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Report On

Application for Grant of Equipment Authorization of the
AnyDATA
ACT233L 4G Vehicle Tracker with Hotspot

FCC Part 15 Subpart C §15.247
IC RSS-Gen and RSS-210 Issue 8 December 2010

Report No. SC1304495A_REV1.0 November 2013

REPORT ON	Radio Testing of the AnyDATA 4G Vehicle Tracker with Hotspot
TEST REPORT NUMBER	SC1304495A_REV1.0
PREPARED FOR	AnyDATA 5 Oldfield Irvine, CA 92618
CONTACT PERSON	Kevin Kim Principal Engineer (949) 900-6040 X306 kevinkim@anydata.com
PREPARED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: EMC/Wireless Test Engineer
APPROVED BY	Chip R. Fleury **Name** Authorized Signatory
DATED	NOVEMBER 04, 2013

Revision History

SC1304495A_REV1.0 AnyDATA ACT233L 4G Vehicle Tracker with Hotspot					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
05/20/13	Initial Release				Ferdinand Custodio
11/04/2013	Initial Release	Rev1.0	Update Output power on Bluetooth L/M/H Channels	9,17,19	Fleury Chip

CONTENTS

SECTION 1

REPORT SUMMARY

Radio Testing of the
AnyDATA
4G Vehicle Tracker with Hotspot

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the AnyDATA ACT233L 4G Vehicle Tracker with Hotspot to the requirements of the following:

- FCC Part 15 Subpart C §15.247
- IC RSS-Gen and RSS-210 Issue 8 December 2010.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	AnyDATA
Model Number(s)	ACT233L
FCC ID Number	P4M-ACT233
IC Number	4594B-ACT233
Serial Number(s)	20130418001833 (Radiated Testing)/20130418001829 (Conducted Antenna Service Port Testing)
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.247 (October 1, 2012). • RSS-210 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment (Issue 8, December 2010). • RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 3, December 2010). • (558074 D01 DTS Meas Guidance v03r01, April 09,2013) Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.
Start of Test	April 29, 2013
Finish of Test	May 02, 2013 October 30/2013 (Re-measure Bluetooth output power)
Name of Engineer(s)	Ferdinand Custodio Juan Manuel Gonzalez
Related Document(s)	None. Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.247 with cross-reference to the corresponding IC RSS standard is shown below.

Section	§15.247 Spec Clause	RSS	Test Description	Result	Comments/ Base Standard
2.1	§15.247(b)(3)	RSS-210 A8.4 (4)	Peak Output Power	Compliant	
2.2	§15.207(a)	RSS-Gen 7.2.4	Conducted Emissions	Not Applicable	
2.3		RSS-Gen 4.6.1	99% Emission Bandwidth	Compliant	
2.4	§15.247(a)(2)	RSS-210 A8.2(a)	Minimum 6 dB RF Bandwidth	Compliant	
2.5	§15.247(d)	RSS-210 A8.5	Out-of-Band Emissions - Conducted	Compliant	
2.6	§15.247(d)	RSS-210 A8.5	Band-edge Compliance of RF Conducted Emissions	Compliant	
2.7	§15.247(d)	RSS-210 A8.5	Spurious Radiated Emissions	Compliant	
2.7		RSS-Gen 4.10	Receiver Spurious Emissions	Compliant	
2.8	§15.247(d)	RSS-210 A8.5	Radiated Band Edge Measurements	Compliant	
2.9	§15.247(e)	RSS-210 A8.2(b)	Power Spectral Density for Digitally Modulated Device	Compliant	

1.3 PRODUCT INFORMATION

1.3.1 EUT General Description

The Equipment Under Test (EUT) was an AnyDATA ACT233L 4G Vehicle Tracker with Hotspot as shown in the photograph below. The EUT connects to a vehicle's OBD2 port; it enables remote functions and vehicle tracking through a Smartphone app.

1.3.2 EUT General Description

EUT Description	ACT233L 4G Vehicle Tracker with Hotspot
Model Number(s)	ACT233L
Rated Voltage	13.5 VDC Nominal voltage.
Mode Verified	802.11 b/g/n and BT LE
Capability	800/1900 CDMA2000 1xRTT and 1xEV-DO Release 0 Revision A, Band 4 and 13 LTE, 802.11 b/g/n WLAN, BT and Part 15.231 Transmitter
Primary Unit (EUT)	☒ Production ☐ Pre-Production ☐ Engineering
Antenna Type	Integral custom ILA (Inverted L Antenna) type
Antenna Gain	2400MHz = -6.0dBi 2440MHz = -5.5dBi 2480MHz = -6.5dBi

1.3.3 Maximum Conducted Peak Output Power

Mode	Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
802.11b	2412-2462	13.00	20.00
802.11g	2412-2462	20.82	121.0
802.11n	2412-2462	20.61	115.0
Bluetooth LE	2402-2480	3.25	2.11

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Conducted antenna port measurement
B	Radiated test setup. EUT transmitting through integral antenna.

Note: Antenna port is for service function only.

1.4.2 EUT Exercise Software

Before each test, the EUT is configured using WLAN FTM Test application provided by the client. The software allows configuration of channels, mode + data rate and power level. Power level is set according to manufacturer specification (10 dBm). For Bluetooth LE, all three channels are preconfigured using BTCmd –Diag (Version 1.1) application provided by the client.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Sony	Support Laptop	Model PCG-3131L SN27545537 3001106
Rongchun	USB cable	0.9m, high speed USB, Type A to Micro-B connector, style 2725, USB Revision 2.0

1.4.4 Worst Case Configuration

Worst-case configuration used in this test report as per Peak Output power measurements:

Mode	Channel	Data Rate
802.11b	11 (High Channel)	1Mbps
802.11g	11 (High Channel)	6Mbps
802.11n	11 (High Channel)	6.5Mbps (mcs 0)
Bluetooth LE	39 (High Channel)	1Mbps

EUT is a mobile device. For radiated measurements X, Y and Z orientations were verified. Worst case position is “X”.

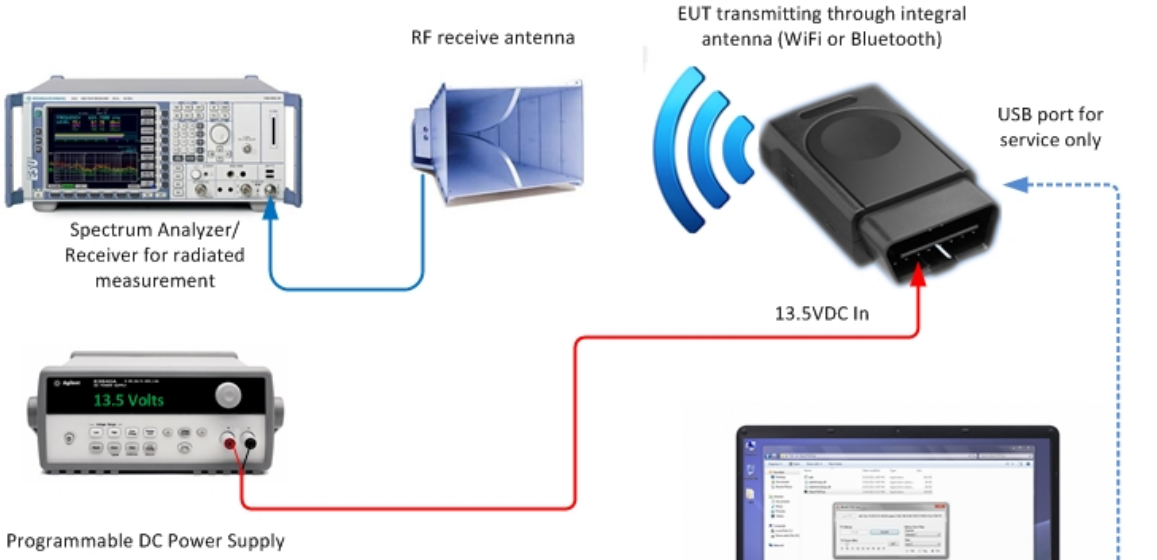
“X” Configuration

“Y” Configuration

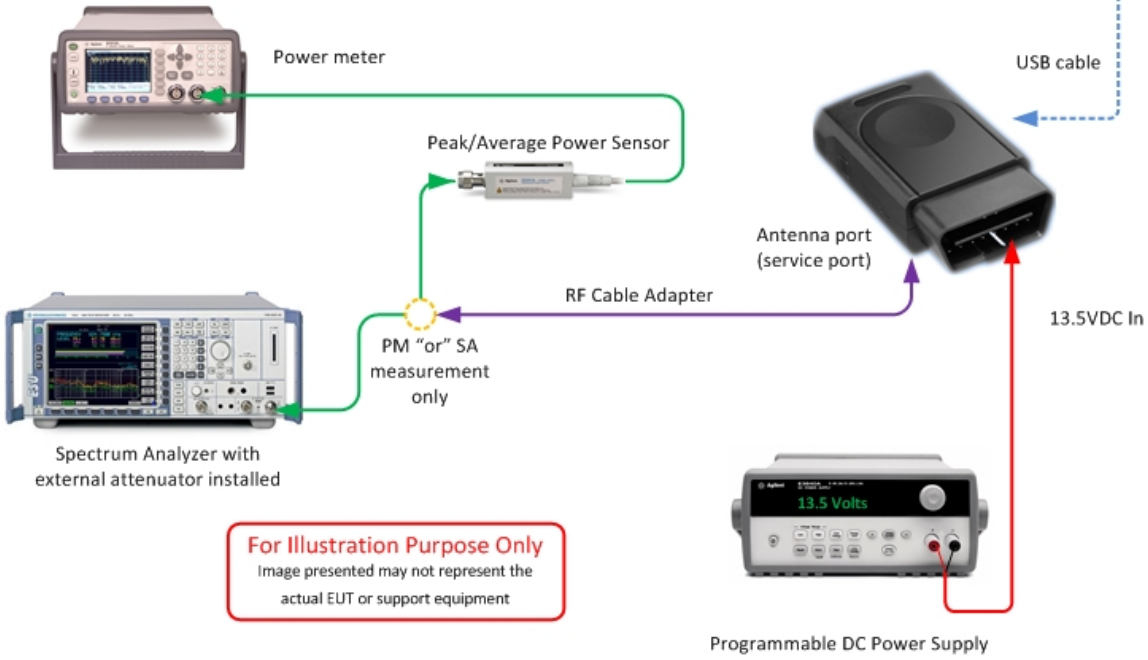
“Z” Configuration

1.4.5 Simplified Test Configuration Diagram

Radiated Test Configuration



Conducted (Antenna Port) Test Configuration



1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number 20130418001833/20130418001829		
N/A		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.
For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY

1.8.1 FCC – Registration No.: US5296

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.498 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US5296.

1.8.2 Industry Canada (IC) Registration No.: 3067A

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.

SECTION 2

TEST DETAILS

Radio Testing of the
AnyDATA
4G Vehicle Tracker with Hotspot

2.1 PEAK OUTPUT POWER

2.1.1 Specification Reference

Part 15 Subpart C §15.247(b)(3)

2.1.2 Standard Applicable

(3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

2.1.3 Equipment Under Test and Modification State

Serial No: 20130418001829 / Test Configuration A

2.1.4 Date of Test/Initial of test personnel who performed the test

May 01, 2013/FSC

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions

Ambient Temperature	25.8°C
Relative Humidity	43.9%
ATM Pressure	99.0 kPa

2.1.7 Additional Observations

- This is a conducted test using direct connection to a power meter.
- An offset of 21.0dB was added to compensate for the external attenuator and cable used from the antenna port to the power sensor.
- The power meter was configured to 802.11 power measurement profile in the 2.4GHz band.
- Both Peak and Average measurements were recorded.

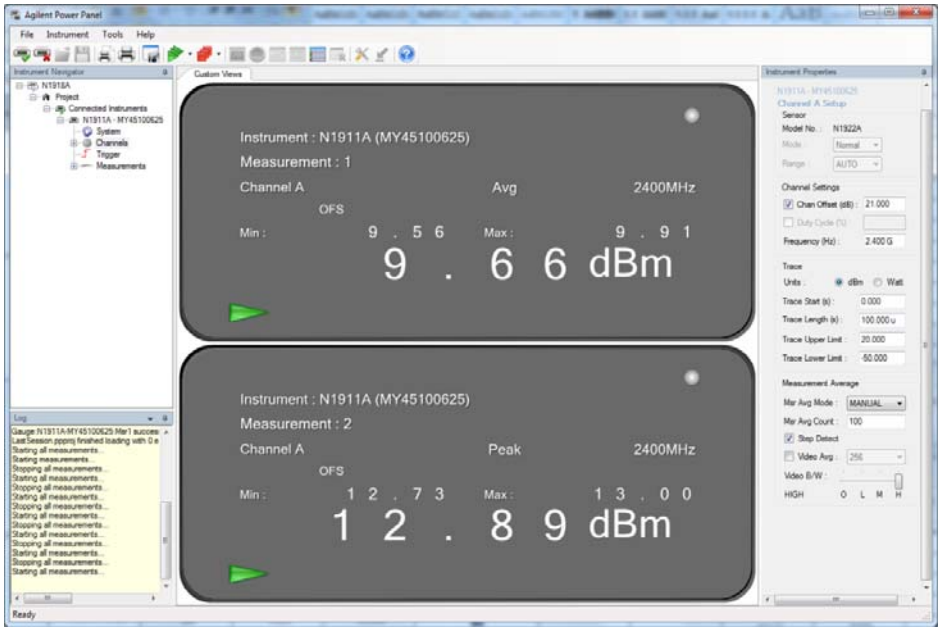
2.1.8 Test Results

WLAN Mode	Channel	Data Rates (Mbps)	Measured Average Power (dBm)	Measured Peak Power (dBm)
802.11b	1 (2412 MHz)	1	9.59	12.95
		2	9.50	12.88
		5.5	9.40	12.87
		11	9.25	12.93
	6 (2437 MHz)	1	9.78	12.94
		2	9.64	12.92
		5.5	9.60	12.89
		11	9.55	12.98
	11 (2462 MHz)	**1**	**9.91**	**13.00**
		2	9.70	12.92
		5.5	9.65	12.94
		11	9.63	12.87
802.11g	1 (2412 MHz)	6	9.83	20.45
		9	9.68	20.68
		12	9.63	20.80
		18	9.55	20.28
		24	9.47	20.71
		36	9.50	20.47
		48	8.72	20.68
		54	8.81	20.60
	6 (2437 MHz)	6	10.00	20.76
		9	9.91	20.80
		12	9.88	20.77
		18	9.80	20.75
		24	9.75	20.80
		36	9.87	20.81
		48	8.88	20.80

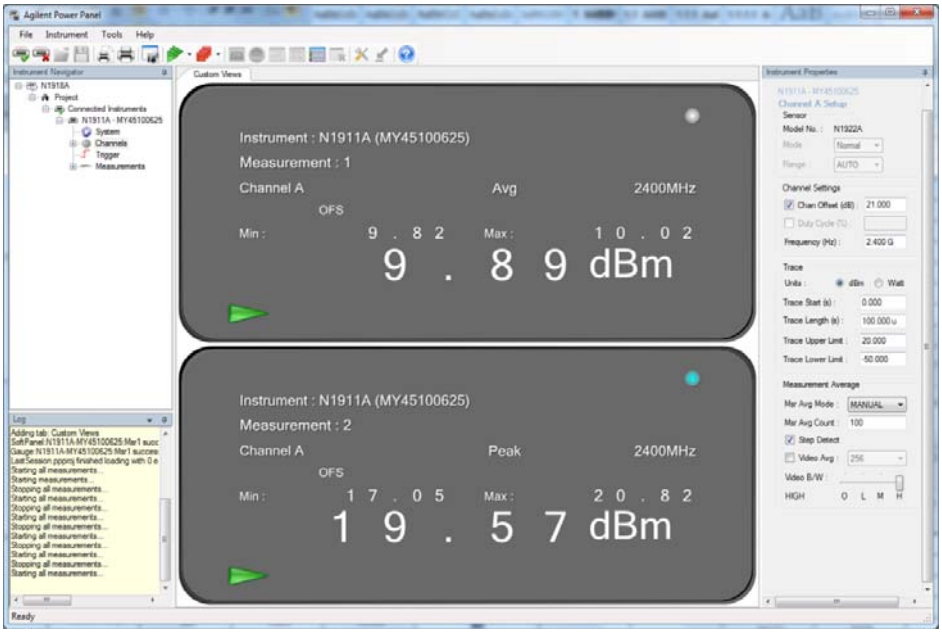
		54	8.52	20.76
	11 (2462 MHz)	**6**	**10.02**	**20.82**
		9	9.82	20.75
		12	9.91	20.68
		18	9.82	20.74
		24	10.01	20.75
		36	10.00	20.80
		48	9.23	20.76
		54	9.16	20.80
WLAN Mode	**Channel**	**Modulation and Coding Scheme**	**Measured Average Power (dBm)**	**Measured Peak Power (dBm)**
802.11n	1 (2412 MHz)	mcs 0	9.51	20.15
		mcs 1	9.42	20.12
		mcs 2	8.92	20.30
		mcs 3	9.24	20.10
		mcs 4	9.21	20.04
		mcs 5	8.31	20.05
		mcs 6	8.44	20.43
		mcs 7	8.17	20.23
	6 (2437 MHz)	mcs 0	9.86	20.54
		mcs 1	9.59	20.25
		mcs 2	9.42	20.22
		mcs 3	9.74	20.54
		mcs 4	9.41	20.32
		mcs 5	8.78	20.22
		mcs 6	8.44	20.45
		mcs 7	8.45	20.56
	11 (2462 MHz)	**mcs 0**	**9.90**	**20.61**
		mcs 1	9.63	20.45
		mcs 2	9.56	20.45

		mcs 3	9.51	20.56
		mcs 4	9.13	20.45
		mcs 5	8.76	20.34
		mcs 6	8.82	20.55
		mcs 7	8.74	20.54
Bluetooth Low Energy (LE)	**Channel**	**Modulation**	**Measured Average Power (dBm)**	**Measured Peak Power (dBm)**
	37 (2402 MHz)	GFSK @ 1Mbps	2.29	5.42
	17 (2440 MHz)		3.19	5.98
	39 (2480 MHz)		**3.25**	**6.12**

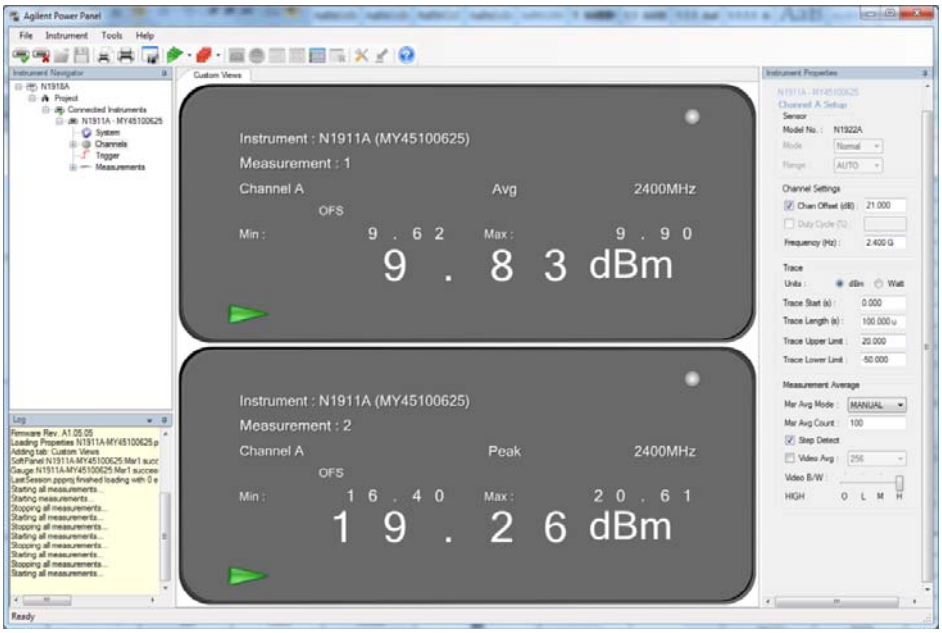
2.1.9 Sample Test Display



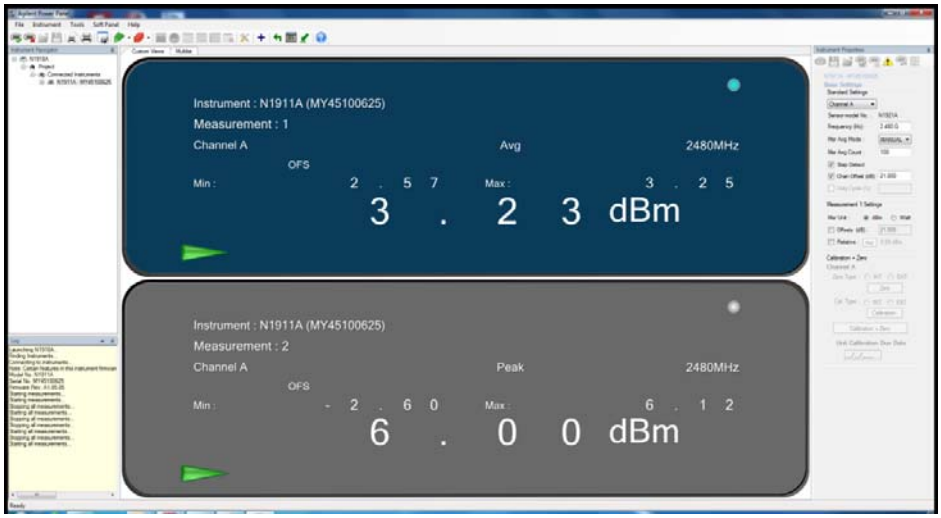
802.11 “b” mode. High Channel 1Mbps



802.11 “g” mode. High Channel 6Mbps



802.11 “n” mode. High Channel mcs 0



Bluetooth Low Energy (LE) High Channel

2.2 CONDUCTED EMISSIONS

2.2.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.2.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

**Decreases with the logarithm of the frequency.*

2.2.3 Equipment Under Test and Modification State

Not applicable. EUT is for vehicle use only.

2.3 99% EMISSION BANDWIDTH

2.3.1 Specification Reference

RSS-Gen Clause 4.6.1

2.3.2 Standard Applicable

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.
The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.
The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

2.3.3 Equipment Under Test and Modification State

Serial No: 20130418001829 / Test Configuration A

2.3.4 Date of Test/Initial of test personnel who performed the test

May 01 and 02, 2013/FSC

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions

Ambient Temperature	25.3-25.8°C
Relative Humidity	40.4-43.9%
ATM Pressure	99.0-99.5 kPa

2.3.7 Additional Observations

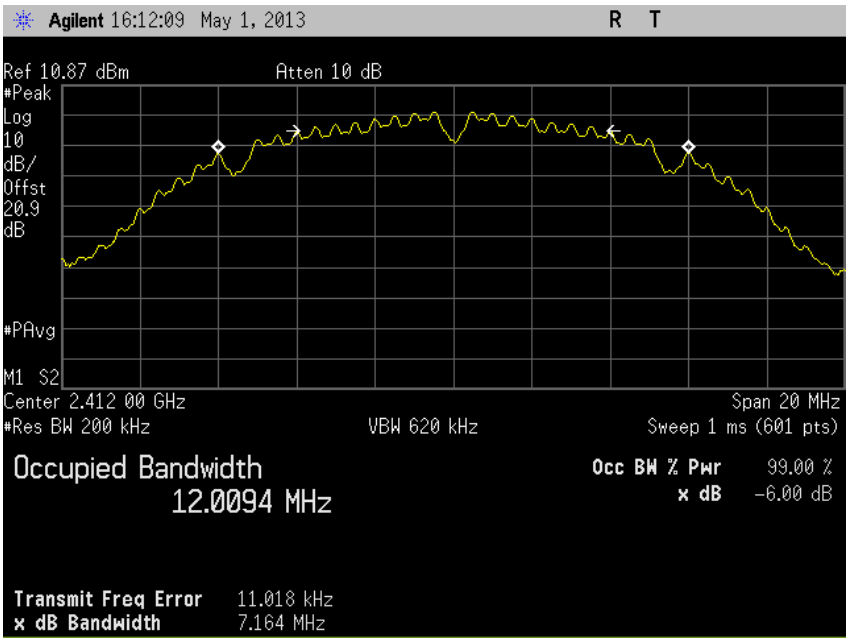
- This is a conducted test.
- An offset of 20.9dB was added to compensate for the external attenuator and cable used.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.

