 7.1	- 11.8
2.500	34.3	39.9	46.0	56.0	- 11.7	- 16.1
2.917	34.3	39.8	46.0	56.0	- 11.7	- 16.2
3.423	32.0	38.7	46.0	56.0	- 14.0	- 17.3
3.878	31.5	38.5	46.0	56.0	- 14.5	- 17.6
4.340	31.2	38.7	46.0	56.0	- 14.8	- 17.3
4.718	33.7	40.6	46.0	56.0	- 12.3	- 15.4
7.428	37.6	43.0	50.0	60.0	- 12.4	- 17.0
10.544	45.6	50.4	50.0	60.0	- 4.4	- 9.6
21.872	40.5	46.0	50.0	60.0	- 9.5	- 14.0

Radio 4, With Patch Antenna: Conducted Disturbance at AC Mains: Line 2



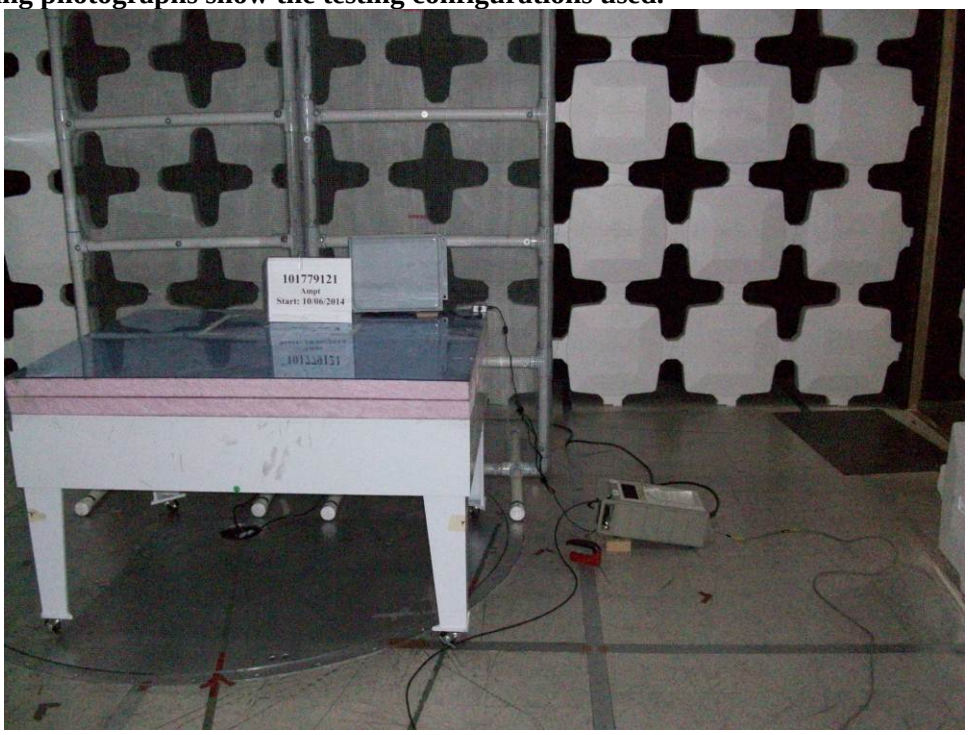
Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC 15.207 (Line 2)

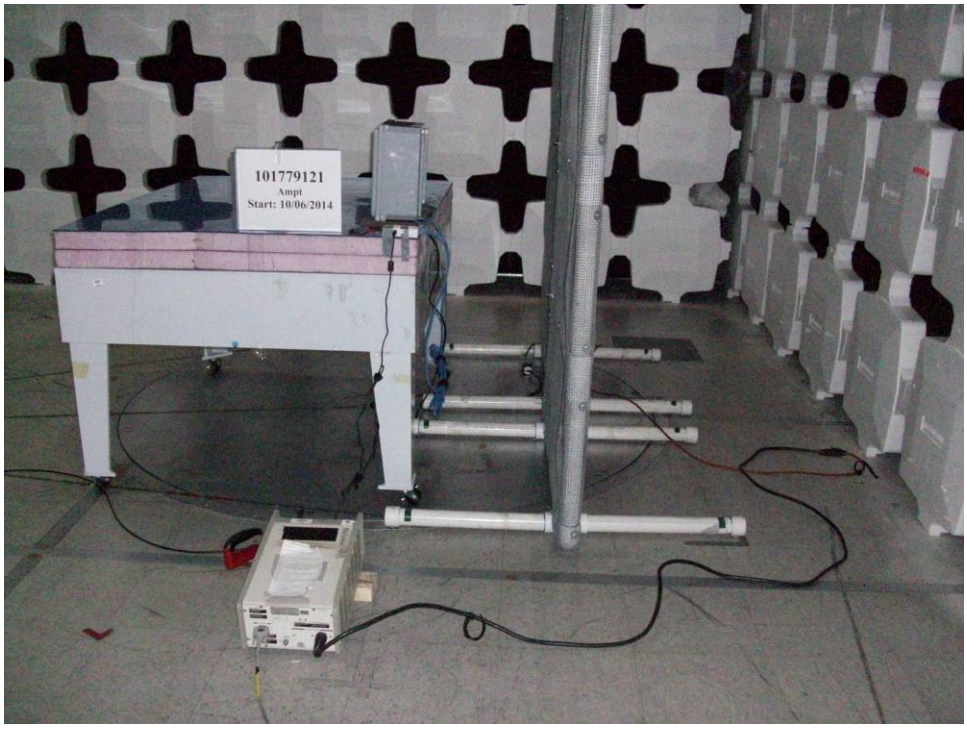
Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
0.176	43.5	54.1	54.7	64.7	- 11.2	- 10.5
0.214	36.0	48.1	53.1	63.1	- 17.1	- 15.0
0.486	43.9	50.8	46.2	56.2	- 2.3	- 5.4
0.567	38.1	45.7	46.0	56.0	- 7.9	- 10.3
0.734	37.9	44.6	46.0	56.0	- 8.1	- 11.4
1.115	40.1	45.8	46.0	56.0	- 6.0	- 10.2
1.596	40.5	46.0	46.0	56.0	- 5.5	- 10.0
2.006	41.9	47.3	46.0	56.0	- 4.1	- 8.7
2.500	36.6	42.6	46.0	56.0	- 9.4	- 13.4
2.917	36.0	42.0	46.0	56.0	- 10.0	- 14.0
3.423	36.0	42.1	46.0	56.0	- 10.0	- 13.9
3.878	36.2	43.1	46.0	56.0	- 9.9	- 12.9
4.340	35.3	42.9	46.0	56.0	- 10.7	- 13.1
4.718	37.6	44.1	46.0	56.0	- 8.4	- 11.9
7.428	40.2	46.3	50.0	60.0	- 9.8	- 13.8
10.544	49.3	54.1	50.0	60.0	- 0.7	- 5.9
21.872	44.0	49.3	50.0	60.0	- 6.0	- 10.7