- Detector is peak.
- The % Power Bandwidth setting in the spectrum analyzer was set to 99% (default).
- The Channel Bandwidth measurement function of the spectrum analyzer was used for this test.

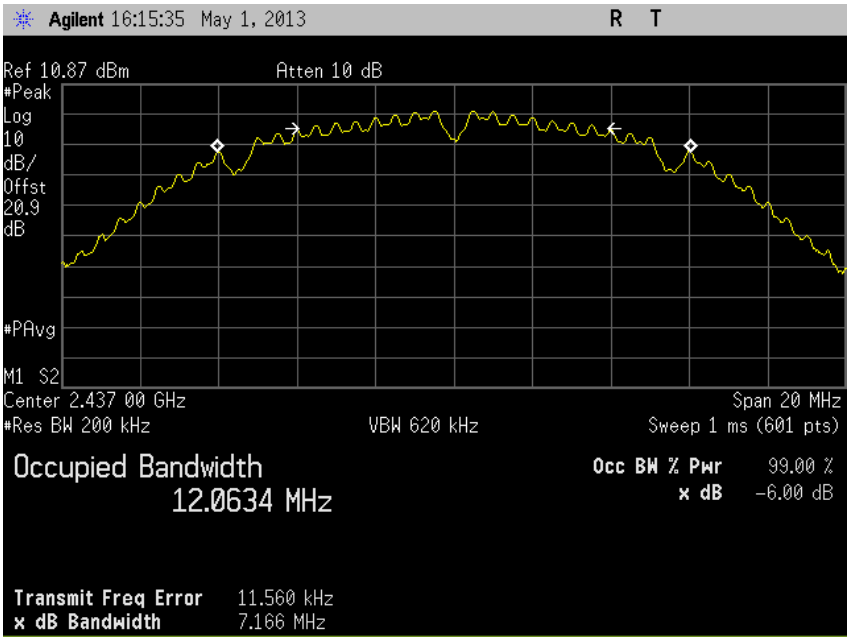
2.3.8 Test Results (For reporting purposes only)

Mode	Channel	Measured 99% Bandwidth (MHz)
802.11b	1 (2412 MHz)	12.01
	6 (2437 MHz)	12.06
	11 (2462 MHz)	12.07
802.11g	1 (2412 MHz)	16.33
	6 (2437 MHz)	16.35
	11 (2462 MHz)	16.32
802.11n HT20	1 (2412 MHz)	17.40
	6 (2437 MHz)	17.41
	11 (2462 MHz)	17.39
Bluetooth LE	37 (2402 MHz)	1.0423
	17 (2440 MHz)	1.0431
	39 (2480 MHz)	1.0433

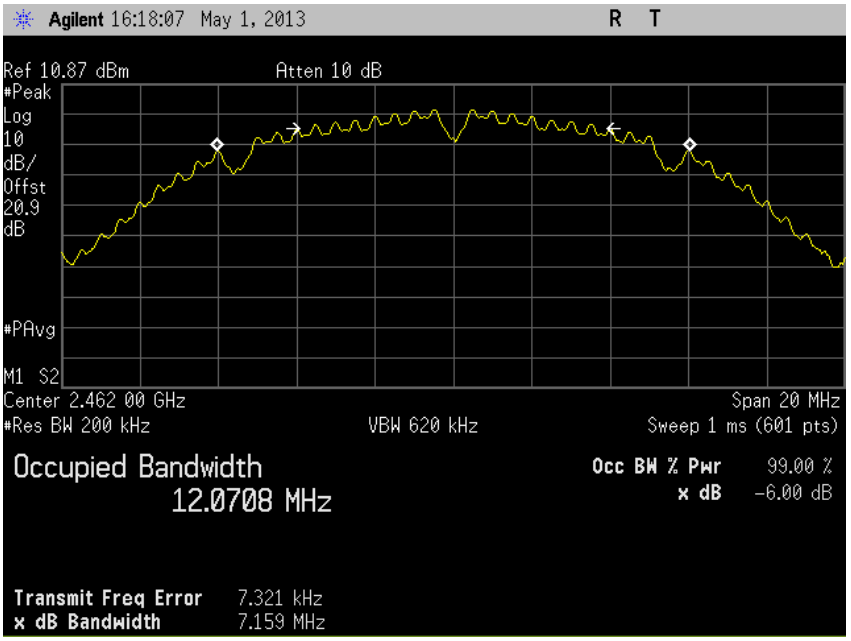
2.3.9 Test Results Plots



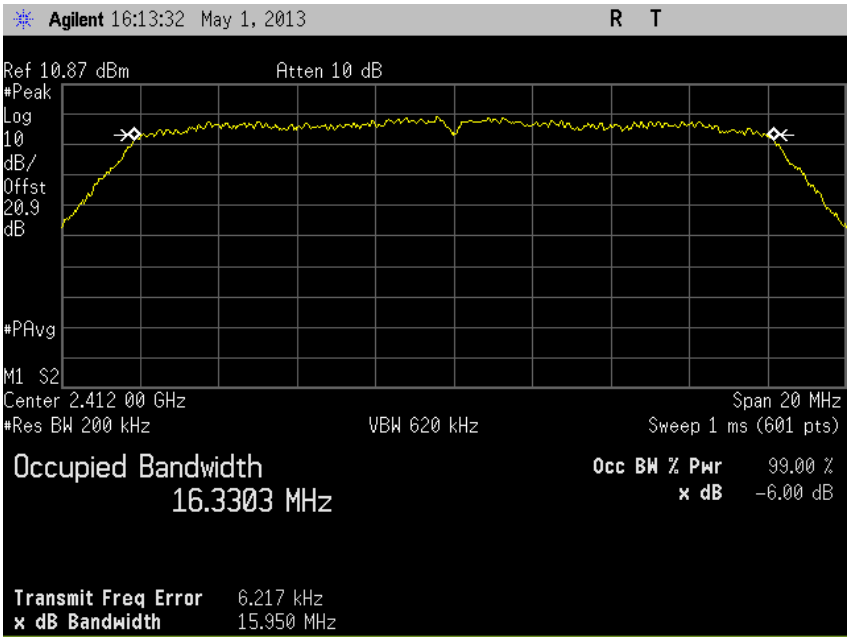
802.11b Low Channel



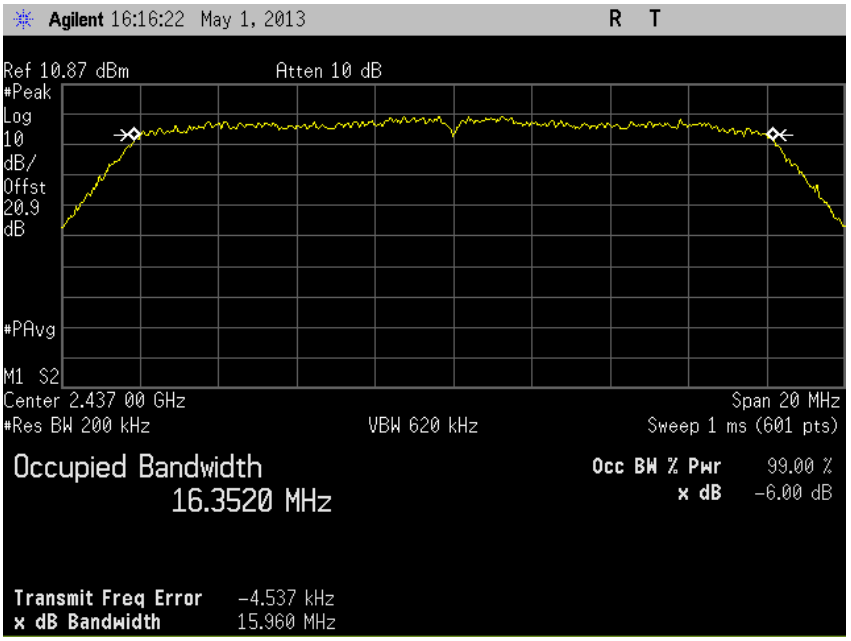
802.11b Mid Channel



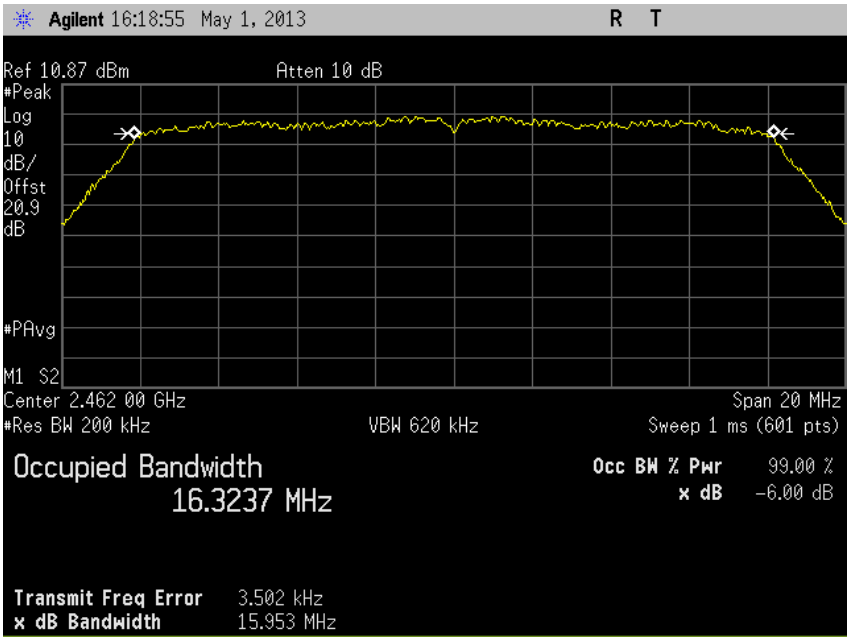
802.11b High Channel



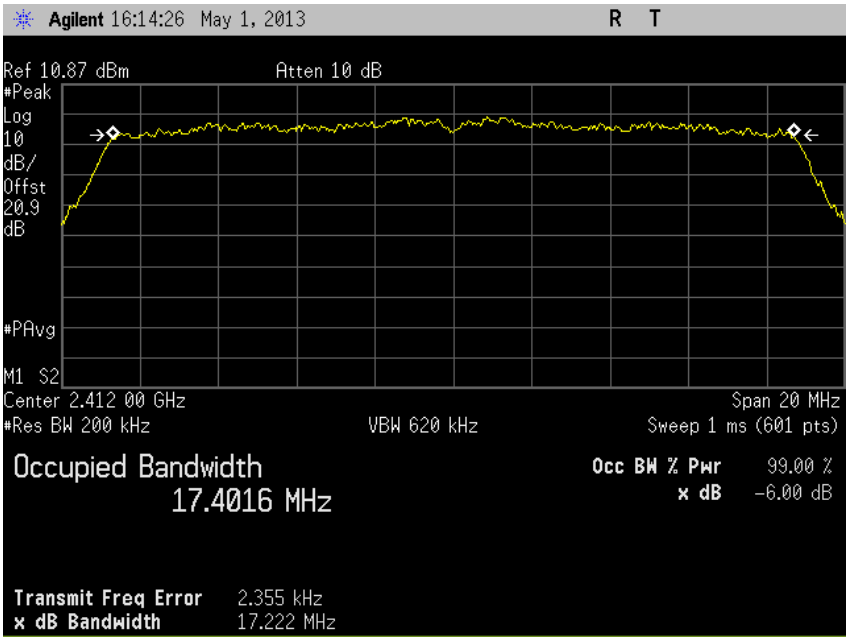
802.11g Low Channel



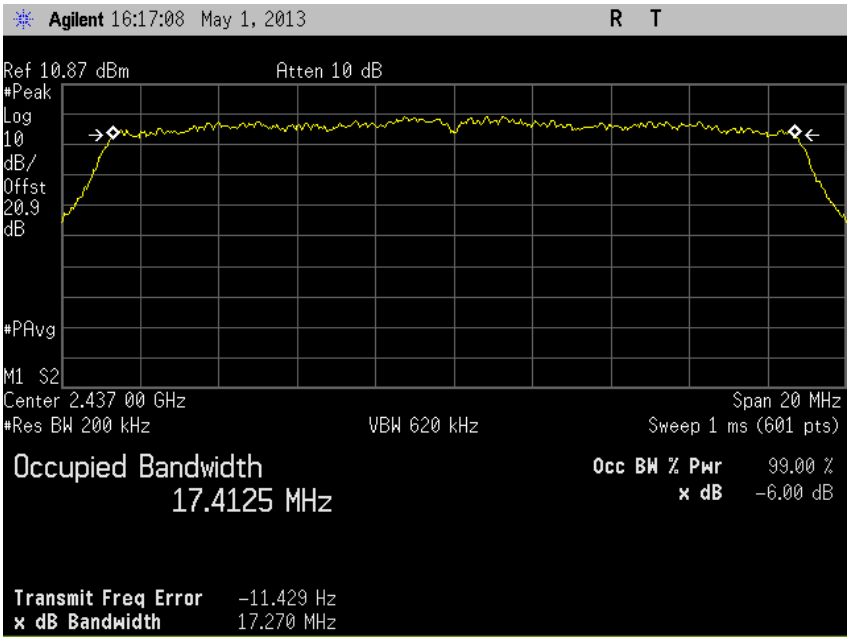
802.11g Mid Channel



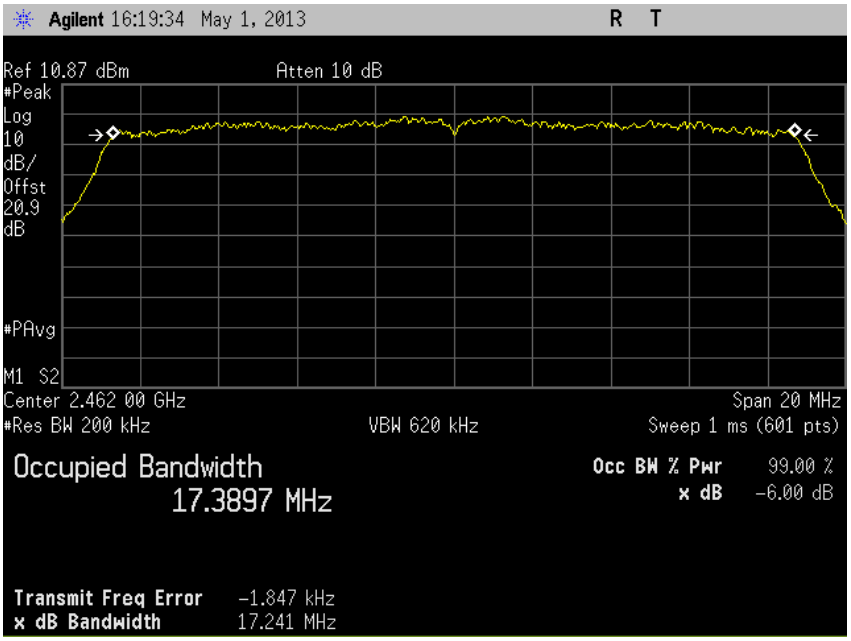
802.11g High Channel



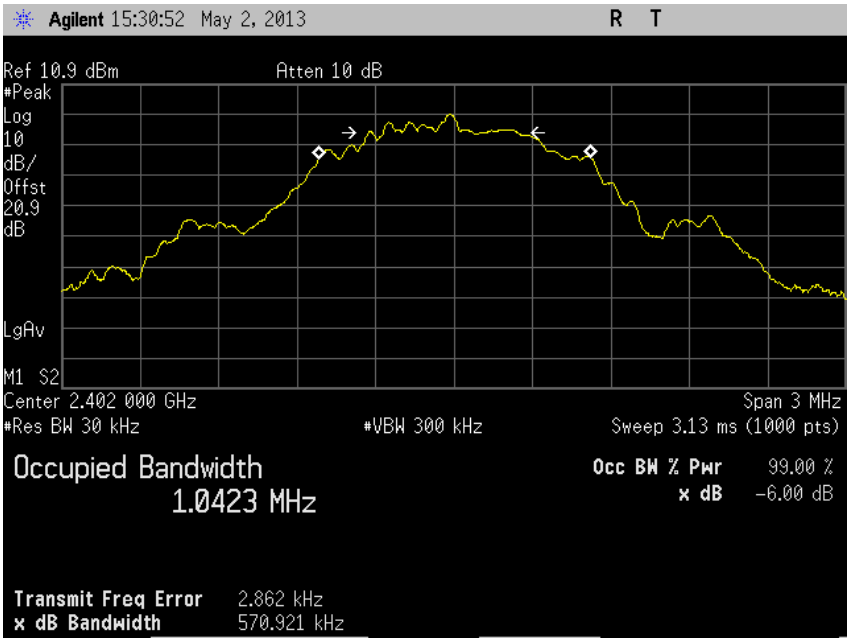
802.11n Low Channel



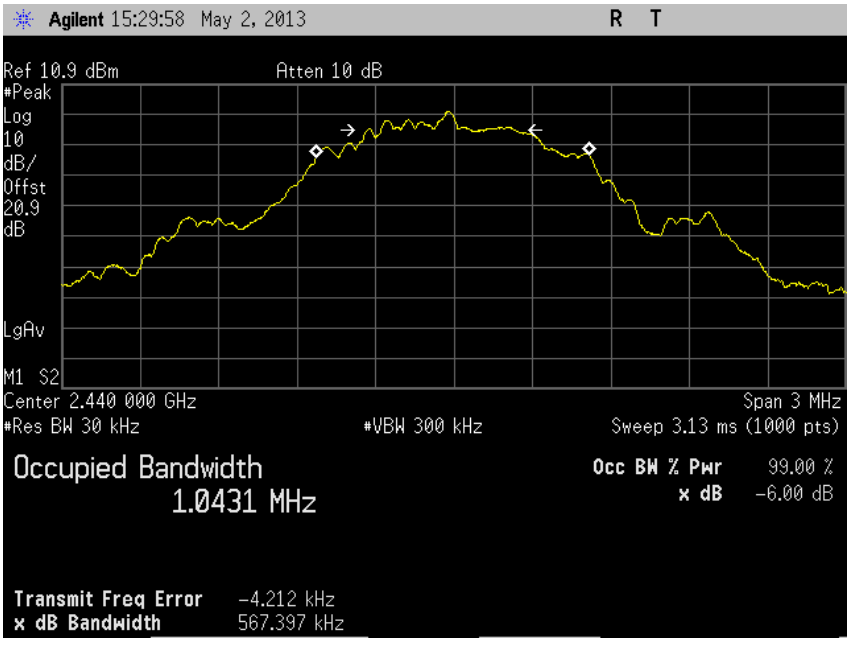
802.11n Mid Channel



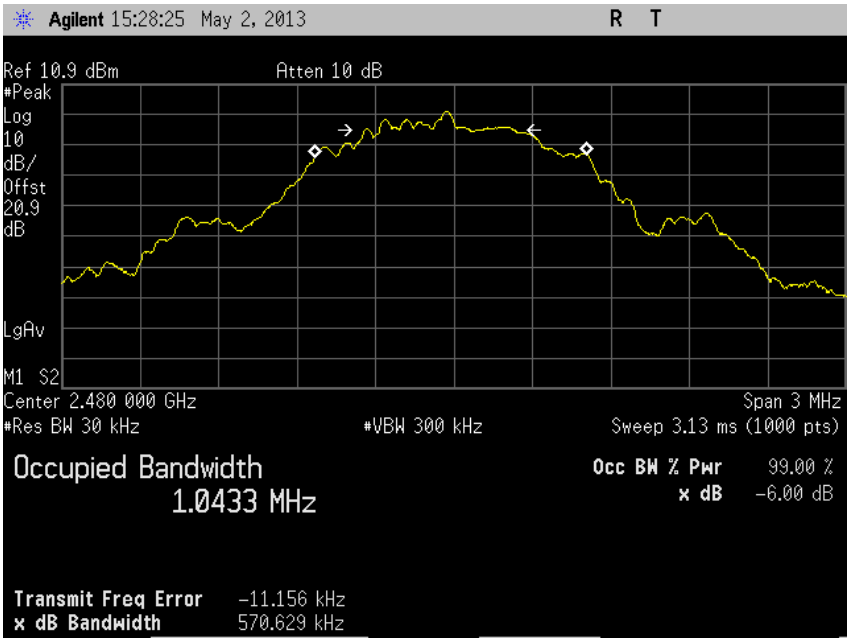
802.11n High Channel



Bluetooth LE Low Channel



Bluetooth LE Mid Channel



Bluetooth LE High Channel

2.4 MINIMUM 6 dB RF BANDWIDTH

2.4.1 Specification Reference

Part 15 Subpart C §15.247(a)(2)

2.4.2 Standard Applicable

(2) Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.4.3 Equipment Under Test and Modification State

Serial No: 20130418001829 / Test Configuration A

2.4.4 Date of Test/Initial of test personnel who performed the test

May 01 and 02, 2013/FSC

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions

Ambient Temperature	25.3-25.8°C
Relative Humidity	40.4-43.9%
ATM Pressure	99.0-99.5 kPa

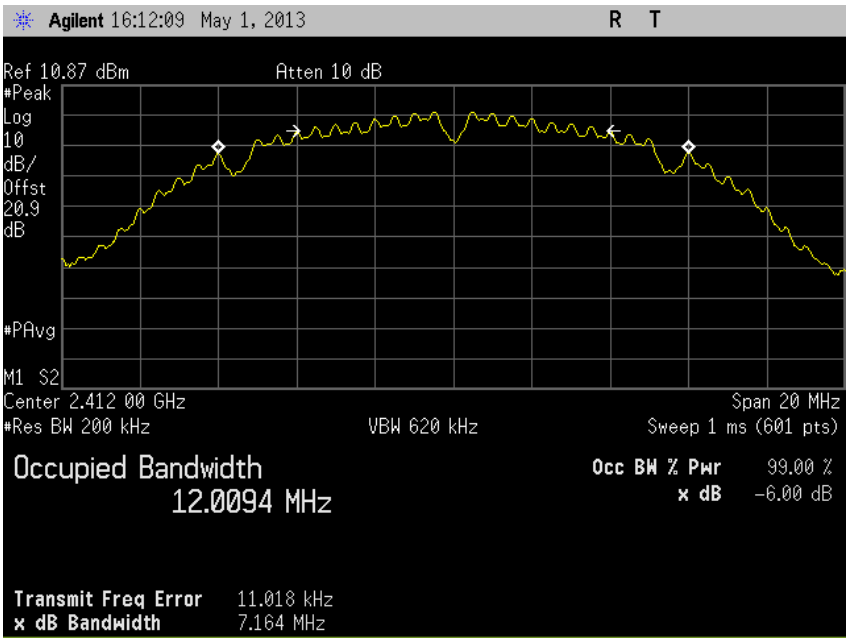
2.4.7 Additional Observations

- This is a conducted test.
- An offset of 20.9dB was added to compensate for the external attenuator and cable used.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.
- The x dB setting in the spectrum analyzer was set to -6.0 dB.
- The Channel Bandwidth measurement function of the spectrum analyzer was used for this test.

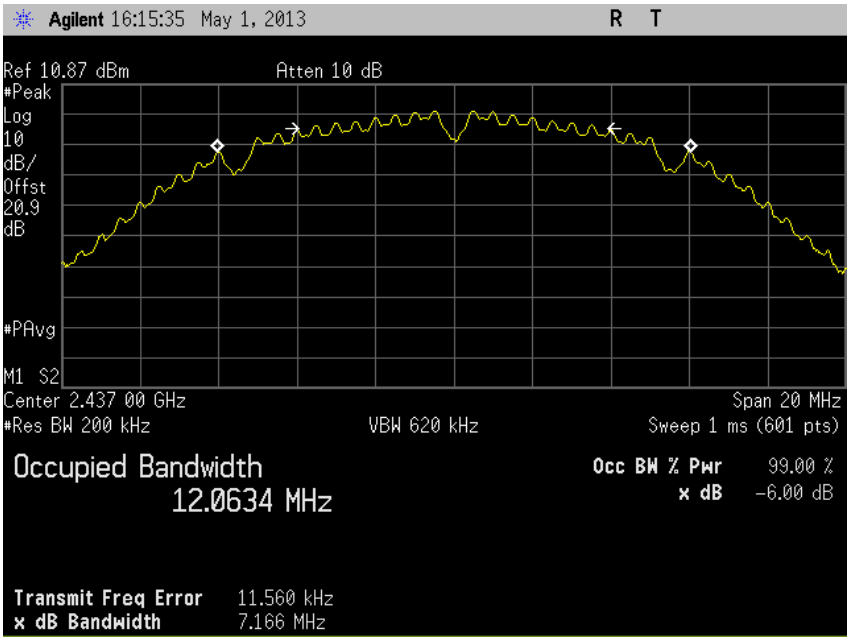
2.4.8 Test Results

Mode	Channel	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Compliance
802.11b	1 (2412 MHz)	7.164	0.500	Complies
	6 (2437 MHz)	7.166	0.500	Complies
	11 (2462 MHz)	7.159	0.500	Complies
802.11g	1 (2412 MHz)	15.950	0.500	Complies
	6 (2437 MHz)	15.960	0.500	Complies
	11 (2462 MHz)	15.953	0.500	Complies
802.11n	1 (2412 MHz)	17.222	0.500	Complies
	6 (2437 MHz)	17.270	0.500	Complies
	11 (2462 MHz)	17.241	0.500	Complies
Bluetooth LE	37 (2402 MHz)	0.571	0.500	Complies
	17 (2440 MHz)	0.567	0.500	Complies
	39 (2480 MHz)	0.571	0.500	Complies

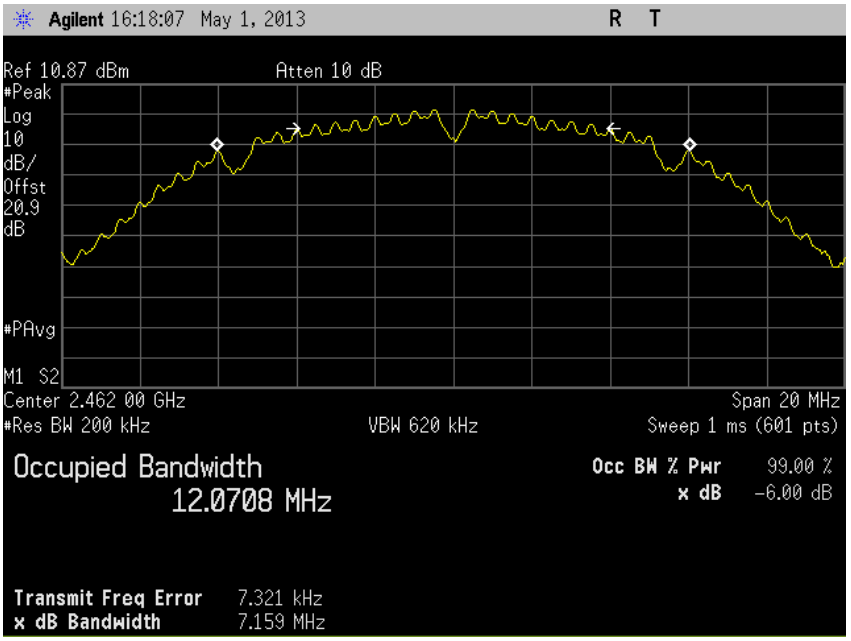
2.4.9 Test Results Plots



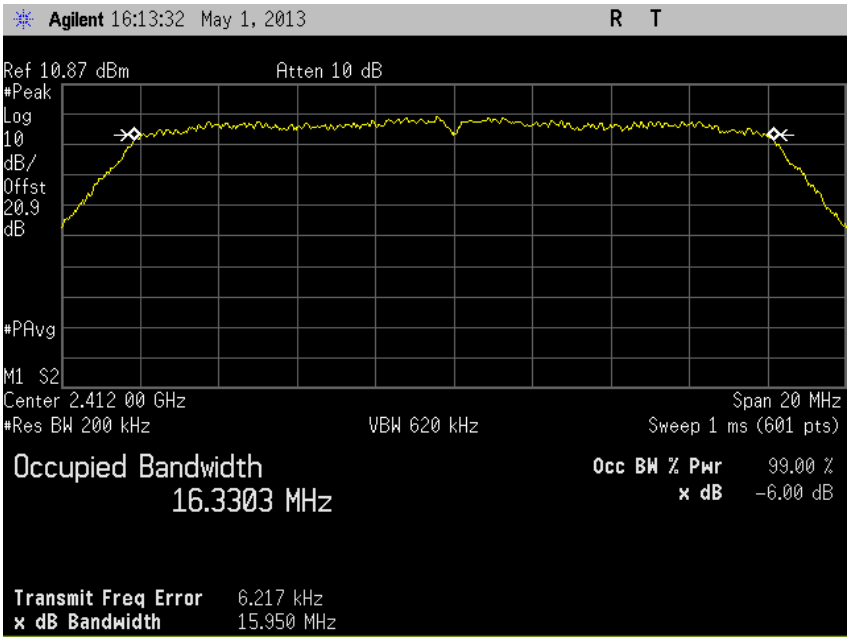
802.11b Low Channel



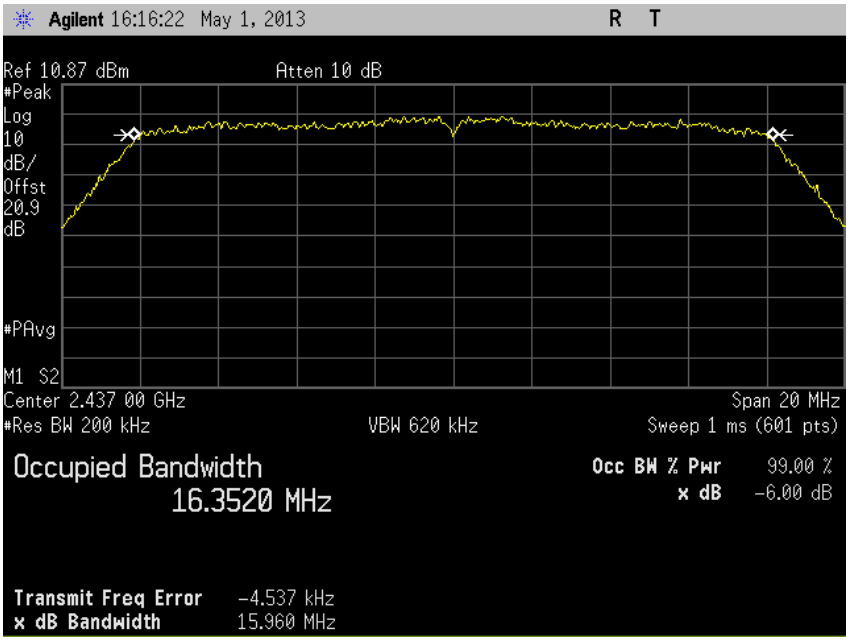
802.11b Mid Channel



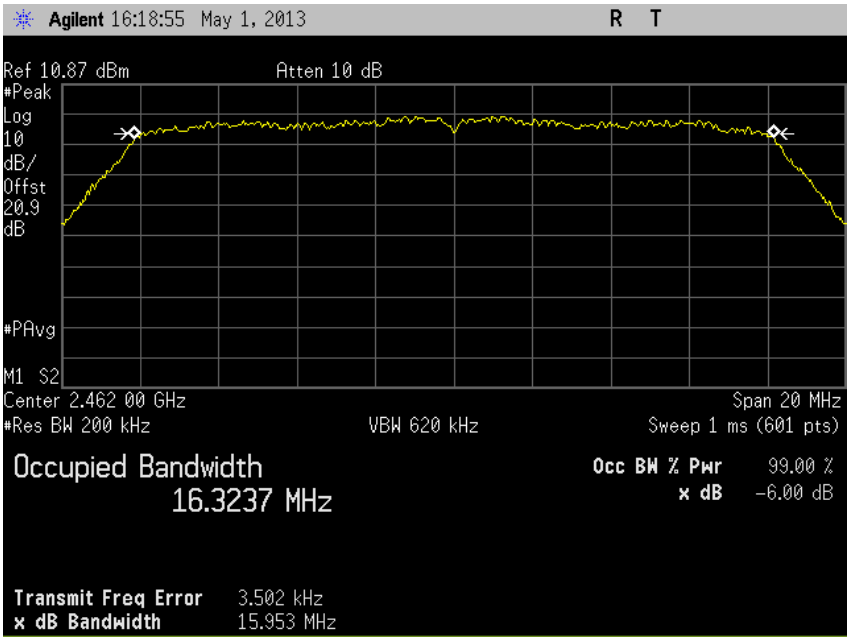
802.11b High Channel



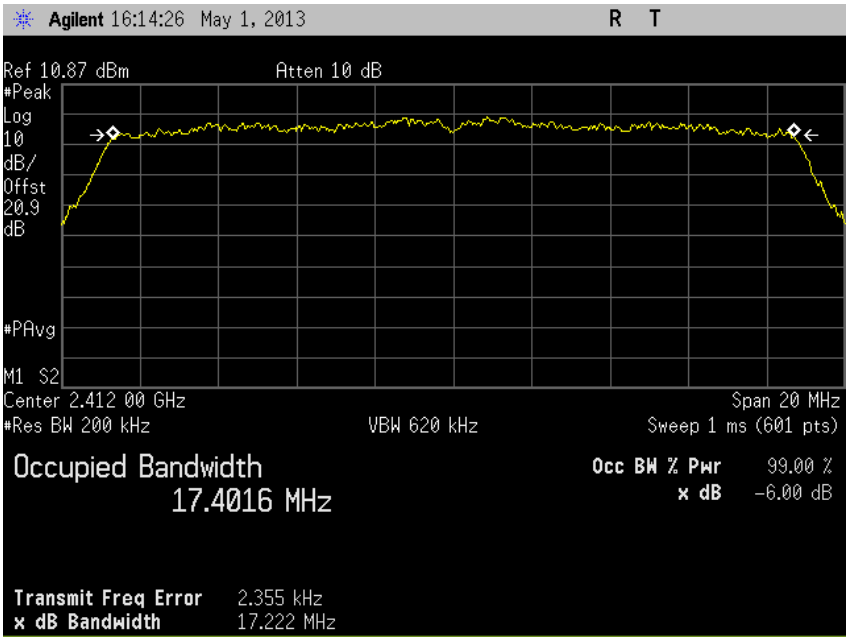
802.11g Low Channel



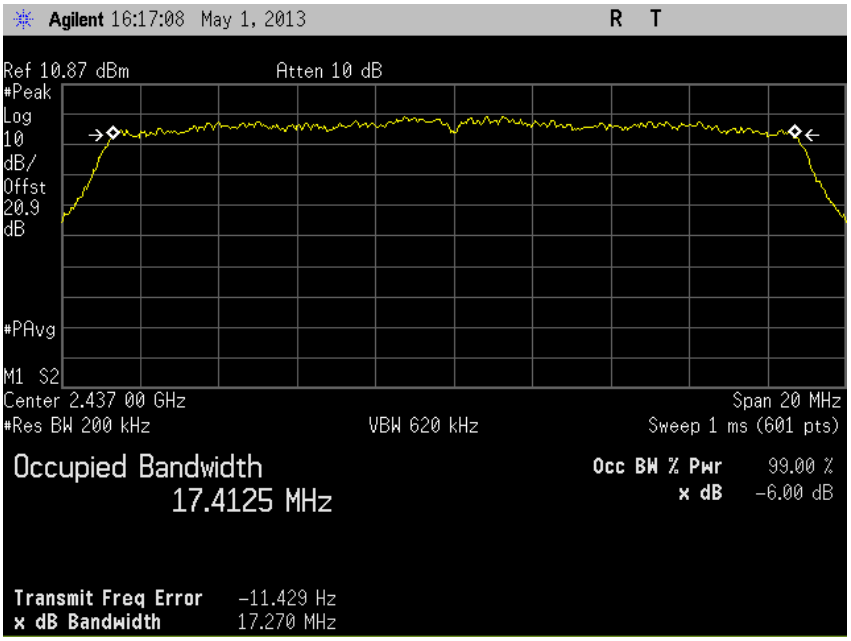
802.11g Mid Channel



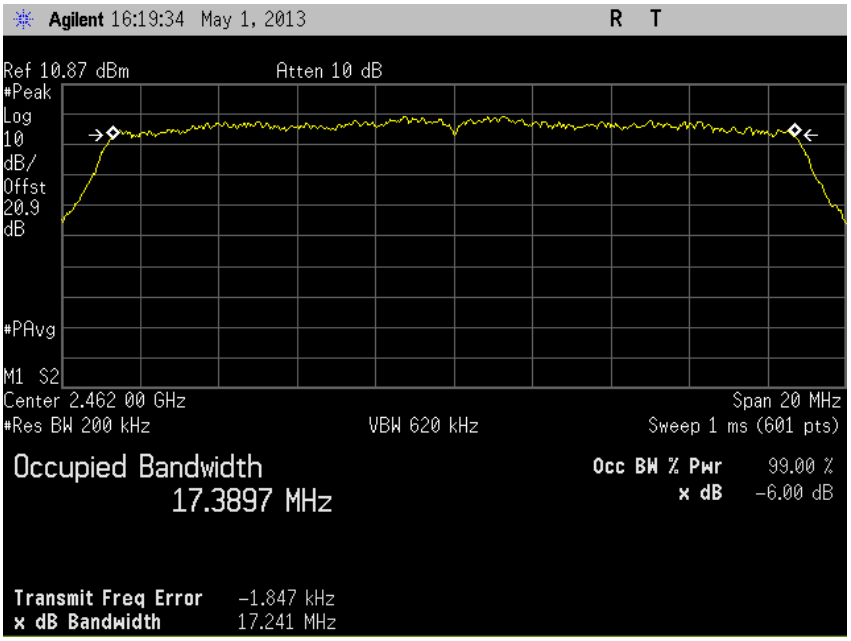
802.11g High Channel



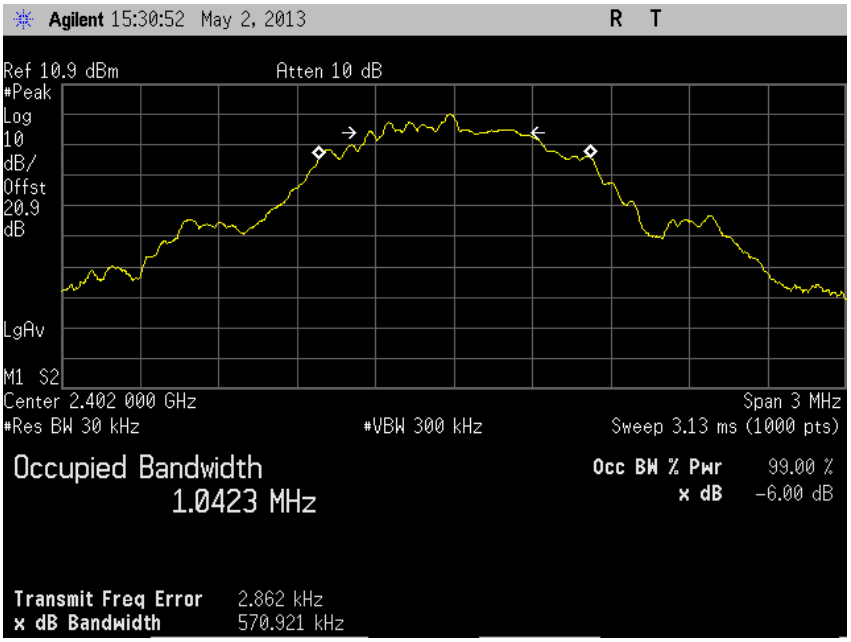
802.11n Low Channel



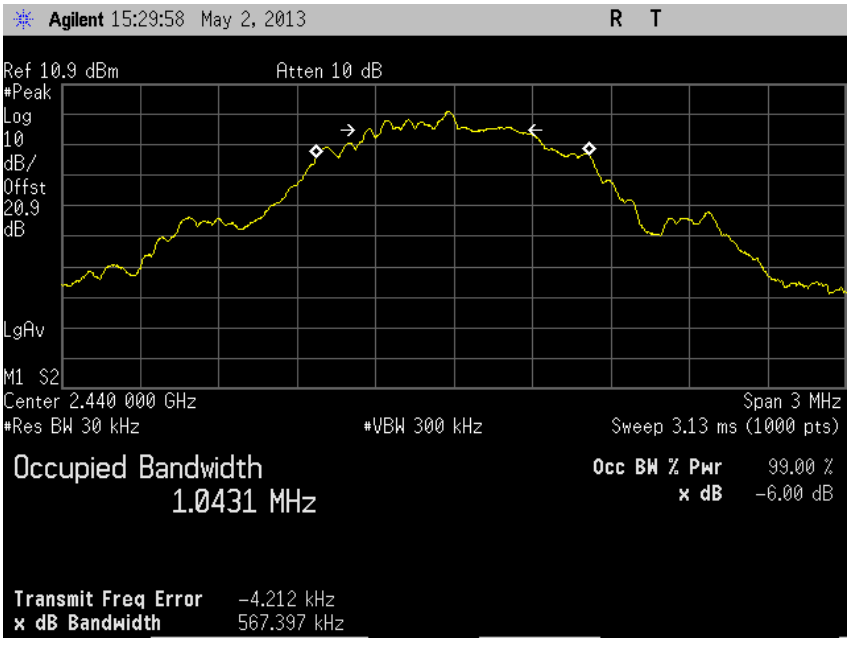
802.11n Mid Channel



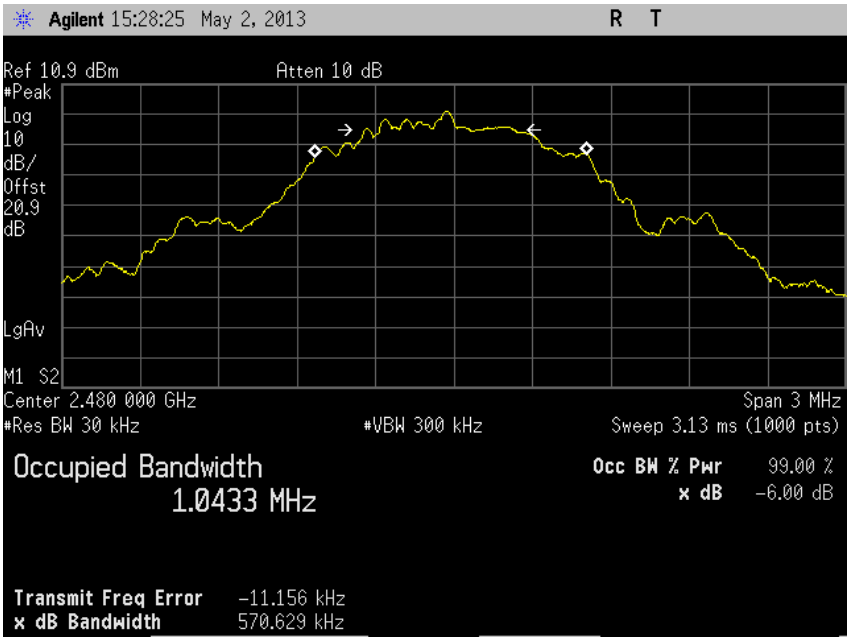
802.11n High Channel



Bluetooth LE Low Channel



Bluetooth LE Mid Channel



Bluetooth LE High Channel

2.5 OUT-OF-BAND EMISSIONS - CONDUCTED

2.5.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.5.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

2.5.3 Equipment Under Test and Modification State

Serial No: 20130418001829 / Test Configuration A

2.5.4 Date of Test/Initial of test personnel who performed the test

May 02, 2013/FSC

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

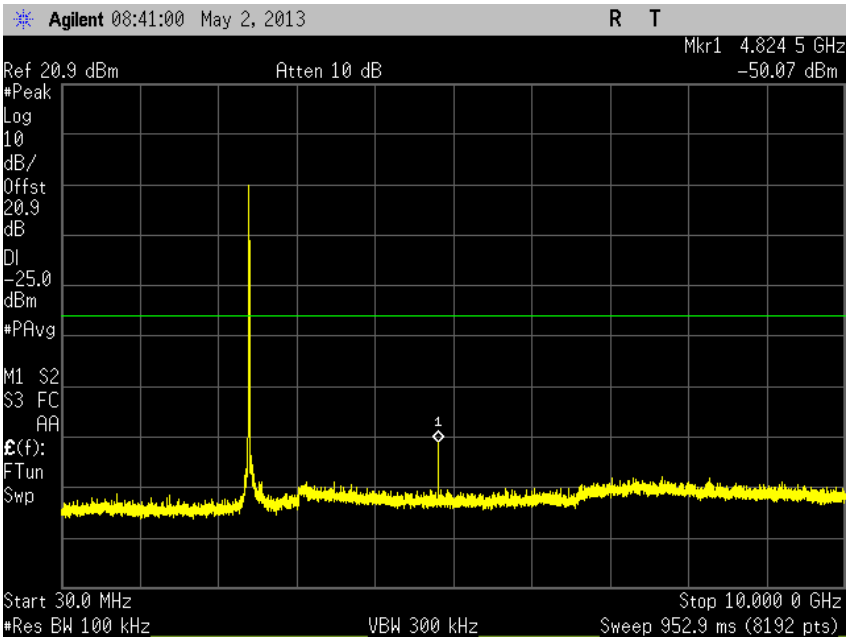
2.5.6 Environmental Conditions

Ambient Temperature	25.3°C
Relative Humidity	40.4.%
ATM Pressure	99.5 kPa

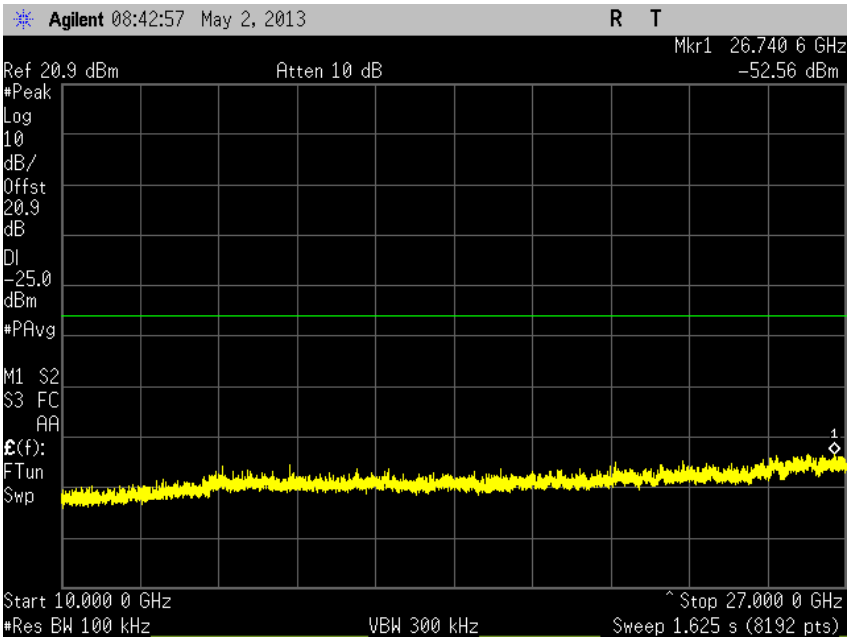
2.5.7 Additional Observations

- This is a conducted test.
- An offset of 20.9dB was added to compensate for the external attenuator and cable used.
- RBW is 100kHz.VBW is 3X RBW.
- Sweep is auto. Detector is peak. Trace is max hold.
- Initial scan was performed to determine the highest level of the desired power within the band. Limit (display line) was drawn 20dB below this level.
- Spectrum was searched from 30MHz up to 26.5GHz.