Results	Complies by 0.4 dB

4.8.4 Test Configuration Photographs

The following photographs show the testing configurations used.





5.0 Emissions from Digital Parts, FCC Part 15B

5.1 Radiated Emissions, 15.109

5.1.1 Requirements

Limits for Electromagnetic Radiated Emissions, FCC Section 15.109(b) and ICES 003*

Frequency (MHz)	Class A at 10m dB(μV/m)	Class B at 3m dB(μV/m)
30-88	39	40.0
88-216	43.5	43.5
216-960	46.4	46.0
Above 960	49.5	54.0

* According to FCC Part 15.109(g) an alternative to the radiated emission limits shown above, digital devices may be shown to comply with the limit of CISPR Pub. 22

5.1.2 Procedure

Measurements are conducted with a quasi-peak detector instrument in the frequency range of 30 MHz to 1000 MHz and with the average detector instrument in the frequency range above 1000 MHz. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole.

Measurements of the radiated field are made with the antenna located at a distance of 3 meters from the EUT.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

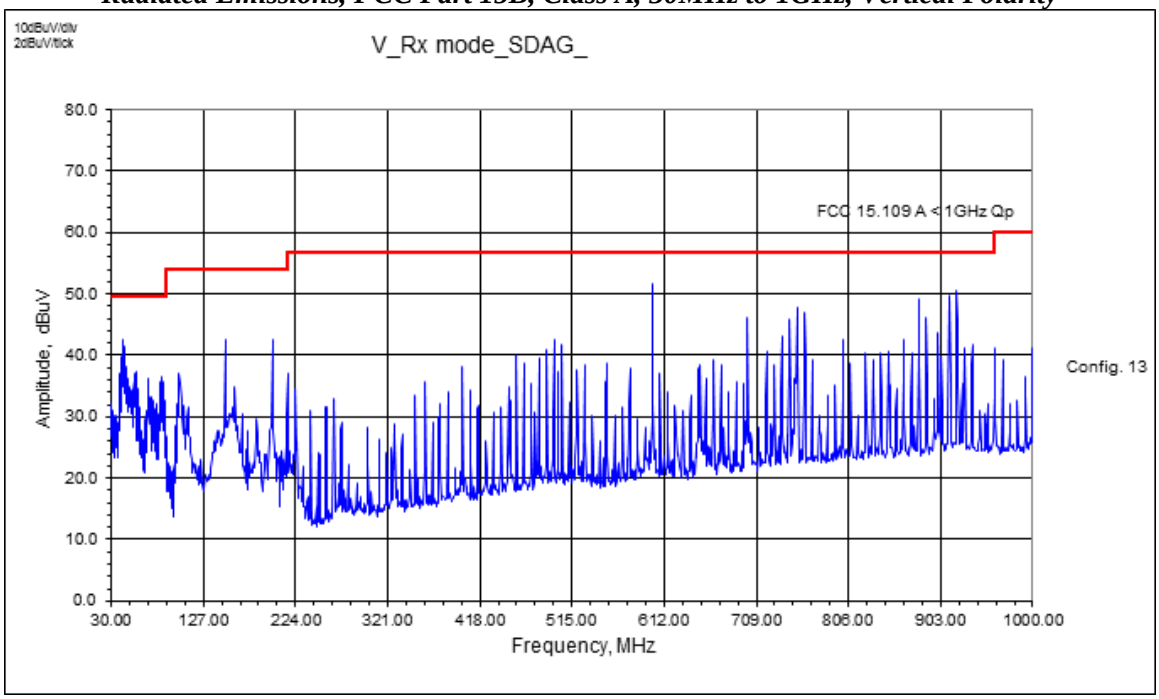
The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for a larger EUT.

Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material.

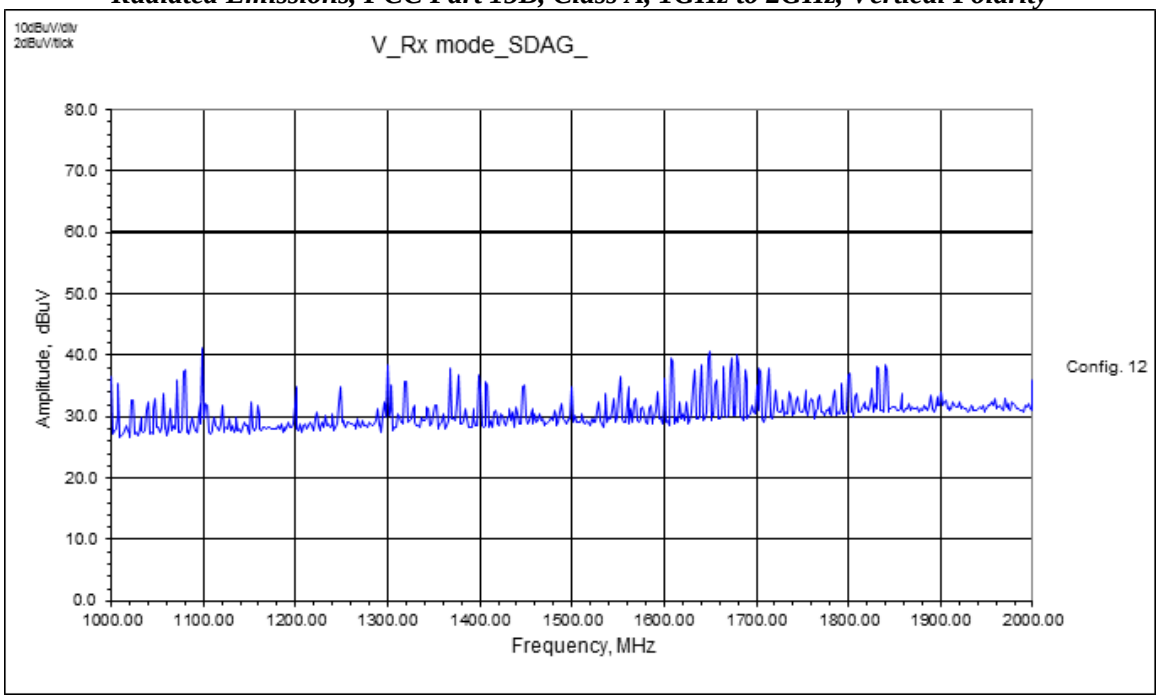
Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4.