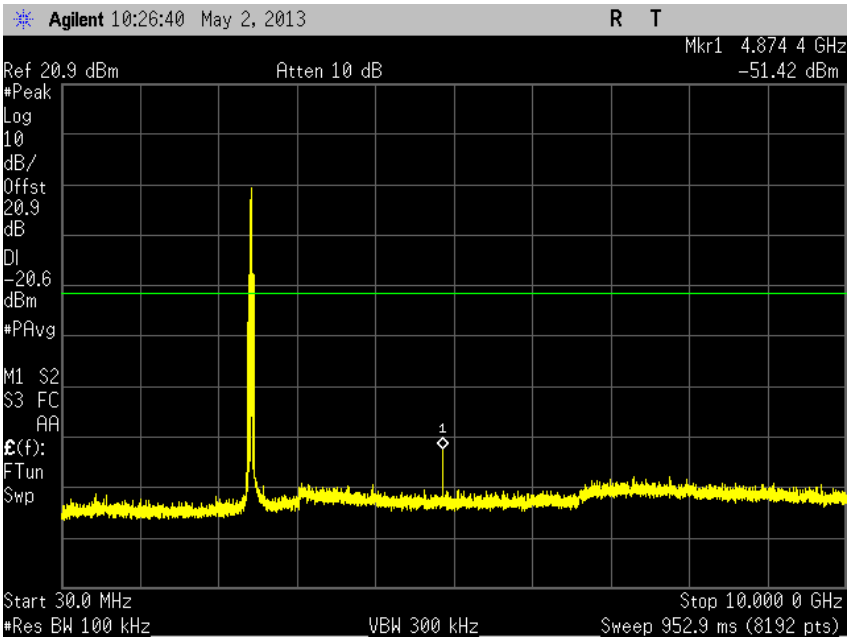
2.5.8 Test Results Plots



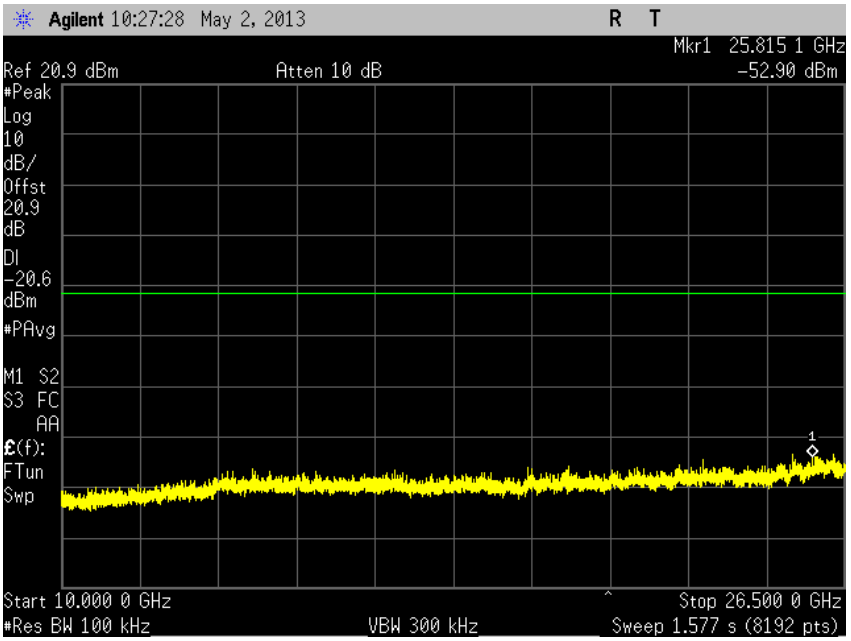
802.11b Low Channel (30MHz to 10GHz)



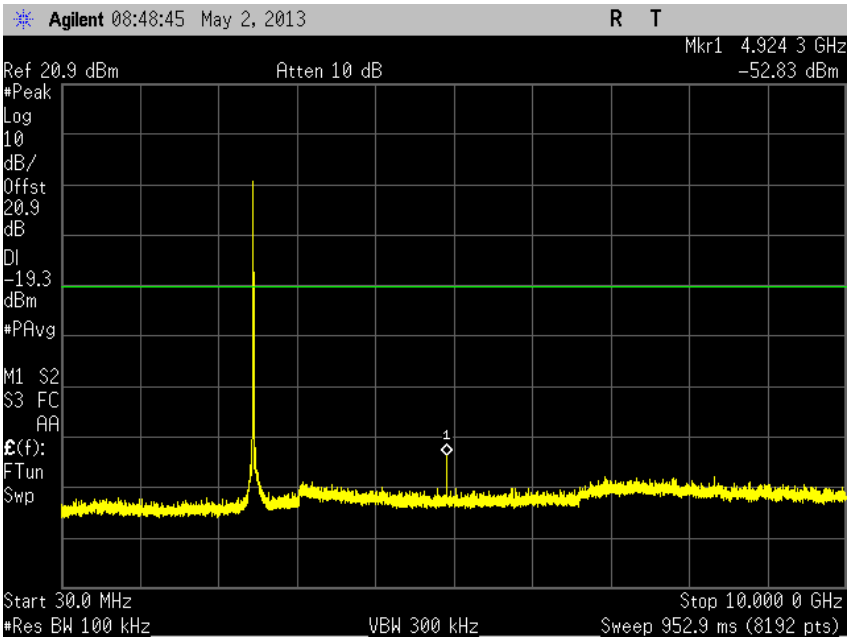
802.11b Low Channel (10GHz to 25GHz)



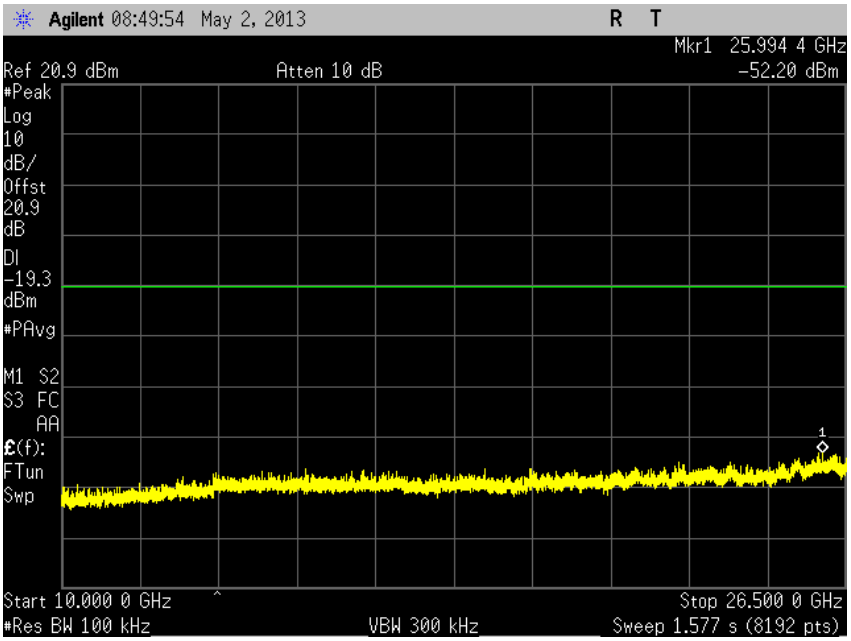
802.11b Mid Channel (30MHz to 10GHz)



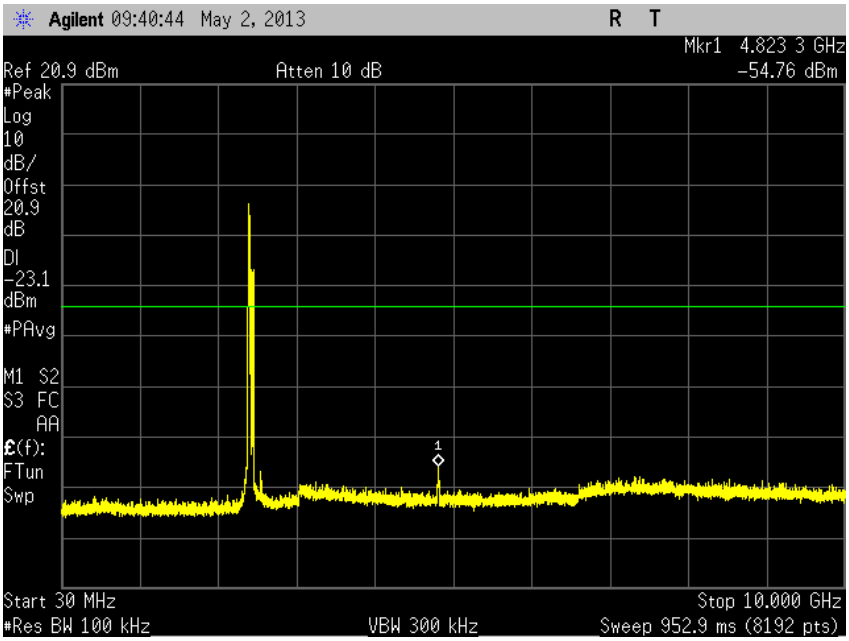
802.11b Mid Channel (10GHz to 25GHz)



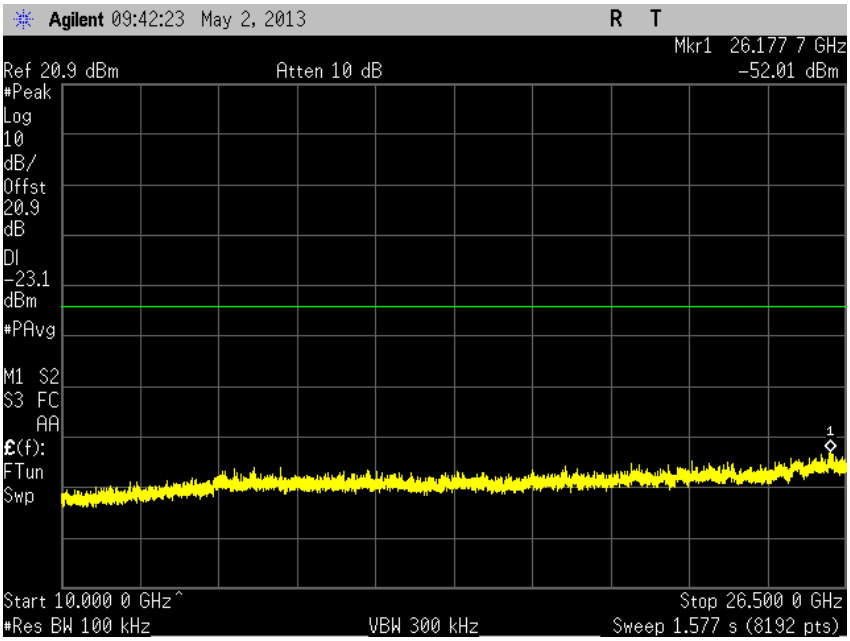
802.11b High Channel (30MHz to 10GHz)



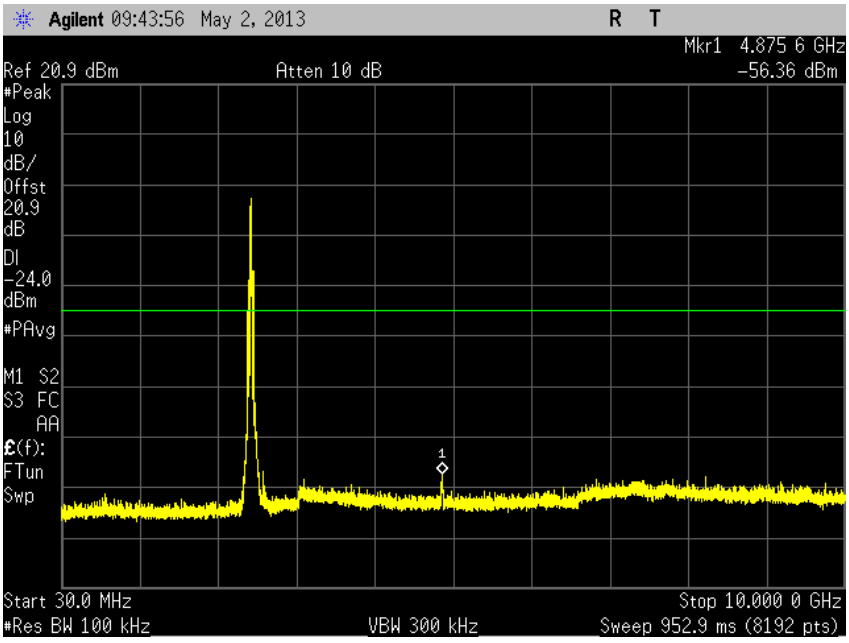
802.11b High Channel (10GHz to 25GHz)



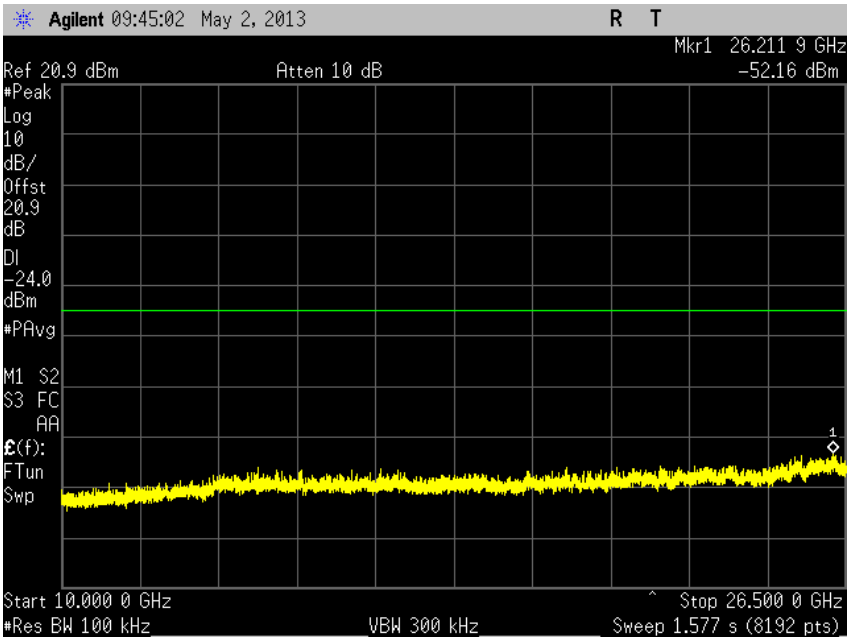
802.11g Low Channel (30MHz to 10GHz)



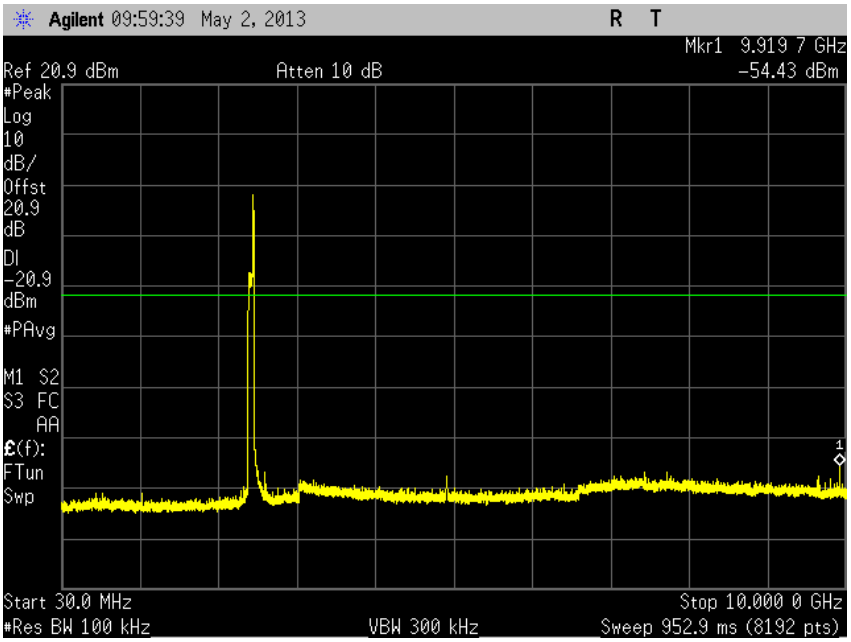
802.11g Low Channel (10GHz to 25GHz)



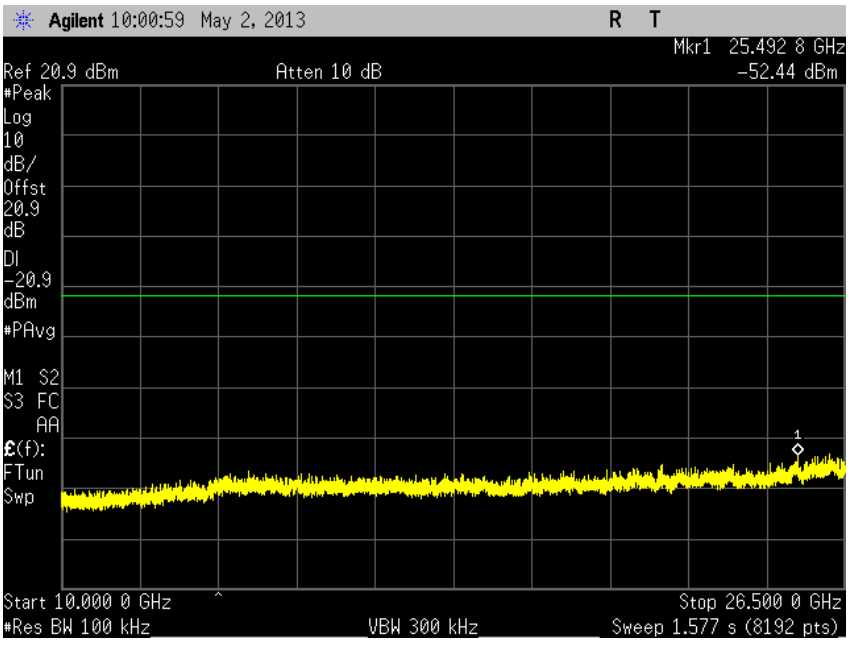
802.11g Mid Channel (30MHz to 10GHz)



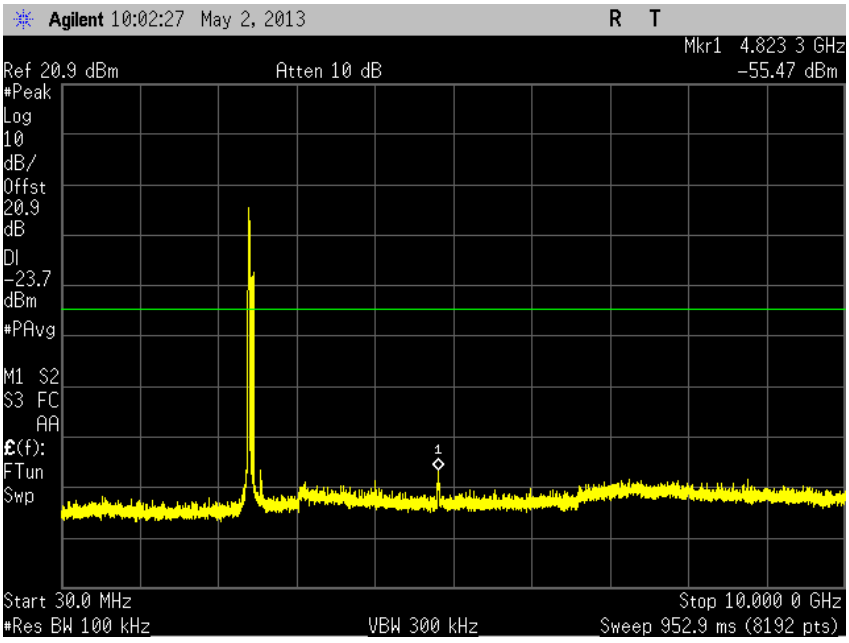
802.11g Mid Channel (10GHz to 25GHz)



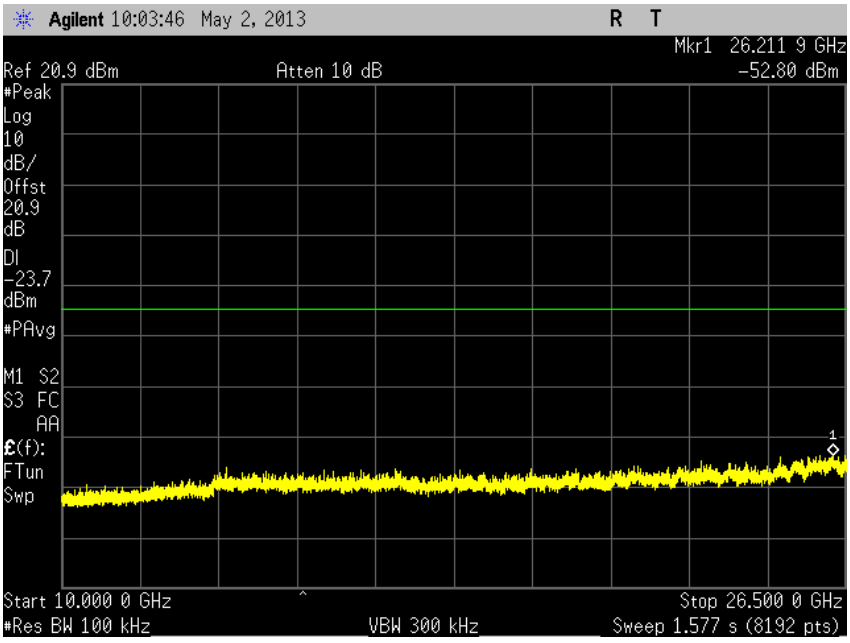
802.11g High Channel (30MHz to 10GHz)



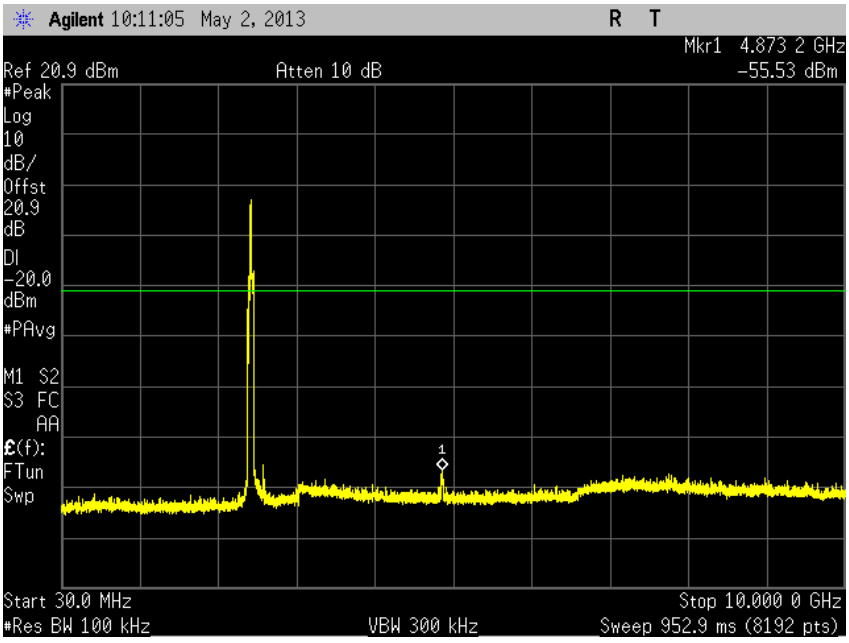
802.11g High Channel (10GHz to 25GHz)



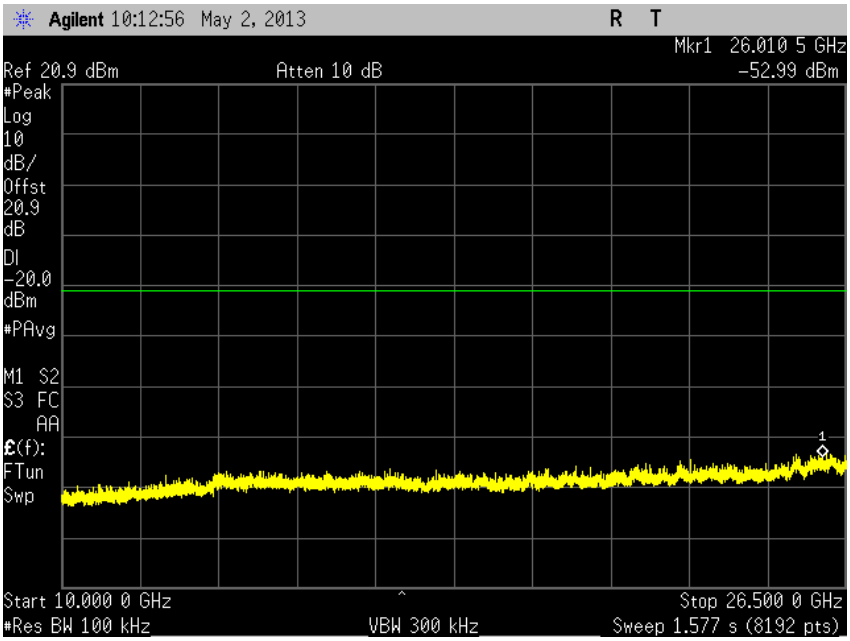
802.11n Low Channel (30MHz to 10GHz)



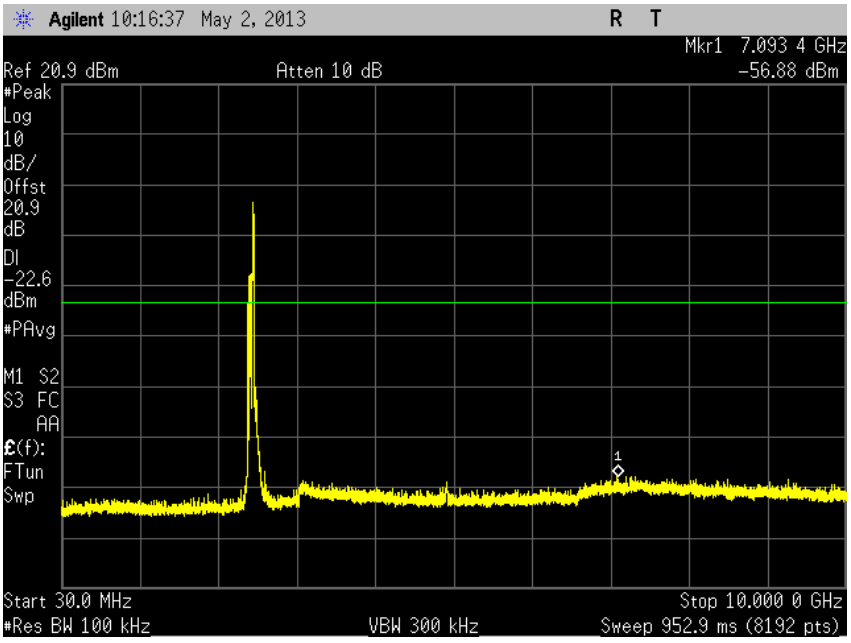
802.11n Low Channel (10GHz to 25GHz)



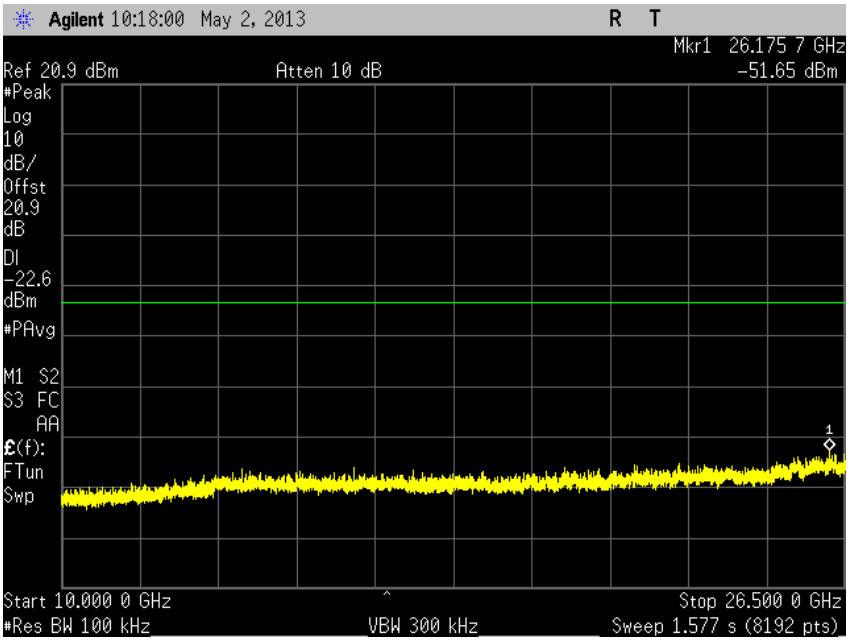
802.11n Mid Channel (30MHz to 10GHz)



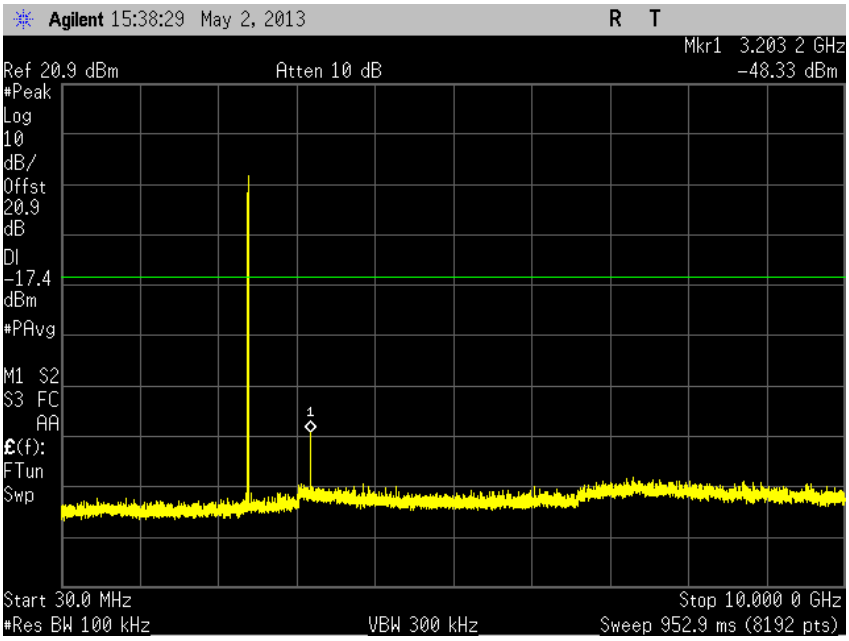
802.11n Mid Channel (10GHz to 25GHz)



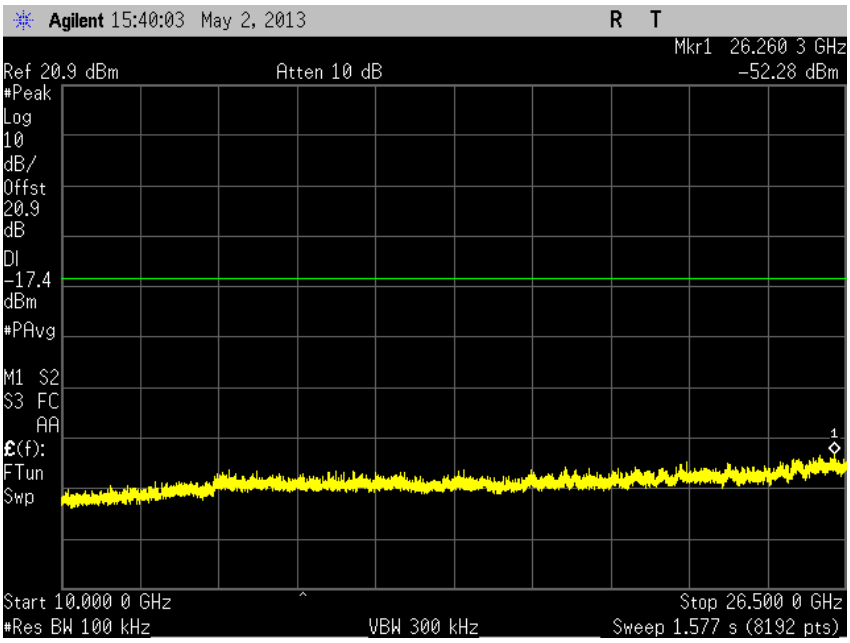
802.11n High Channel (30MHz to 10GHz)



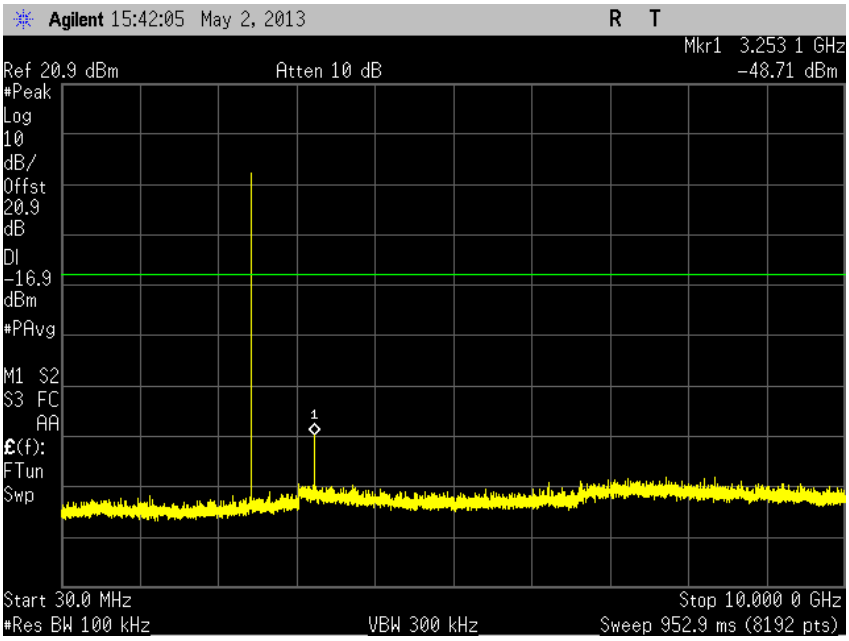
802.11n High Channel (10GHz to 25GHz)



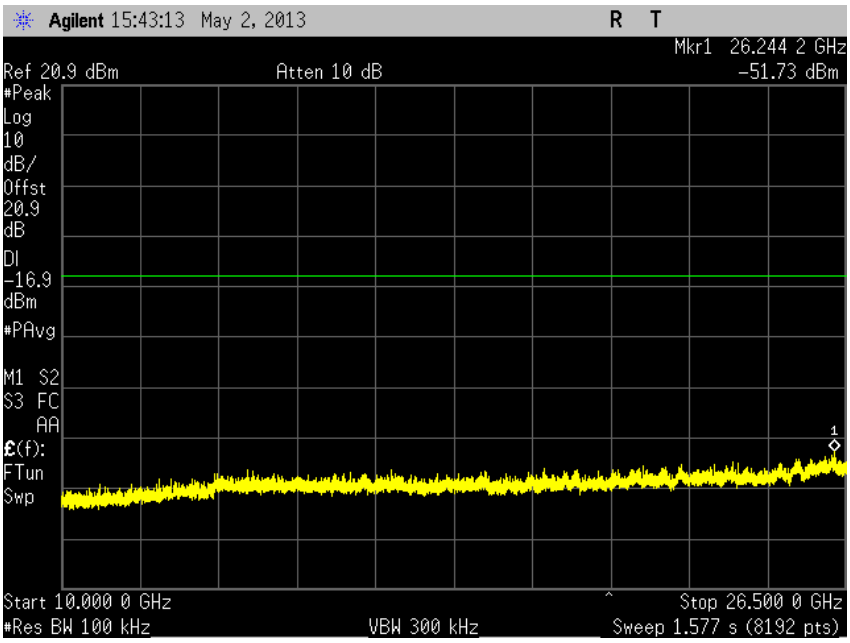
Bluetooth LE Low Channel (30MHz to 10GHz)



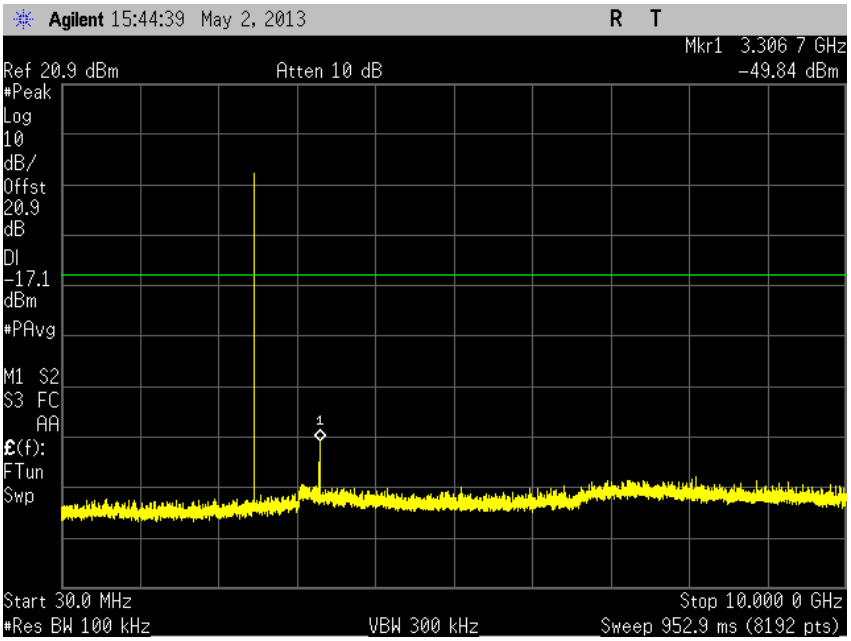
Bluetooth LE Low Channel (10GHz to 25GHz)



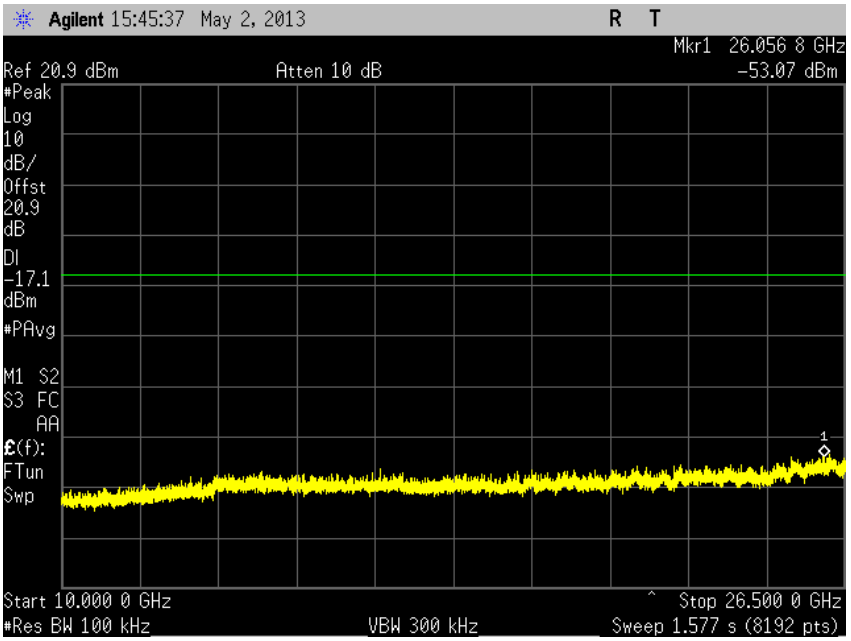
Bluetooth LE Mid Channel (30MHz to 10GHz)



Bluetooth LE Mid Channel (10GHz to 25GHz)



Bluetooth LE High Channel (30MHz to 10GHz)



Bluetooth LE High Channel (10GHz to 25GHz)

2.6 BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

2.6.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.6.2 Standard Applicable

See previous test.

2.6.3 Equipment Under Test and Modification State

Serial No: 20130418001829 / Test Configuration A

2.6.4 Date of Test/Initial of test personnel who performed the test

May 02, 2013/FSC

2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.6 Environmental Conditions

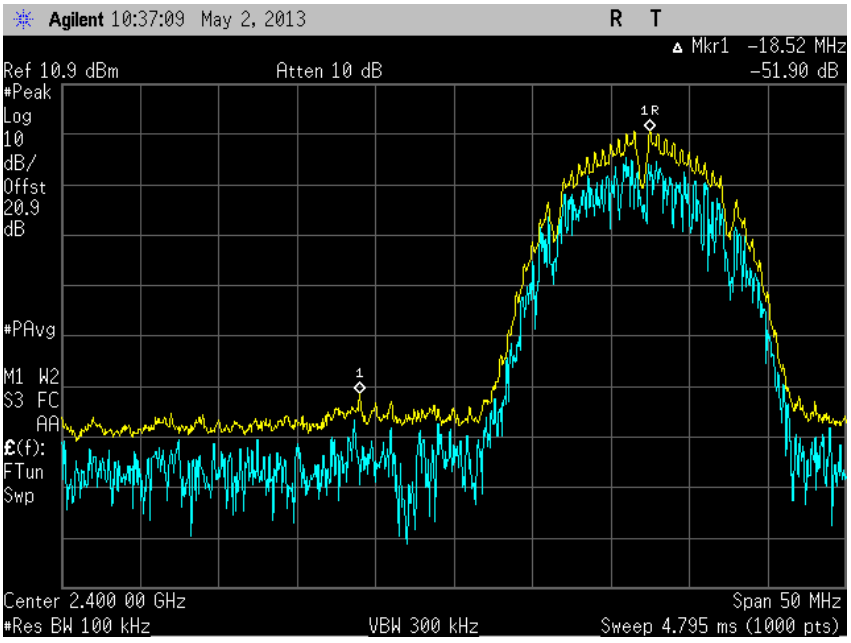
Ambient Temperature	25.3°C
Relative Humidity	40.4.%
ATM Pressure	99.5 kPa

2.6.7 Additional Observations

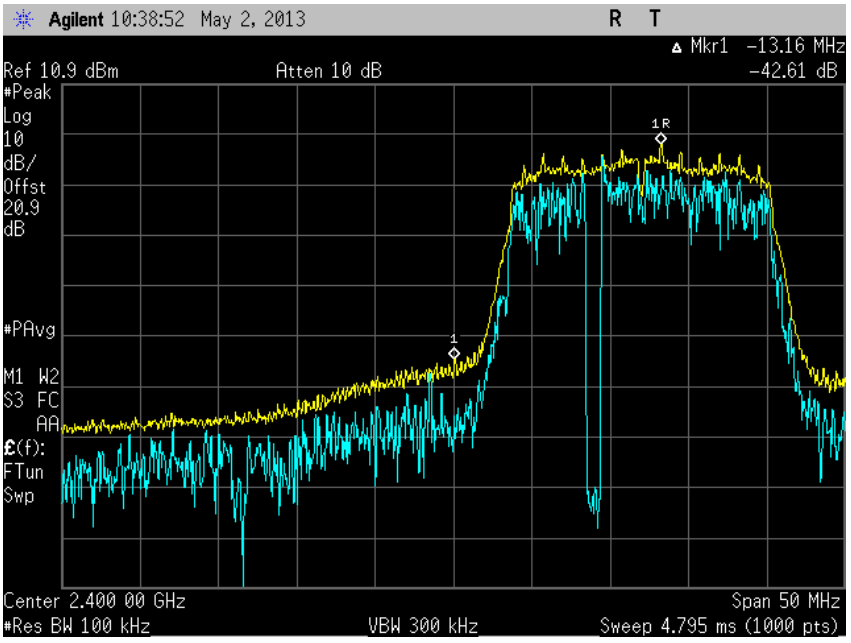
- Setup is identical to “Out-of-Band Emissions – Conducted“ test (previous test).
- Band-edge (2400MHz and 2483.5MHz) emissions were verified in this test.
- The spectrum analyzer was centred on the band-edge frequency while setting the EUT to the corresponding transmit channel (i.e. Low Channel for lower band-edge).
- Limit is 20dB below the highest level of the desired power within the band.

2.6.8 Test Results

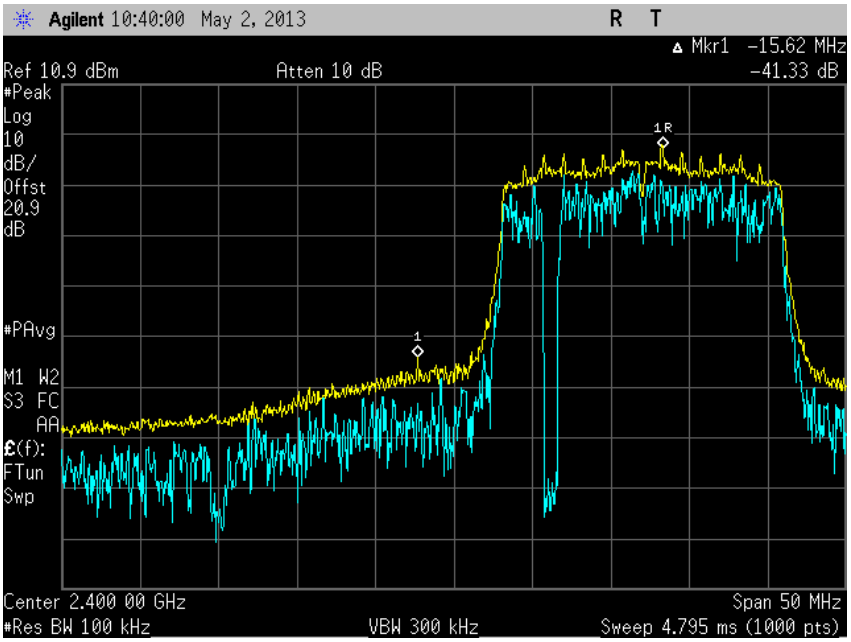
Complies. See attached plots.