5.1.3 Test Results

Radiated Emissions, FCC Part 15B, Class A, 30MHz to 1GHz, Vertical Polarity

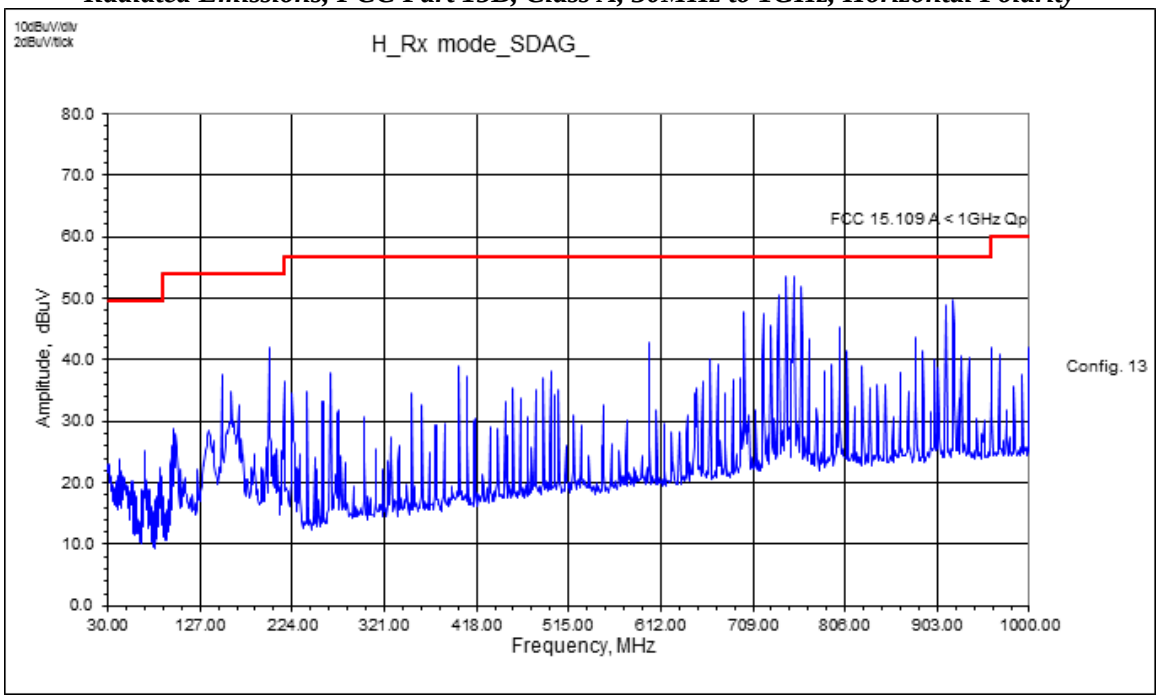


Radiated Emissions, FCC Part 15B, Class A, 1GHz to 2GHz, Vertical Polarity

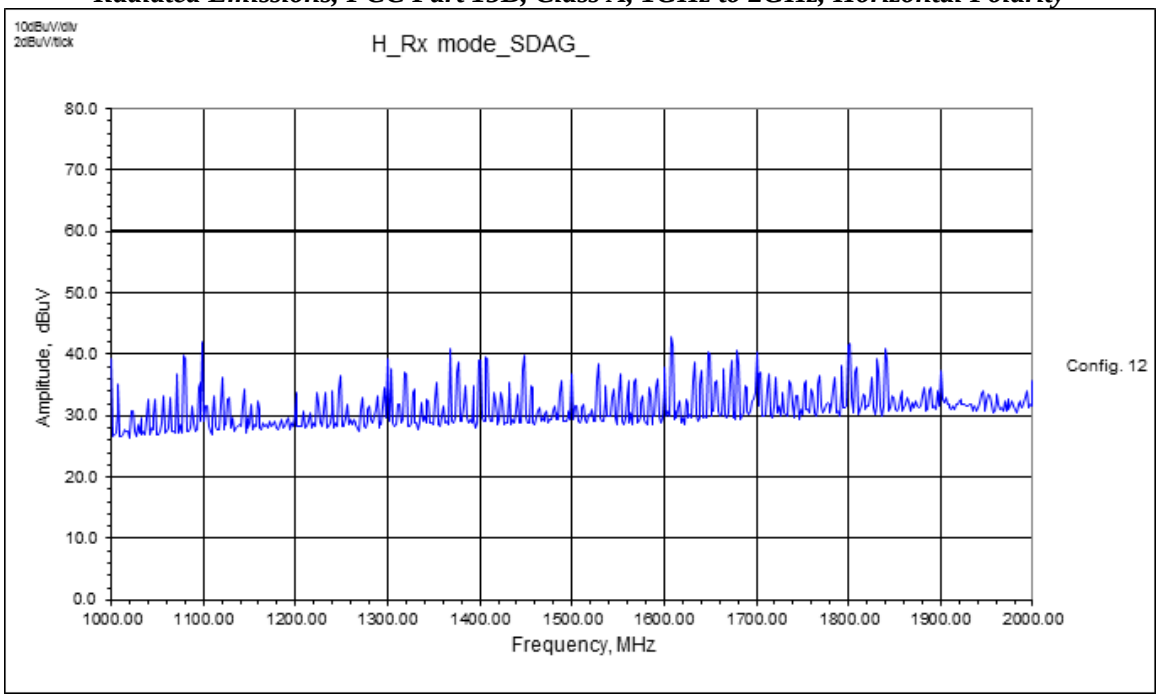


5.1.3 Test Results (Continued)

Radiated Emissions, FCC Part 15B, Class A, 30MHz to 1GHz, Horizontal Polarity



Radiated Emissions, FCC Part 15B, Class A, 1GHz to 2GHz, Horizontal Polarity



5.1.3 Test Results (Continued)

FCC Part 15B, Class A Radiated Emissions, Final Measurements

Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS@ 3 m	Detector	FS Limit@ 3 m	Margin
MHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Quasi-peak	dB(uV/m)	dB
42.06	V	54.5	28.2	12.2	0.8	39.3	Qp	49.5	-10.2
599.97	V	59.6	28.9	18.8	1.7	51.2	Qp	56.9	-5.7
751.96	V	57.3	28.0	20.6	1.9	51.8	Qp	56.9	-5.1
759.96	V	55.5	27.9	20.7	1.9	50.2	Qp	56.9	-6.7
879.95	V	52.5	27.7	21.6	2.1	48.5	Qp	56.9	-8.4
911.95	V	52.1	27.7	22.5	2.1	49.0	Qp	56.9	-7.9
919.95	V	53.4	27.7	22.4	2.1	50.2	Qp	56.9	-6.7
199.99	H	56.3	27.6	12.3	0.9	41.9	Qp	54.0	-12.1
735.96	H	54.6	28.1	20.4	1.9	48.8	Qp	56.9	-8.1
743.96	H	58.2	28.0	20.5	1.9	52.6	Qp	56.9	-4.3
751.96	H	58.5	28.0	20.6	1.9	53.0	Qp	56.9	-3.9
759.96	H	57.2	27.9	20.7	1.9	51.9	Qp	56.9	-5.0
911.95	H	55.0	27.7	22.5	2.1	51.9	Qp	56.9	-5.0
919.95	H	56.8	27.7	22.4	2.1	53.6	Qp	56.9	-3.3

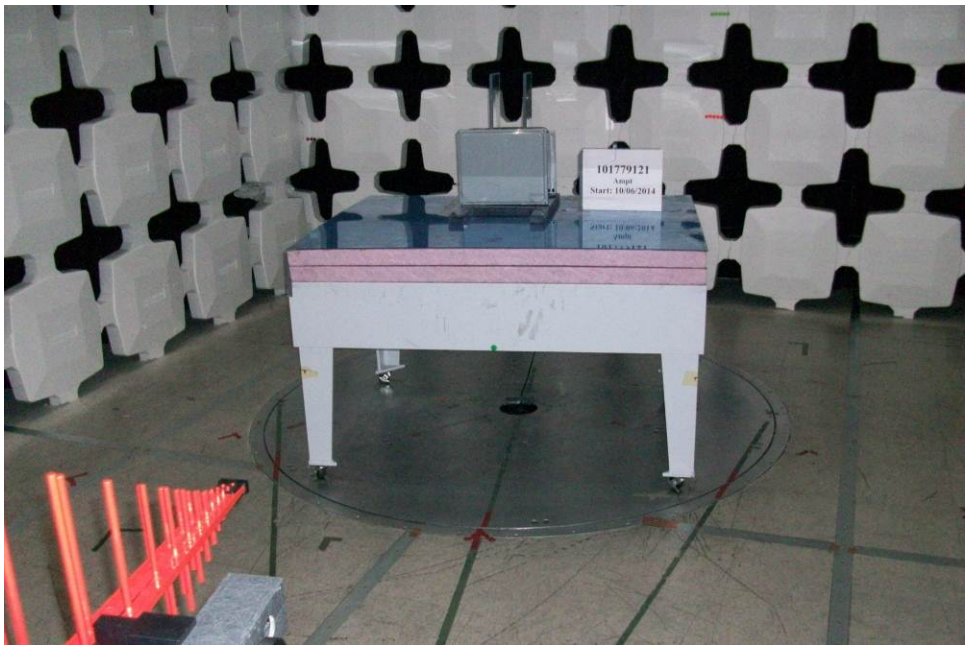
Results	Complies by 3.3 dB for below 1GHz

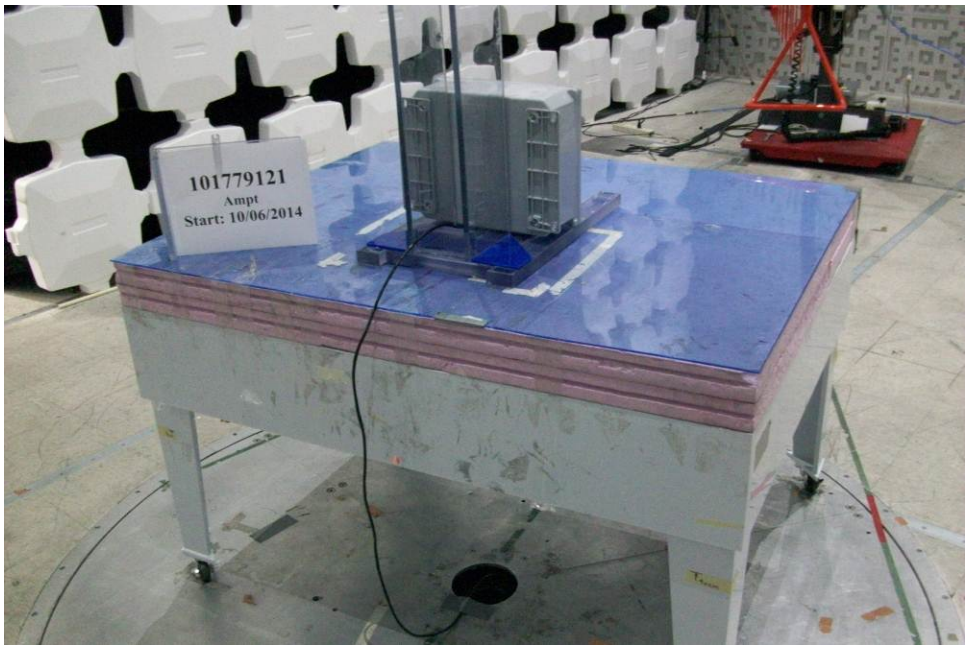
Frequency	Antenna Polarity	Raw Amplitude @ 3 m	Preamp	Antenna Factor	Cable Loss	FS@ 3 m	Detector	FS Limit@ 3 m	Margin
GHz	H/V	dB(uV)	dB	dB(1/m)	dB	dB(uV/m)	Peak / Avg	dB(uV/m)	dB
1.1000	V	50.9	37.3	24.5	2.3	40.4	Avg	60	-19.6
1.3000	V	46.6	36.9	25.2	2.5	37.4	Avg	60	-22.6
1.6479	V	50.4	36.8	25.8	2.9	42.3	Avg	60	-17.7
1.1000	H	50.0	37.3	24.5	2.3	39.5	Avg	60	-20.5
1.6079	H	52.0	36.8	25.5	2.8	43.5	Avg	60	-16.5
1.7999	H	46.2	37.1	26.6	3.0	38.7	Avg	60	-21.3

Results	Complies by 16.5 dB for above 1GHz

Notes: Measurements made at 3 meters distance.