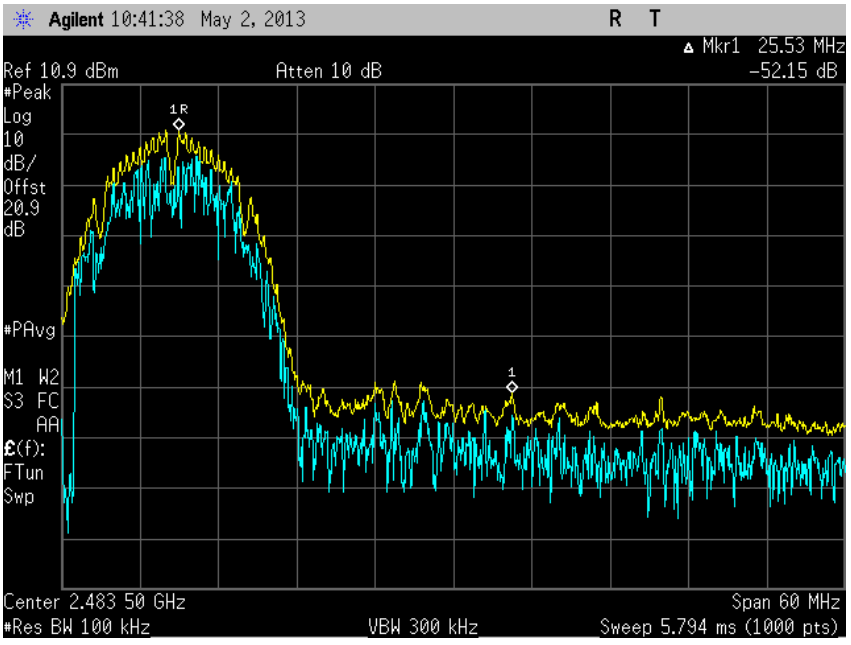
802.11b Low Channel (2412 MHz)



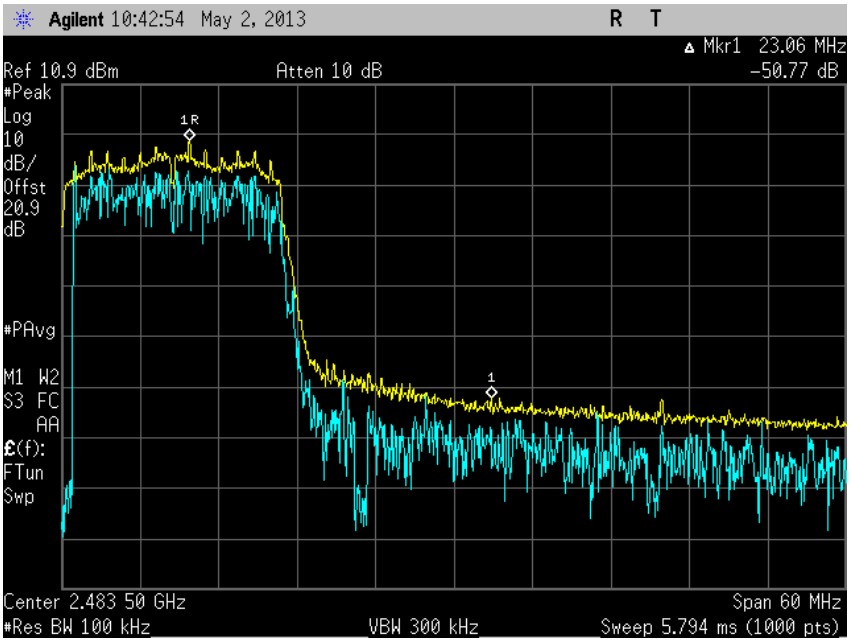
802.11g Low Channel (2412 MHz)



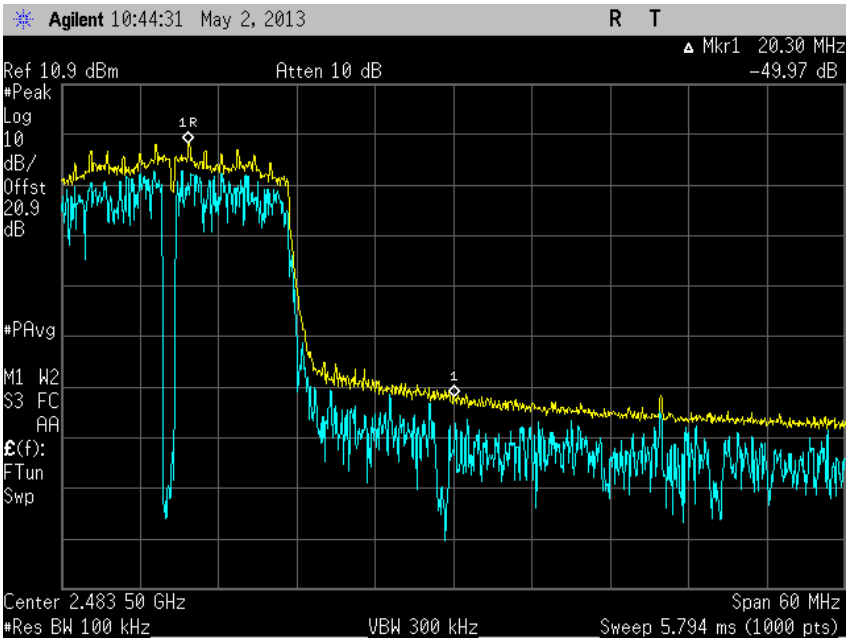
802.11n Low Channel (2412 MHz)



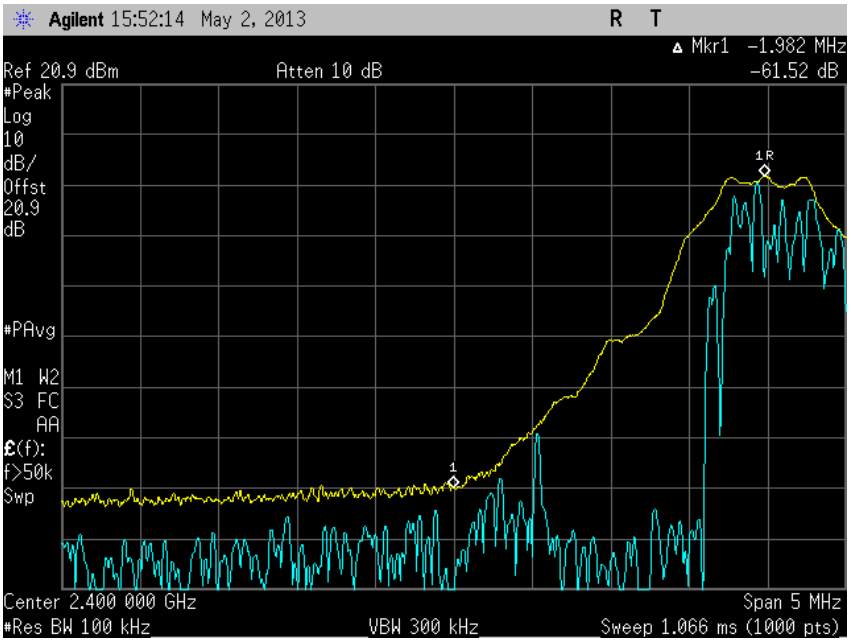
802.11b High Channel (2462 MHz)



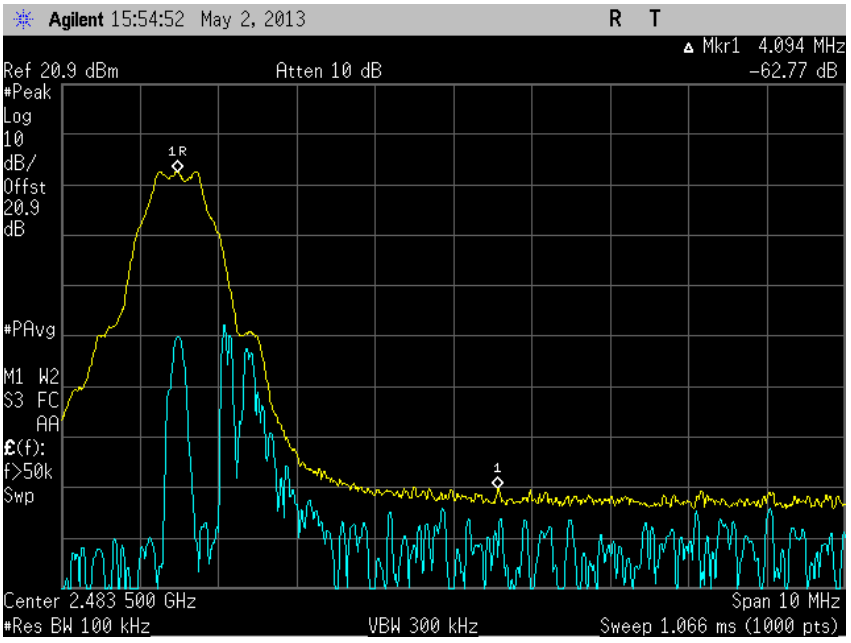
802.11g High Channel (2462 MHz)



802.11n High Channel (2462 MHz)



Bluetooth LE Low Channel (2402 MHz)



Bluetooth LE High Channel (2480 MHz)

2.7 SPURIOUS RADIATED EMISSIONS

2.7.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.7.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

2.7.3 Equipment Under Test and Modification State

Serial No: 20130418001833 / Test Configuration B

2.7.4 Date of Test/Initial of test personnel who performed the test

April 29 and 30, 2013/FSC

2.7.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.6 Environmental Conditions

Ambient Temperature	25.4-25.8°C
Relative Humidity	43.5-44.5%
ATM Pressure	98.7-99.0 kPa

2.7.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic (25GHz).
- There are no emissions found that do not comply to the restricted bands defined in FCC Part 15 Subpart C, 15.205 or Part 15.247(d).
- Only the considered worst case WLAN configuration (802.11g, High Channel,6Mbps) presented for radiated emissions below 1GHz. There are no significant differences in emissions between the three modes below 1GHz.

- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.7.8 for sample computation.

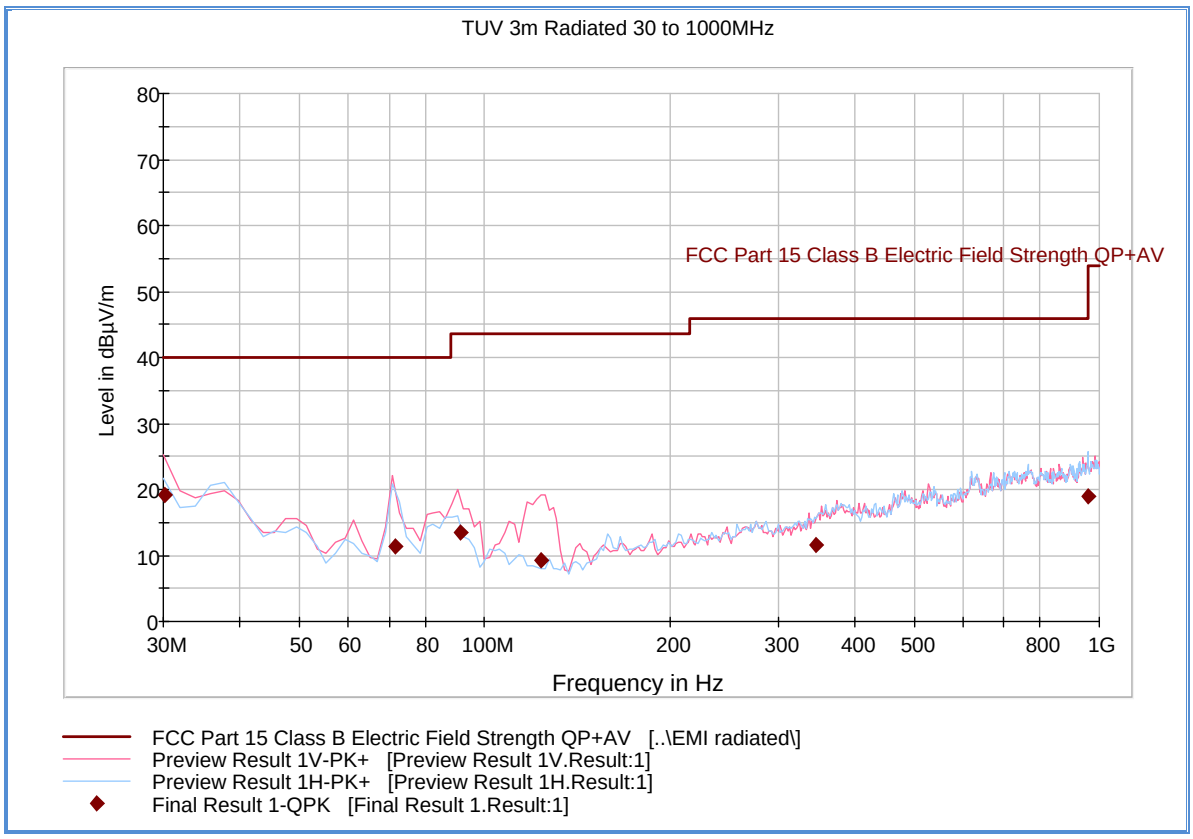
2.7.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dbµV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbµV/m) @ 30MHz			**11.8**

2.7.9 Test Results

See attached plots.

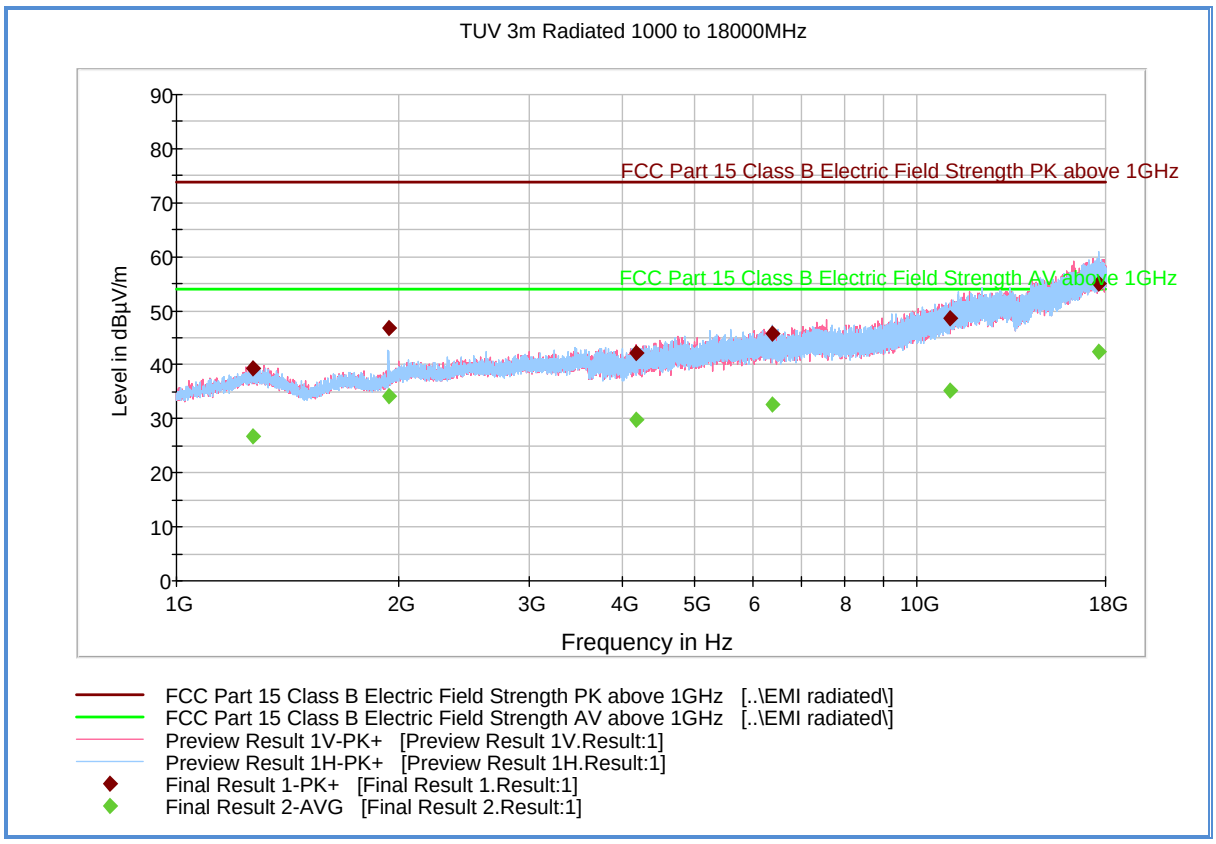
2.7.10 Test Results Below 1GHz (Receive Mode)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.200000	19.2	1000.0	120.000	350.0	V	221.0	-11.8	20.8	40.0
71.381643	11.4	1000.0	120.000	100.0	V	332.0	-21.7	28.6	40.0
91.540521	13.6	1000.0	120.000	110.0	V	244.0	-20.3	29.9	43.5
123.586613	9.3	1000.0	120.000	105.0	V	156.0	-20.3	34.2	43.5
346.077595	11.6	1000.0	120.000	309.0	V	173.0	-10.2	34.4	46.0
960.258357	18.9	1000.0	120.000	200.0	H	129.0	0.8	35.0	53.9

2.7.11 Test Results Above 1GHz (Receive Mode)



Peak Data

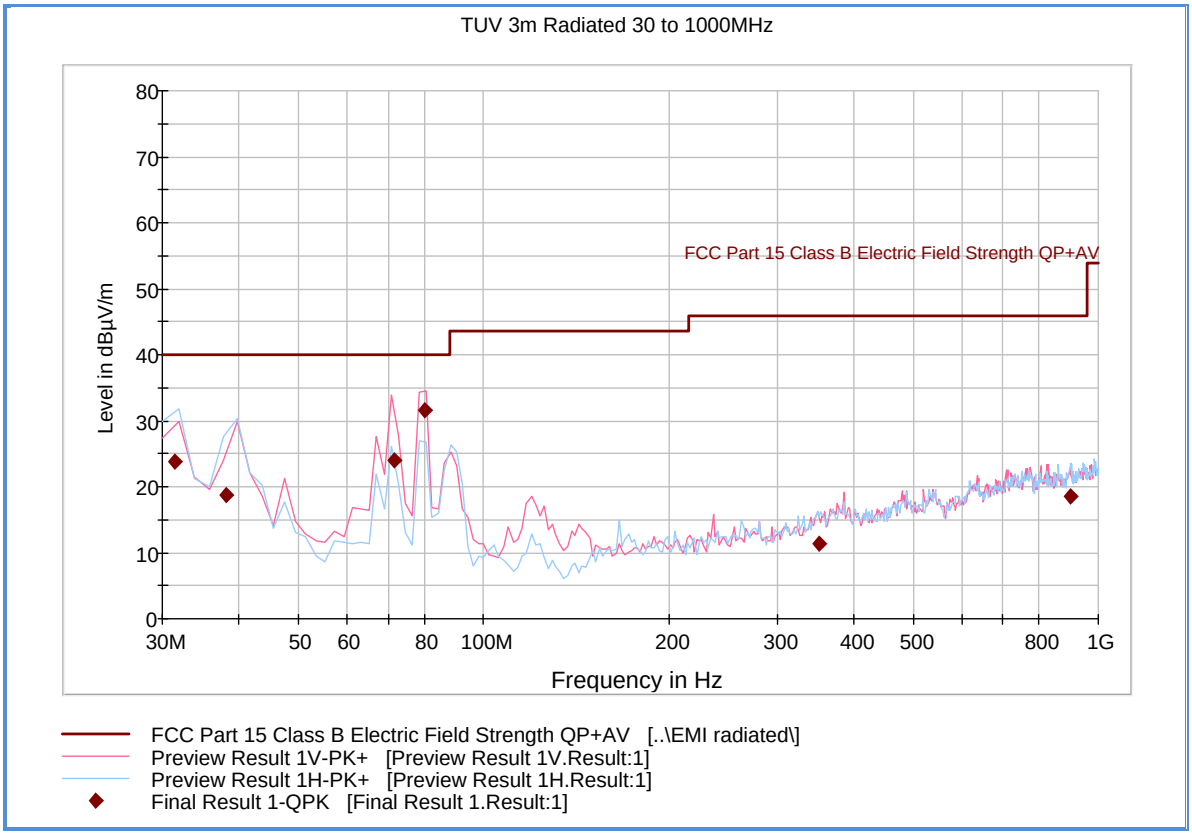
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1270.886667	39.3	1000.0	1000.000	400.4	V	15.0	-4.8	34.6	73.9
1932.746667	46.7	1000.0	1000.000	99.8	H	43.0	-2.0	27.2	73.9
4177.726667	42.3	1000.0	1000.000	307.2	V	15.0	3.7	31.6	73.9
6369.073333	45.8	1000.0	1000.000	209.5	H	302.0	8.4	28.1	73.9
11114.33333	48.5	1000.0	1000.000	400.4	H	331.0	14.6	25.4	73.9
17648.44000	55.0	1000.0	1000.000	296.3	H	10.0	22.1	18.9	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1270.886667	26.9	1000.0	1000.000	400.4	V	15.0	-4.8	27.0	53.9
1932.746667	34.3	1000.0	1000.000	99.8	H	43.0	-2.0	19.6	53.9
4177.726667	29.8	1000.0	1000.000	307.2	V	15.0	3.7	24.1	53.9
6369.073333	32.5	1000.0	1000.000	209.5	H	302.0	8.4	21.4	53.9
11114.33333	35.2	1000.0	1000.000	400.4	H	331.0	14.6	18.7	53.9
17648.44000	42.3	1000.0	1000.000	296.3	H	10.0	22.1	11.6	53.9

Test Notes: No significant emissions observed.

2.7.12 Test Results Below 1GHz (WLAN worst Case Configuration)

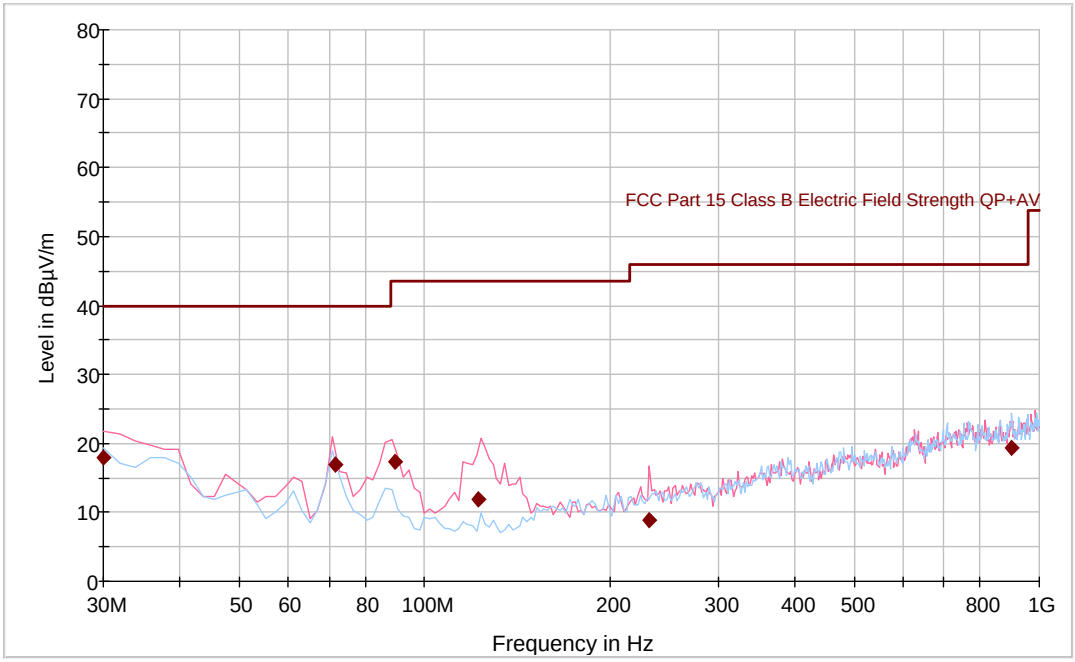


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
31.440000	23.8	1000.0	120.000	123.0	H	70.0	-12.5	16.2	40.0
38.159439	18.8	1000.0	120.000	113.0	H	22.0	-15.9	21.2	40.0
71.501643	24.1	1000.0	120.000	100.0	V	110.0	-21.7	15.9	40.0
79.997194	31.6	1000.0	120.000	100.0	V	327.0	-21.5	8.4	40.0
350.877595	11.4	1000.0	120.000	260.0	V	67.0	-9.5	34.6	46.0
902.325611	18.6	1000.0	120.000	372.0	H	68.0	0.4	27.4	46.0

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.