5.1.4 Test Setup Photographs





Radiated emissions: 1-18GHz, front view

5.2 AC Line Conducted Emission, 15.107

5.2.1 Requirements

Frequency Band MHz	Quasi-Peak	Average
0.15-0.50	66 to 56 Decreases linearly with the logarithm of the frequency	56 to 46 Decreases linearly with the logarithm of the frequency
0.50-5.00	56	46
5.00-30.00	60	50

Note: At the transition frequency the lower limit applies.

5.2.2 Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

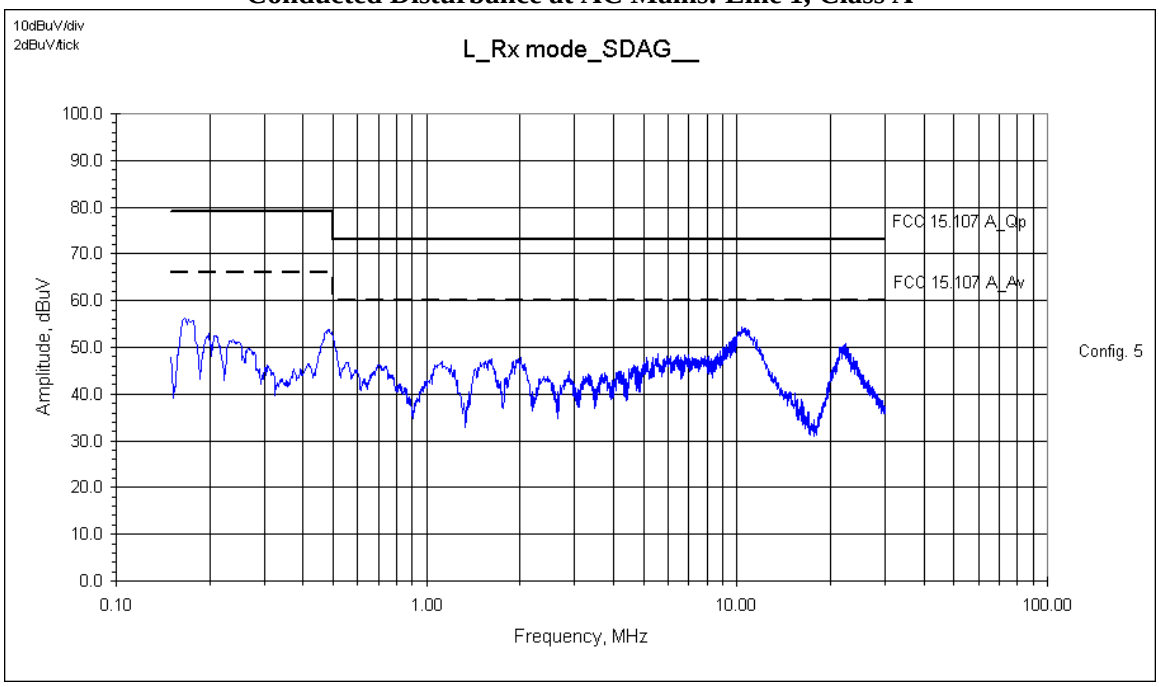
The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4.

5.2.3 Test Results

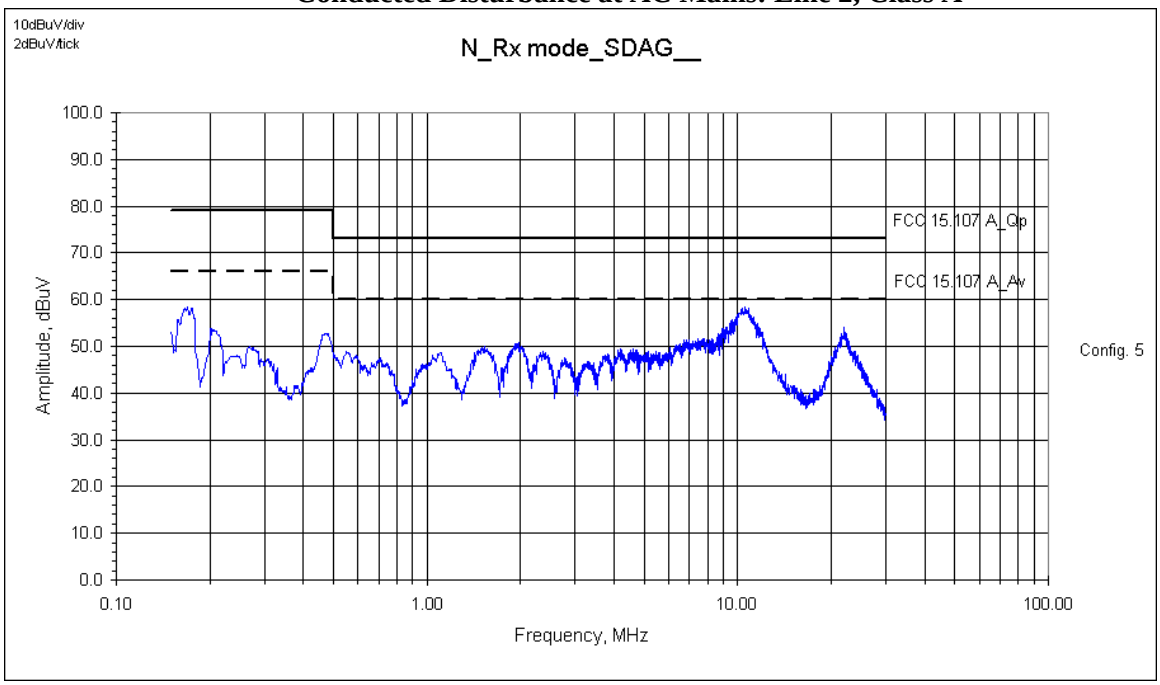
Conducted Disturbance at AC Mains: Line 1, Class A



Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC 15.107 (Line 1)

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
MHz	dBuV	dBuV	dBuV	dBuV	dB	dB
0.177	39.7	52.7	66.0	79.0	- 26.3	- 26.3
0.248	36.6	47.5	66.0	79.0	- 29.4	- 31.5
0.487	45.5	52.4	66.0	79.0	- 20.5	- 26.6
0.564	36.7	43.7	60.0	73.0	- 23.3	- 29.3
0.734	37.4	44.0	60.0	73.0	- 22.6	- 29.0
1.147	37.8	43.6	60.0	73.0	- 22.2	- 29.4
1.628	38.3	43.9	60.0	73.0	- 21.7	- 29.1
2.058	37.0	42.7	60.0	73.0	- 23.0	- 30.3
4.827	31.6	38.7	60.0	73.0	- 28.4	- 34.3
5.168	35.2	41.7	60.0	73.0	- 24.9	- 31.3
10.865	45.1	49.9	60.0	73.0	- 14.9	- 23.1
23.205	38.9	44.2	60.0	73.0	- 21.1	- 28.8

Conducted Disturbance at AC Mains: Line 2, Class A

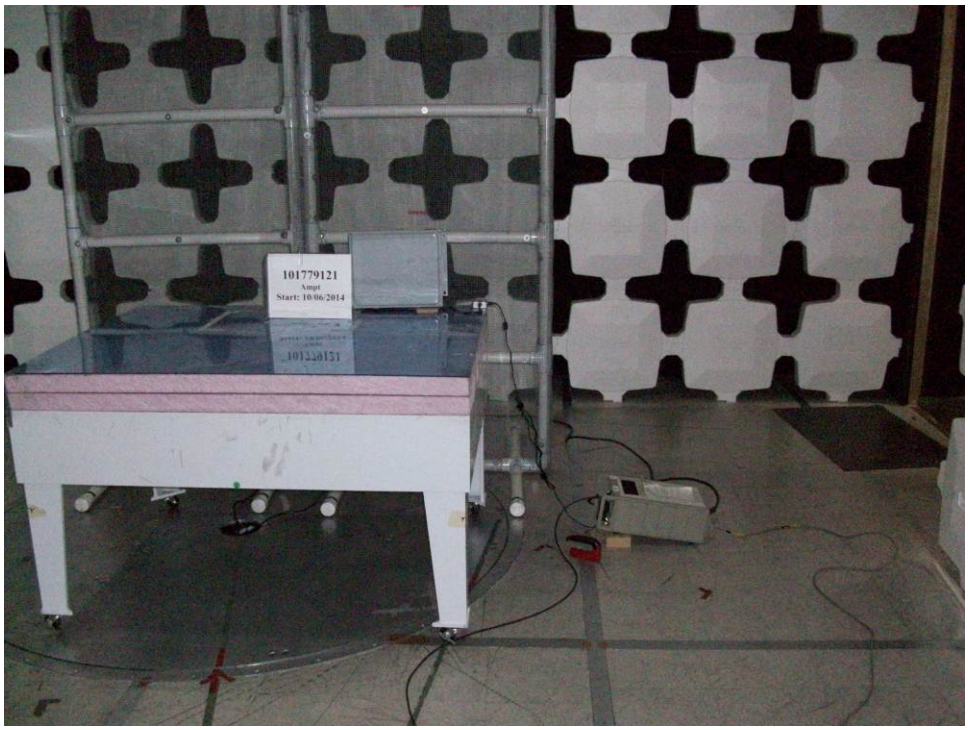


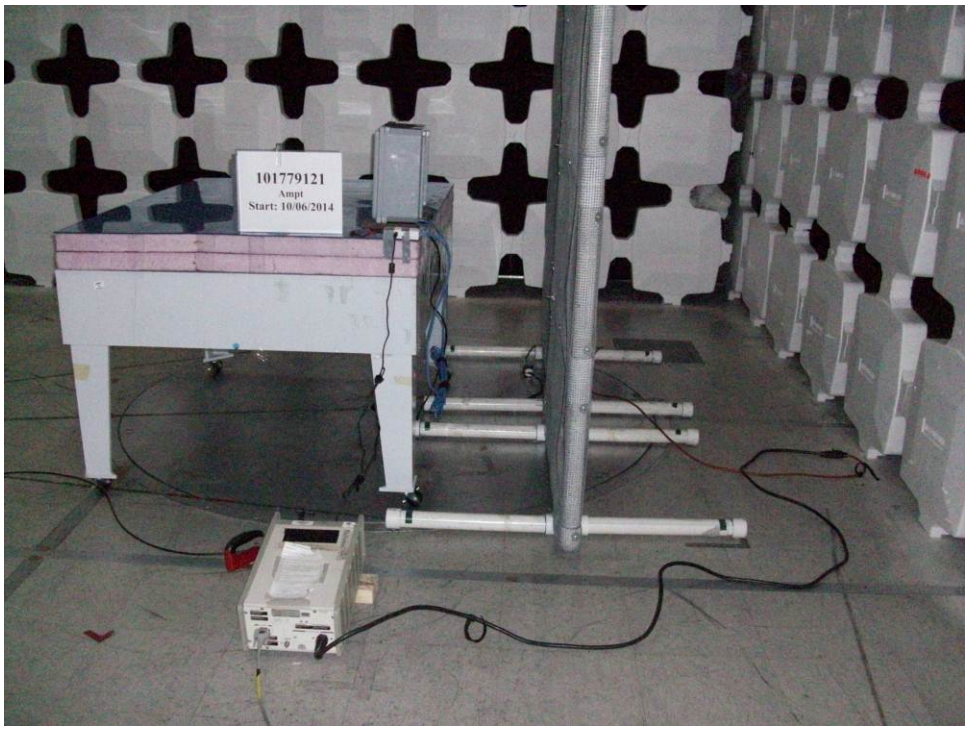
Intertek Testing Services
Line Conducted Emissions 150 kHz - 30 MHz
FCC 15.107 (Line 2)

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
MHz	dBuV	dBuV	dBuV	dBuV	dB	dB
0.176	45.2	54.8	66.0	79.0	- 20.8	- 24.2
0.215	36.4	48.1	66.0	79.0	- 29.6	- 30.9
0.475	44.2	51.5	66.0	79.0	- 21.9	- 27.5
0.564	39.4	46.6	60.0	73.0	- 20.6	- 26.4
0.604	37.4	44.6	60.0	73.0	- 22.6	- 28.4
0.715	37.4	44.4	60.0	73.0	- 22.6	- 28.6
1.115	39.8	45.8	60.0	73.0	- 20.2	- 27.2
1.564	40.8	46.5	60.0	73.0	- 19.2	- 26.5
2.032	40.8	46.5	60.0	73.0	- 19.2	- 26.5
2.455	38.3	44.0	60.0	73.0	- 21.7	- 29.0
2.917	35.7	42.0	60.0	73.0	- 24.3	- 31.1
3.897	34.0	41.5	60.0	73.0	- 26.0	- 31.5
3.897	34.5	41.6	60.0	73.0	- 25.5	- 31.4
4.333	34.6	42.2	60.0	73.0	- 25.4	- 30.8
4.718	36.3	43.5	60.0	73.0	- 23.7	- 29.6
7.973	41.7	47.1	60.0	73.0	- 18.3	- 25.9
10.865	48.7	53.7	60.0	73.0	- 11.3	- 19.3
22.468	42.7	48.1	60.0	73.0	- 17.3	- 24.9

Results	**Complies by** 11.3 dB

5.2.4 Test Setup Photographs





6.0 RF Exposure Evaluation

FCC 2.1091