2.7.13 Test Results Below 1GHz (Bluetooth LE)

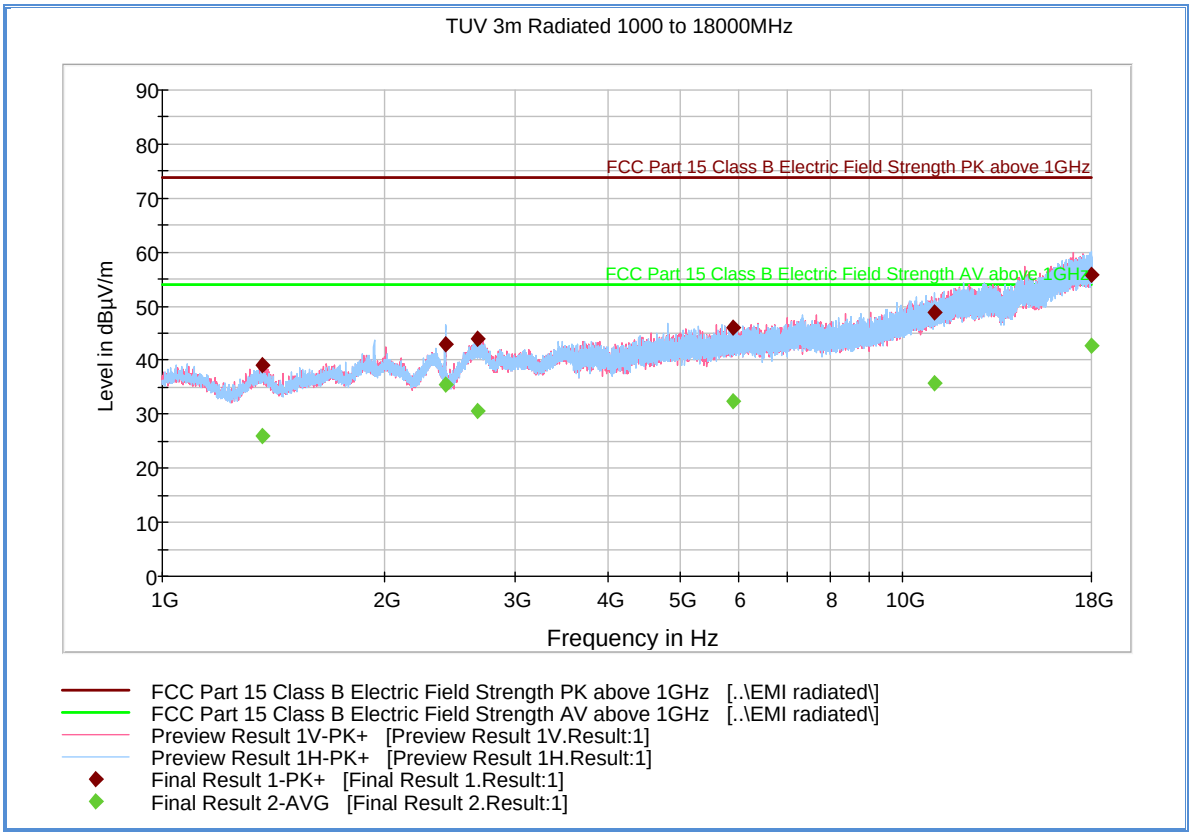


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.000000	17.9	1000.0	120.000	212.0	V	0.0	-11.7	22.1	40.0
71.501643	17.0	1000.0	120.000	196.0	V	265.0	-21.7	23.0	40.0
89.412745	17.3	1000.0	120.000	155.0	V	244.0	-20.5	26.2	43.5
122.426613	11.9	1000.0	120.000	100.0	V	3.0	-20.3	31.6	43.5
232.004329	8.8	1000.0	120.000	155.0	V	222.0	-14.2	37.2	46.0
899.685611	19.3	1000.0	120.000	251.0	H	264.0	0.6	26.7	46.0

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.

2.7.14 Test Results Above 1GHz (802.11b Low Channel)



Peak Data

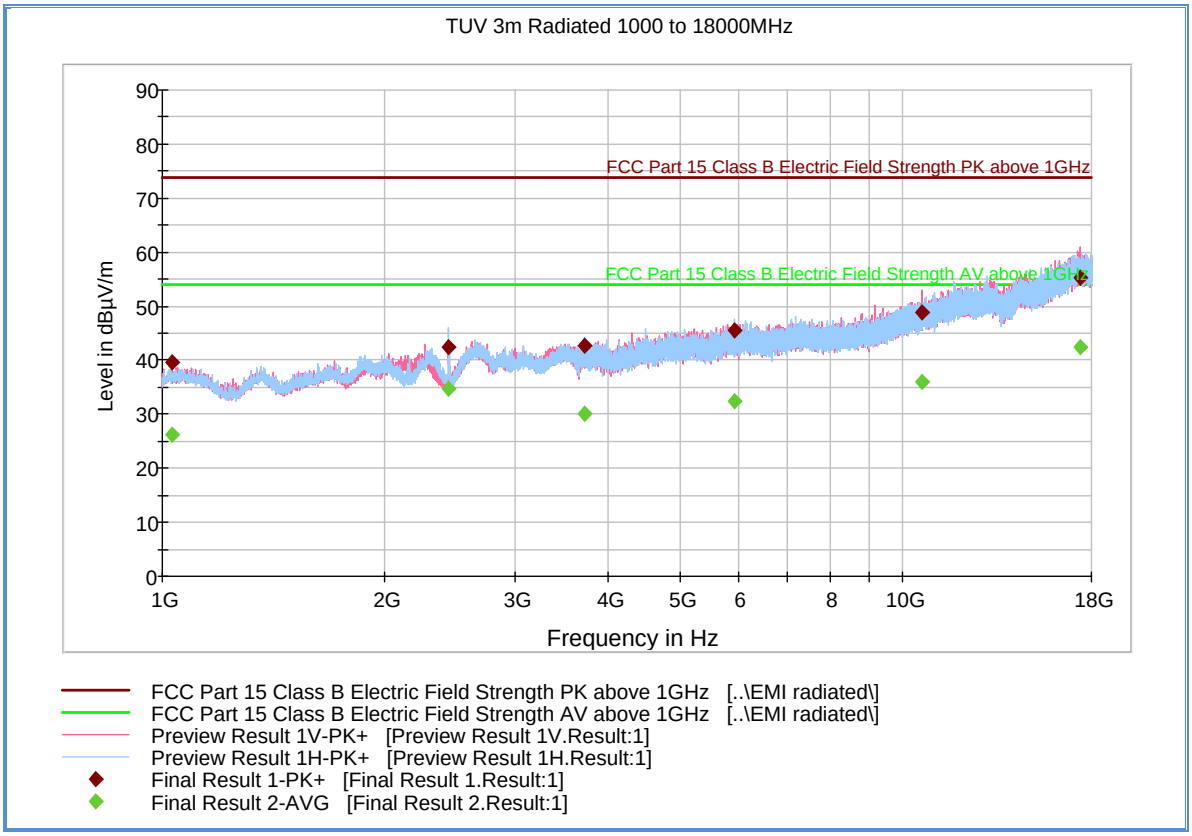
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1365.766667	39.1	1000.0	1000.000	277.3	V	67.0	-4.9	34.8	73.9
2411.020000	42.8	1000.0	1000.000	112.8	H	37.0	-0.4	31.1	73.9
2668.160000	44.0	1000.0	1000.000	237.4	V	29.0	0.6	29.9	73.9
5911.080000	46.0	1000.0	1000.000	400.4	V	4.0	7.8	27.9	73.9
11045.440000	48.7	1000.0	1000.000	318.2	H	326.0	14.6	25.2	73.9
17999.420000	55.8	1000.0	1000.000	385.1	H	331.0	22.7	18.1	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1365.766667	26.0	1000.0	1000.000	277.3	V	67.0	-4.9	27.9	53.9
2411.020000	35.5	1000.0	1000.000	112.8	H	37.0	-0.4	18.4	53.9
2668.160000	30.6	1000.0	1000.000	237.4	V	29.0	0.6	23.3	53.9
5911.080000	32.4	1000.0	1000.000	400.4	V	4.0	7.8	21.5	53.9
11045.440000	35.8	1000.0	1000.000	318.2	H	326.0	14.6	18.1	53.9
17999.420000	42.8	1000.0	1000.000	385.1	H	331.0	22.7	11.1	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.7.15 Test Results Above 1GHz (802.11b Mid Channel)



Peak Data

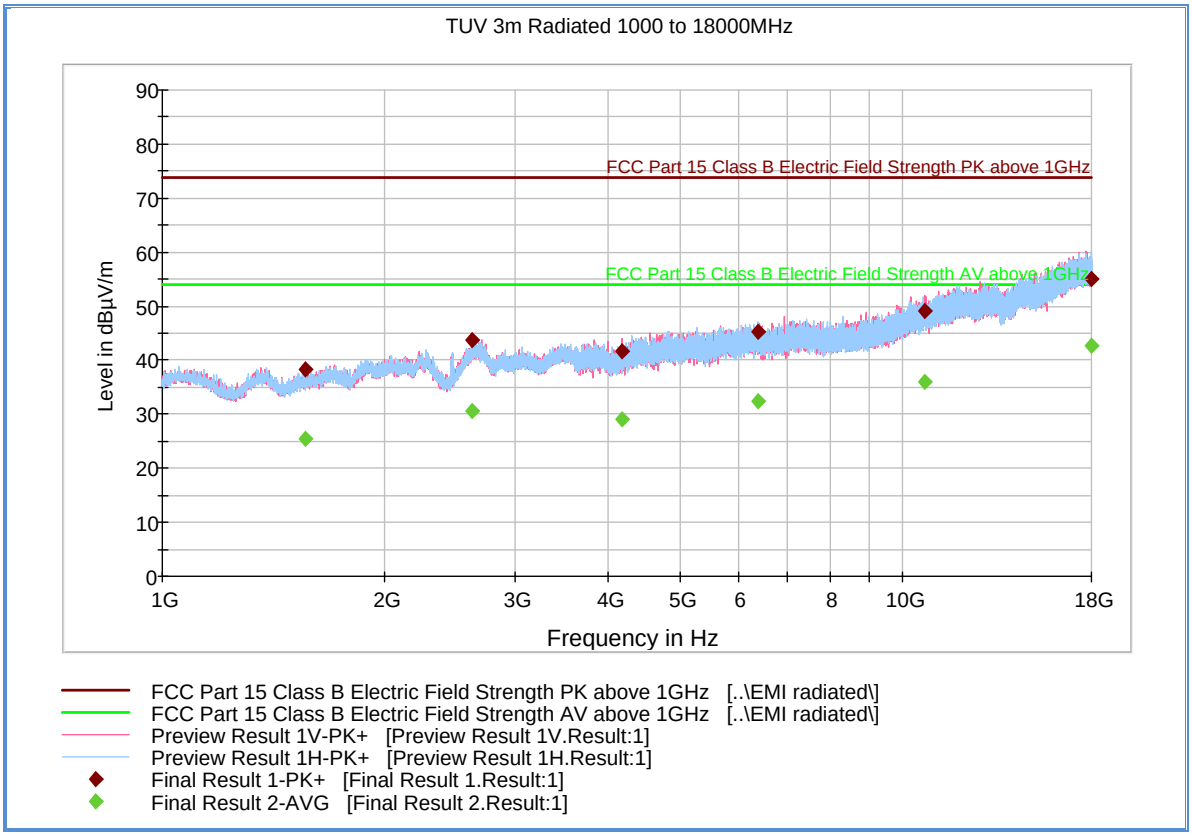
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1031.706667	39.6	1000.0	1000.000	217.5	V	83.0	-6.1	34.3	73.9
2436.486667	42.5	1000.0	1000.000	101.8	H	42.0	-0.3	31.4	73.9
3724.506667	42.7	1000.0	1000.000	350.2	H	309.0	3.0	31.2	73.9
5937.946667	45.6	1000.0	1000.000	226.5	H	309.0	7.7	28.3	73.9
10605.026667	48.8	1000.0	1000.000	246.4	V	62.0	13.7	25.1	73.9
17352.440000	55.3	1000.0	1000.000	342.2	V	189.0	22.1	18.6	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1031.706667	26.2	1000.0	1000.000	217.5	V	83.0	-6.1	27.7	53.9
2436.486667	34.7	1000.0	1000.000	101.8	H	42.0	-0.3	19.2	53.9
3724.506667	30.1	1000.0	1000.000	350.2	H	309.0	3.0	23.8	53.9
5937.946667	32.5	1000.0	1000.000	226.5	H	309.0	7.7	21.4	53.9
10605.026667	36.0	1000.0	1000.000	246.4	V	62.0	13.7	17.9	53.9
17352.440000	42.5	1000.0	1000.000	342.2	V	189.0	22.1	11.4	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.7.16 Test Results Above 1GHz (802.11b High Channel)



Peak Data

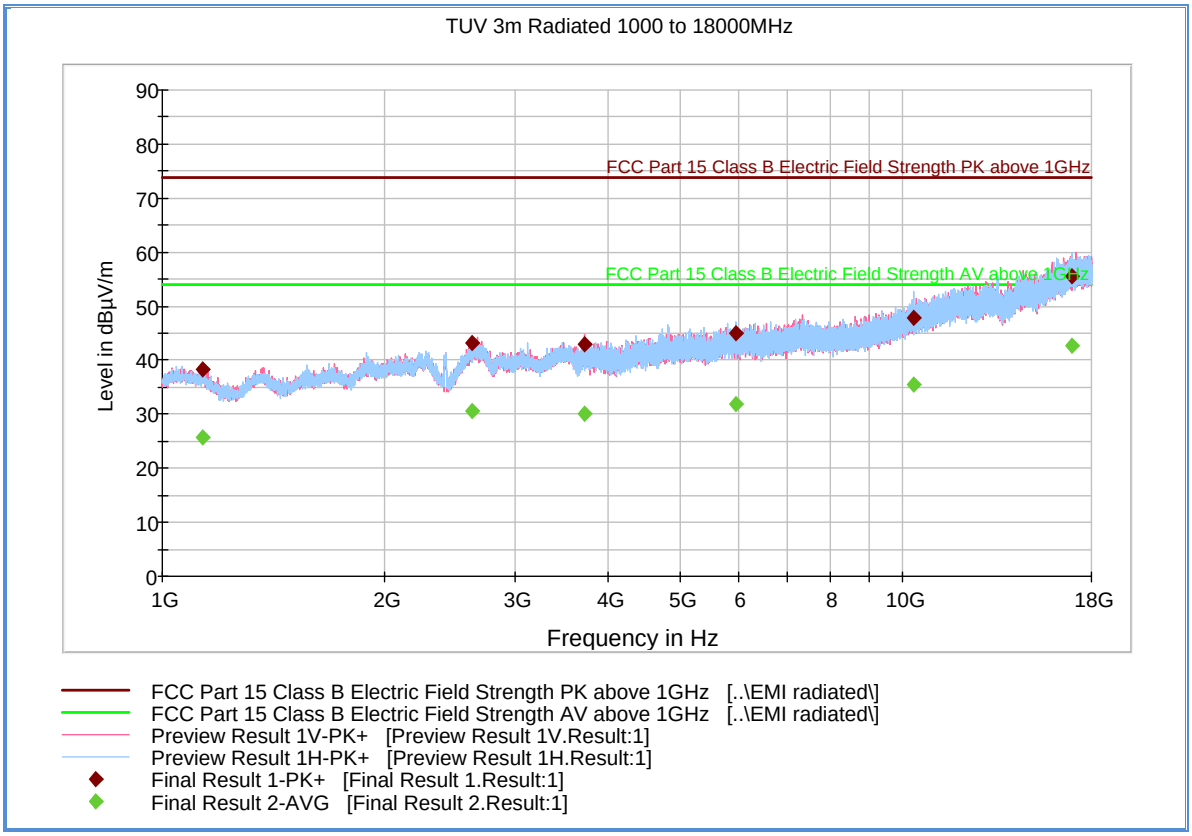
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1560.933333	38.3	1000.0	1000.000	102.8	H	280.0	-4.6	35.6	73.9
2618.493333	43.7	1000.0	1000.000	400.4	V	289.0	0.4	30.2	73.9
4185.340000	41.8	1000.0	1000.000	400.4	V	15.0	3.7	32.1	73.9
6382.186667	45.4	1000.0	1000.000	400.4	H	324.0	8.3	28.6	73.9
10715.026667	49.2	1000.0	1000.000	218.5	V	148.0	13.8	24.7	73.9
17972.246667	55.1	1000.0	1000.000	248.4	H	64.0	22.6	18.8	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1560.933333	25.4	1000.0	1000.000	102.8	H	280.0	-4.6	28.5	53.9
2618.493333	30.5	1000.0	1000.000	400.4	V	289.0	0.4	23.4	53.9
4185.340000	29.1	1000.0	1000.000	400.4	V	15.0	3.7	24.8	53.9
6382.186667	32.4	1000.0	1000.000	400.4	H	324.0	8.3	21.5	53.9
10715.026667	36.0	1000.0	1000.000	218.5	V	148.0	13.8	17.9	53.9
17972.246667	42.7	1000.0	1000.000	248.4	H	64.0	22.6	11.2	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.7.17 Test Results Above 1GHz (802.11g Low Channel)



Peak Data

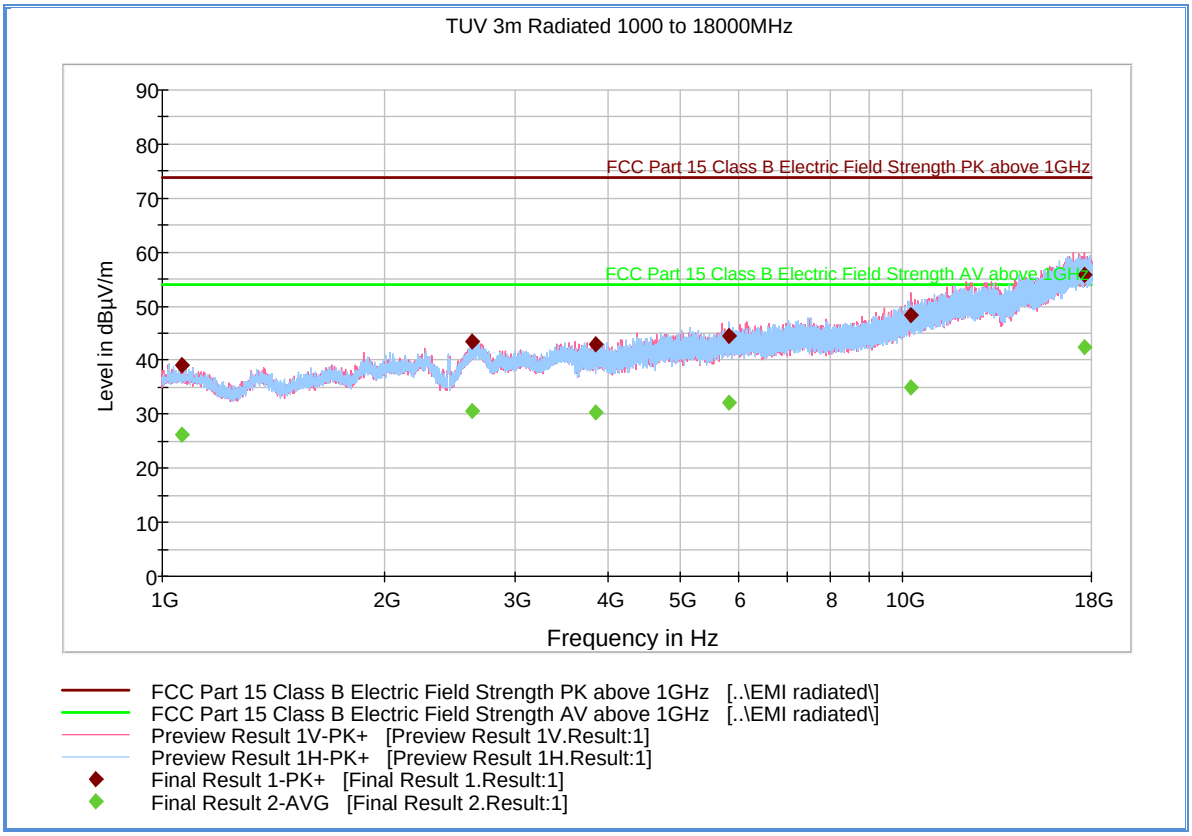
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1132.900000	38.4	1000.0	1000.000	377.1	V	69.0	-5.5	35.5	73.9
2616.846667	43.3	1000.0	1000.000	400.4	V	177.0	0.4	30.6	73.9
3722.846667	43.0	1000.0	1000.000	400.4	V	148.0	3.0	30.9	73.9
5964.633333	45.0	1000.0	1000.000	400.4	H	45.0	7.7	28.9	73.9
10342.293333	47.9	1000.0	1000.000	112.8	H	337.0	13.3	26.0	73.9
16970.020000	55.5	1000.0	1000.000	370.1	H	293.0	22.0	18.4	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1132.900000	25.6	1000.0	1000.000	377.1	V	69.0	-5.5	28.3	53.9
2616.846667	30.5	1000.0	1000.000	400.4	V	177.0	0.4	23.4	53.9
3722.846667	30.0	1000.0	1000.000	400.4	V	148.0	3.0	23.9	53.9
5964.633333	31.9	1000.0	1000.000	400.4	H	45.0	7.7	22.0	53.9
10342.293333	35.5	1000.0	1000.000	112.8	H	337.0	13.3	18.4	53.9
16970.020000	42.8	1000.0	1000.000	370.1	H	293.0	22.0	11.1	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.7.18 Test Results Above 1GHz (802.11g Mid Channel)



Peak Data

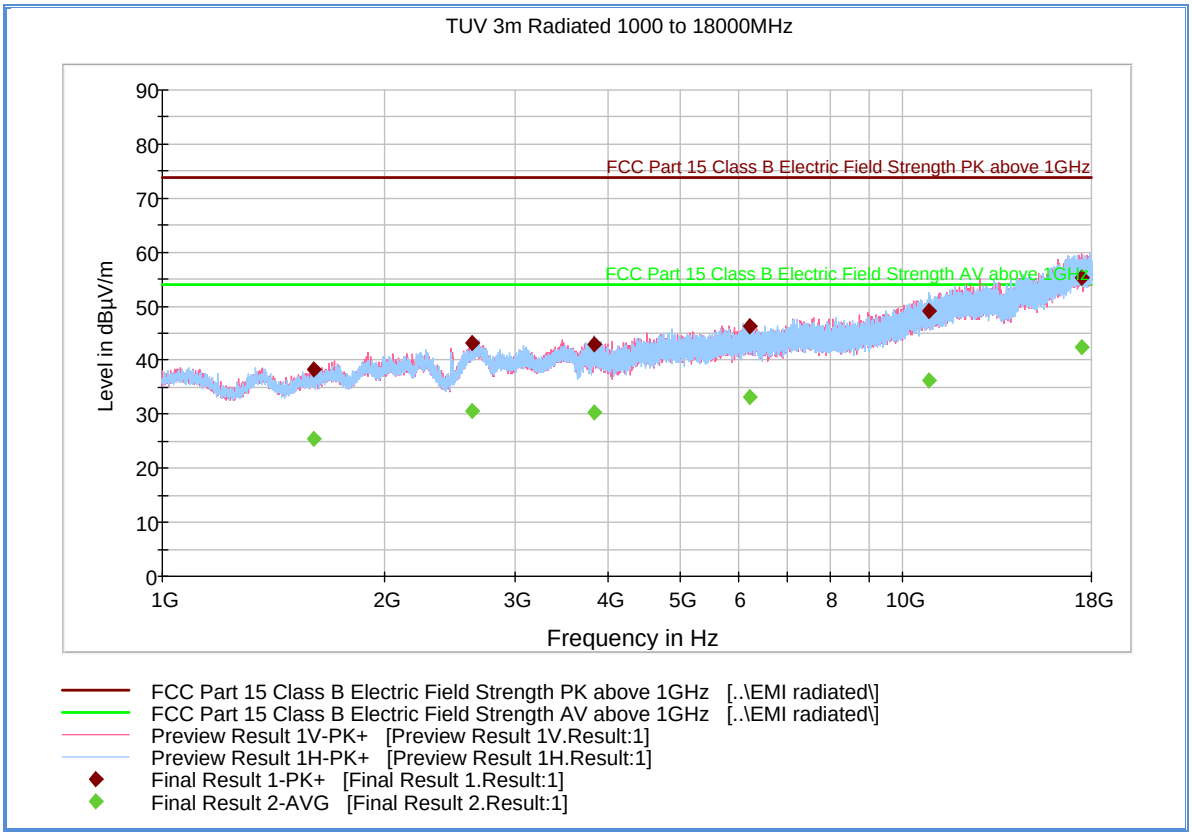
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1062.920000	39.0	1000.0	1000.000	135.7	V	169.0	-5.9	34.9	73.9
2620.113333	43.5	1000.0	1000.000	149.7	H	186.0	0.4	30.4	73.9
3846.833333	42.9	1000.0	1000.000	400.4	V	218.0	3.1	31.0	73.9
5826.933333	44.6	1000.0	1000.000	400.4	H	122.0	7.9	29.3	73.9
10250.566667	48.4	1000.0	1000.000	220.4	V	179.0	12.9	25.5	73.9
17651.186667	55.8	1000.0	1000.000	377.1	V	87.0	22.1	18.1	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1062.920000	26.3	1000.0	1000.000	135.7	V	169.0	-5.9	27.6	53.9
2620.113333	30.6	1000.0	1000.000	149.7	H	186.0	0.4	23.3	53.9
3846.833333	30.3	1000.0	1000.000	400.4	V	218.0	3.1	23.6	53.9
5826.933333	32.0	1000.0	1000.000	400.4	H	122.0	7.9	21.9	53.9
10250.566667	35.1	1000.0	1000.000	220.4	V	179.0	12.9	18.8	53.9
17651.186667	42.5	1000.0	1000.000	377.1	V	87.0	22.1	11.4	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz.