The EUT is a wireless device used in a mobile application and will be at least 20 cm from any body part of the user or nearby persons.

The maximum conducted power is 11.0 dBm (12.59mW); the antenna 5dBi gain; therefore, to comply with the requirements for RF Exposure, the MPE is calculated.

The maximum Peak EIRP calculated is as 11.0dBm (RF Power) + 5 dBi (Antenna Gain) or 39.82mW.

The Power Density can be calculated using the formula

$$S = EIRP/ 4\pi D^2$$

Where: S is Power Density in W/m^2
D is the distance from the antenna.

It is considered that 20cm is the minimum distance that a user can go near the EUT which is installed inside a host.

At 0.2 m, S = 0.007924 W/m^2, which is below the MPE Limit of 10 W/m^2

A statement that a minimum separation distance of 20 cm between the antenna and persons is included in the User's Manual.

7.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Asset #	Cal Int	Cal Due
Transient Limiter	Hewlett-Packard	11947A	18885	04/17/2014	04/17/2015
Single Phase LISN	EMCO	3816/NM	18914	04/09/2014	04/09/2015
Horn Antenna 1-18GHz	EMCO	3115	18887	03/27/2014	03/27/2015
RF Pre-Amplifier (4-8 GHz)	Avantek	AFT97-8434-10F	18900	05/21/2014	05/21/2015
RF Pre-Amplifier (8-18 GHz)	Avantek	AWT-18037	18901	05/21/2014	05/21/2015
Amplifier	Mini-Circuits Lab	ZHL-42	18906	05/23/2014	05/23/2015
9 kHz- 1.3GHz Pre Amp	Hewlett-Packard	8447F	18912	05/21/2014	05/21/2015
Bilog Antenna 30 MHz - 6GHz	Sunol Sciences	JB6	19936	11/13/2013	11/13/2014
EMI Receiver	ROHDE & SCHWARZ	ESU 26	DEN-073	01/29/2014	01/29/2015
Spectrum Analyzer	Agilent	E7405A	18913	07/21/2014	07/21/2015
Horn Antenna (18-26.5GHz)	EMCO	3160-09	00571	6/9/2014	06/09/2015

8.0 Document History

Revision/ Job Number	Writer Initials	Reviewer Initials	Date	Change
1.0 / G101779121	AS	KV	November 07, 2014	Original document