2.7.19 Test Results Above 1GHz (802.11g High Channel)



Peak Data

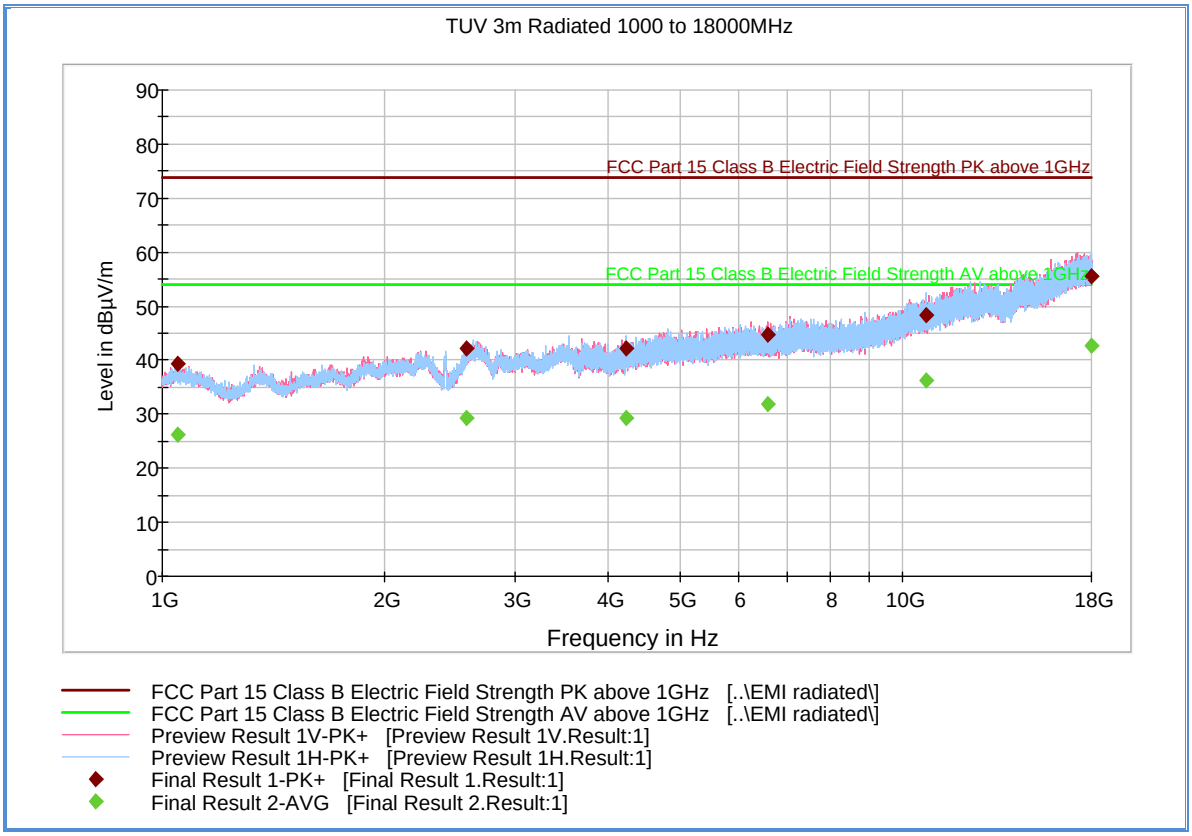
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1603.486667	38.4	1000.0	1000.000	268.3	V	52.0	-4.3	35.5	73.9
2620.033333	43.2	1000.0	1000.000	127.7	V	190.0	0.4	30.7	73.9
3829.060000	42.9	1000.0	1000.000	331.1	H	38.0	3.0	31.0	73.9
6214.166667	46.2	1000.0	1000.000	102.8	V	330.0	8.5	27.7	73.9
10846.626667	49.0	1000.0	1000.000	160.7	H	45.0	14.1	24.9	73.9
17476.173333	55.2	1000.0	1000.000	238.4	V	258.0	22.2	18.7	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1603.486667	25.5	1000.0	1000.000	268.3	V	52.0	-4.3	28.4	53.9
2620.033333	30.5	1000.0	1000.000	127.7	V	190.0	0.4	23.4	53.9
3829.060000	30.2	1000.0	1000.000	331.1	H	38.0	3.0	23.7	53.9
6214.166667	33.1	1000.0	1000.000	102.8	V	330.0	8.5	20.8	53.9
10846.626667	36.2	1000.0	1000.000	160.7	H	45.0	14.1	17.7	53.9
17476.173333	42.4	1000.0	1000.000	238.4	V	258.0	22.2	11.5	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.7.20 Test Results Above 1GHz (802.11n Low Channel)



Peak Data

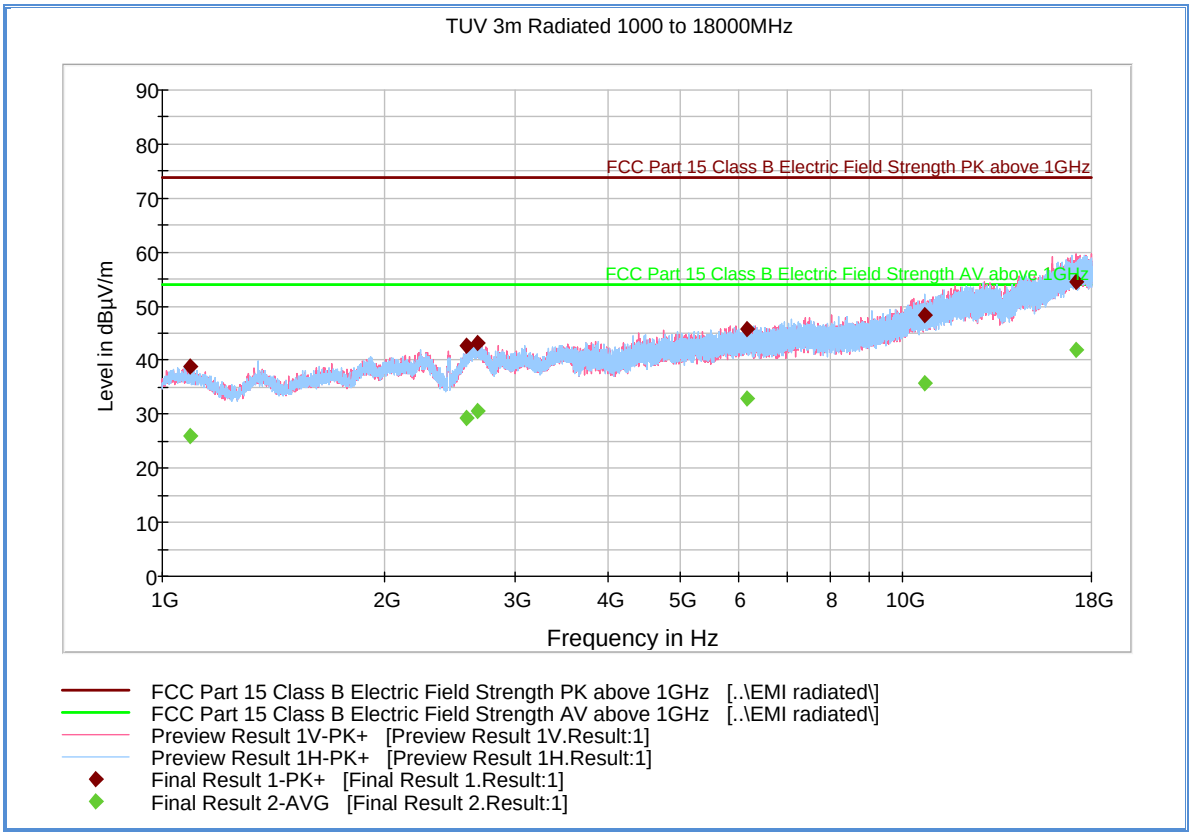
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1049.880000	39.4	1000.0	1000.000	112.8	V	283.0	-5.9	34.5	73.9
2580.813333	42.2	1000.0	1000.000	390.1	V	344.0	0.2	31.7	73.9
4227.873333	42.1	1000.0	1000.000	358.1	H	170.0	3.9	31.8	73.9
6570.200000	44.7	1000.0	1000.000	301.2	V	326.0	8.0	29.2	73.9
10763.973333	48.5	1000.0	1000.000	400.4	H	206.0	13.8	25.4	73.9
17994.146667	55.5	1000.0	1000.000	210.5	H	306.0	22.7	18.4	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1049.880000	26.2	1000.0	1000.000	112.8	V	283.0	-5.9	27.7	53.9
2580.813333	29.4	1000.0	1000.000	390.1	V	344.0	0.2	24.5	53.9
4227.873333	29.4	1000.0	1000.000	358.1	H	170.0	3.9	24.5	53.9
6570.200000	31.8	1000.0	1000.000	301.2	V	326.0	8.0	22.1	53.9
10763.973333	36.1	1000.0	1000.000	400.4	H	206.0	13.8	17.8	53.9
17994.146667	42.7	1000.0	1000.000	210.5	H	306.0	22.7	11.2	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.7.21 Test Results Above 1GHz (802.11n Mid Channel)



Peak Data

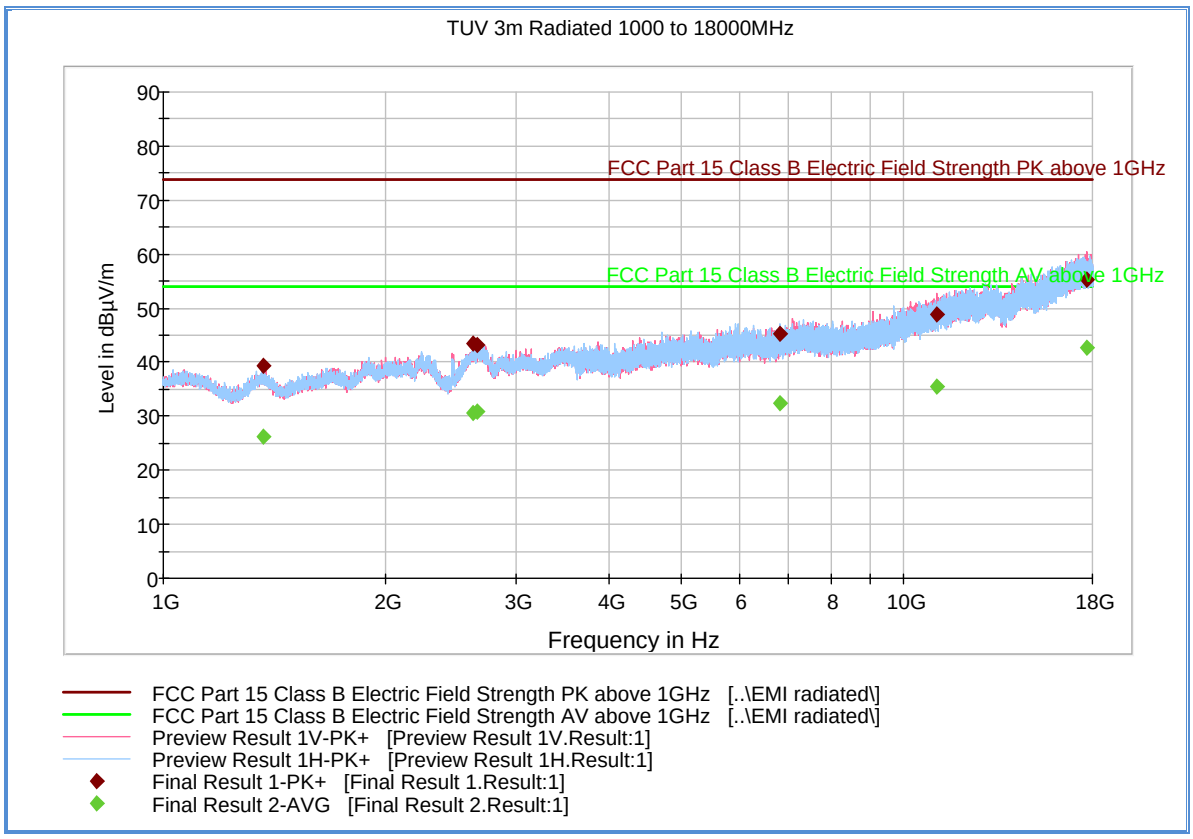
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1089.873333	38.8	1000.0	1000.000	184.6	H	325.0	-5.8	35.1	73.9
2574.546667	42.8	1000.0	1000.000	400.4	H	42.0	0.2	31.1	73.9
2666.186667	43.3	1000.0	1000.000	400.4	V	155.0	0.6	30.6	73.9
6171.500000	45.8	1000.0	1000.000	400.4	V	255.0	8.4	28.1	73.9
10727.953333	48.4	1000.0	1000.000	240.4	H	45.0	13.8	25.5	73.9
17199.560000	54.6	1000.0	1000.000	400.4	V	126.0	21.7	19.3	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1089.873333	26.1	1000.0	1000.000	184.6	H	325.0	-5.8	27.8	53.9
2574.546667	29.2	1000.0	1000.000	400.4	H	42.0	0.2	24.7	53.9
2666.186667	30.6	1000.0	1000.000	400.4	V	155.0	0.6	23.3	53.9
6171.500000	32.8	1000.0	1000.000	400.4	V	255.0	8.4	21.1	53.9
10727.953333	35.7	1000.0	1000.000	240.4	H	45.0	13.8	18.2	53.9
17199.560000	42.0	1000.0	1000.000	400.4	V	126.0	21.7	11.9	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz.

2.7.22 Test Results Above 1GHz (802.11n High Channel)



Peak Data

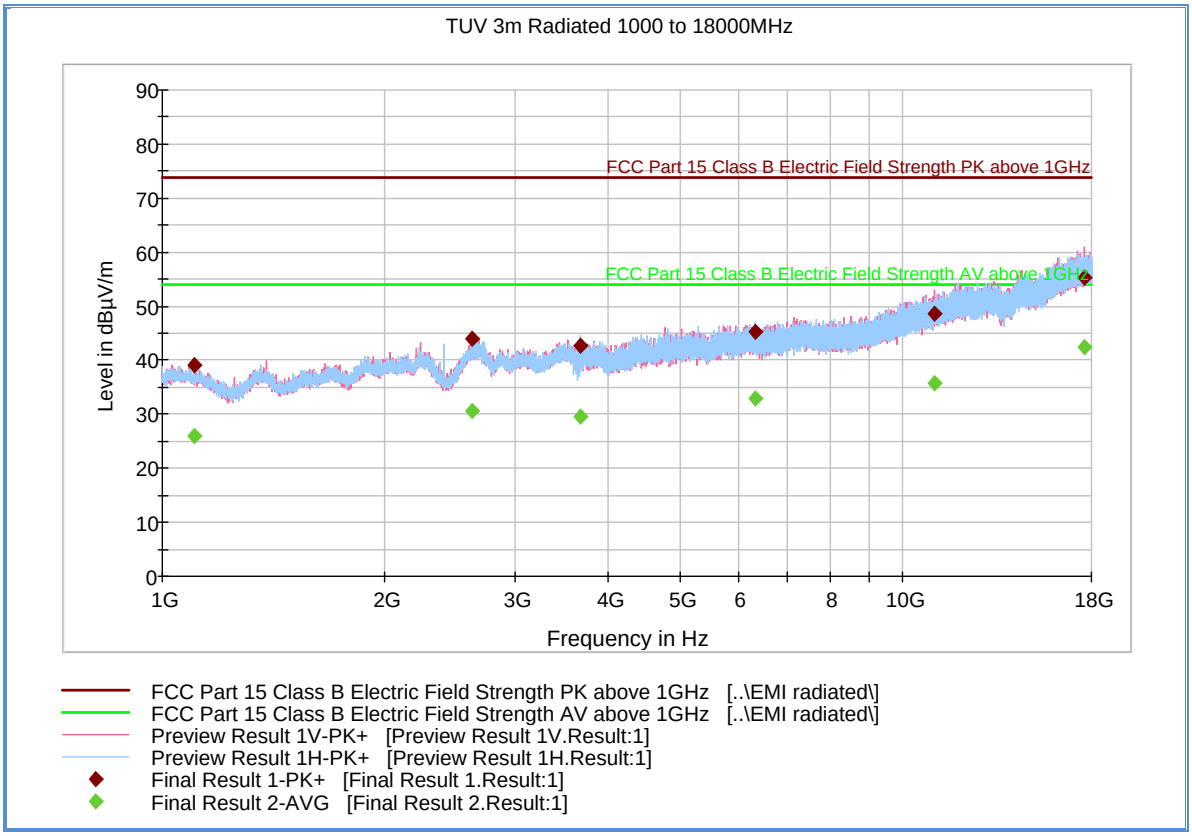
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1362.240000	39.2	1000.0	1000.000	333.2	H	199.0	-4.9	34.7	73.9
2618.346667	43.4	1000.0	1000.000	290.3	H	0.0	0.4	30.5	73.9
2658.333333	43.3	1000.0	1000.000	368.1	H	107.0	0.6	30.6	73.9
6813.413333	45.2	1000.0	1000.000	311.2	H	170.0	8.8	28.7	73.9
11082.073333	48.8	1000.0	1000.000	356.1	V	305.0	14.6	25.1	73.9
17695.520000	55.3	1000.0	1000.000	151.7	V	110.0	22.1	18.6	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1362.240000	26.1	1000.0	1000.000	333.2	H	199.0	-4.9	27.8	53.9
2618.346667	30.6	1000.0	1000.000	290.3	H	0.0	0.4	23.3	53.9
2658.333333	30.9	1000.0	1000.000	368.1	H	107.0	0.6	23.0	53.9
6813.413333	32.4	1000.0	1000.000	311.2	H	170.0	8.8	21.5	53.9
11082.073333	35.6	1000.0	1000.000	356.1	V	305.0	14.6	18.3	53.9
17695.520000	42.7	1000.0	1000.000	151.7	V	110.0	22.1	11.2	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.7.23 Test Results Above 1GHz (Bluetooth LE Low Channel)



Peak Data

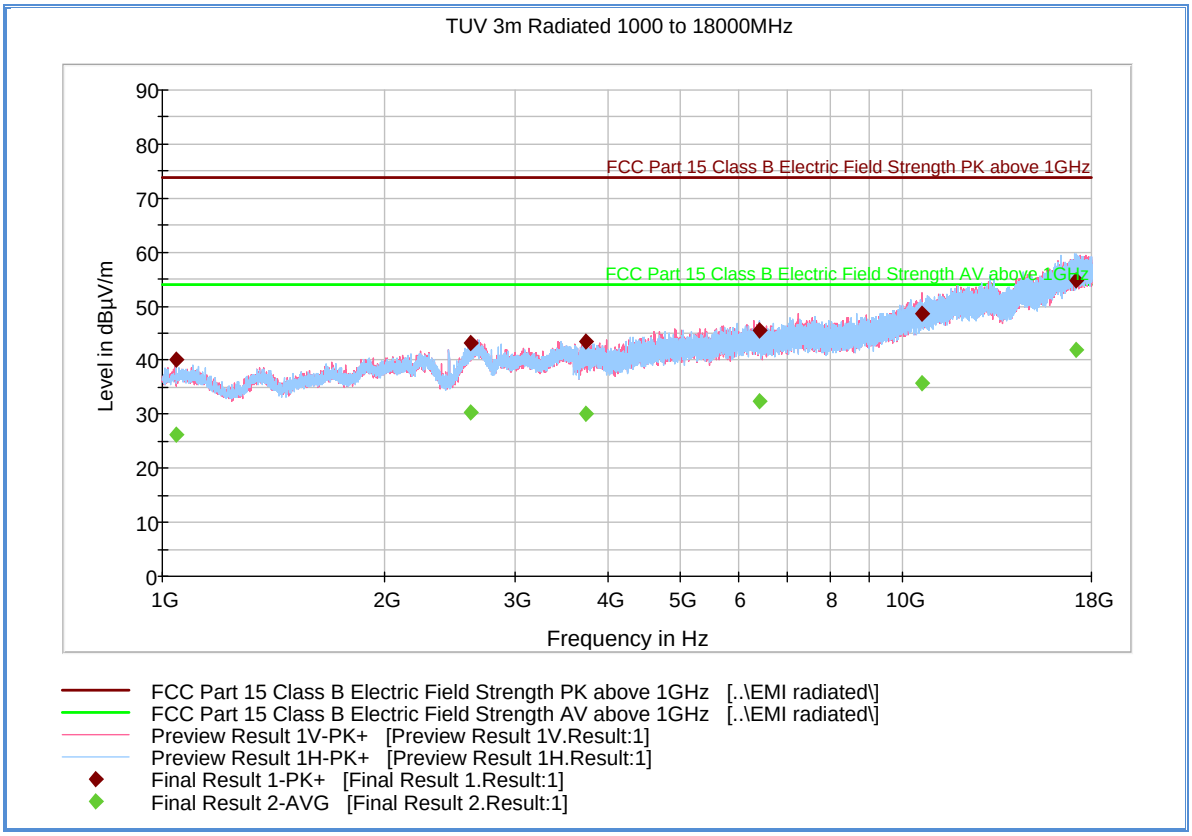
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1105.460000	39.0	1000.0	1000.000	100.6	H	51.0	-5.7	34.9	73.9
2616.640000	43.9	1000.0	1000.000	100.6	H	286.0	0.4	30.0	73.9
3677.160000	42.6	1000.0	1000.000	100.6	H	155.0	2.6	31.3	73.9
6335.833333	45.3	1000.0	1000.000	100.6	H	9.0	8.4	28.6	73.9
11069.573333	48.6	1000.0	1000.000	100.6	V	123.0	14.6	25.3	73.9
17590.073333	55.2	1000.0	1000.000	100.6	V	29.0	22.1	18.7	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1105.460000	26.0	1000.0	1000.000	100.6	H	51.0	-5.7	27.9	53.9
2616.640000	30.7	1000.0	1000.000	100.6	H	286.0	0.4	23.2	53.9
3677.160000	29.6	1000.0	1000.000	100.6	H	155.0	2.6	24.3	53.9
6335.833333	32.9	1000.0	1000.000	100.6	H	9.0	8.4	21.0	53.9
11069.573333	35.8	1000.0	1000.000	100.6	V	123.0	14.6	18.1	53.9
17590.073333	42.4	1000.0	1000.000	100.6	V	29.0	22.1	11.5	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.7.24 Test Results Above 1GHz (Bluetooth LE Mid Channel)



Peak Data

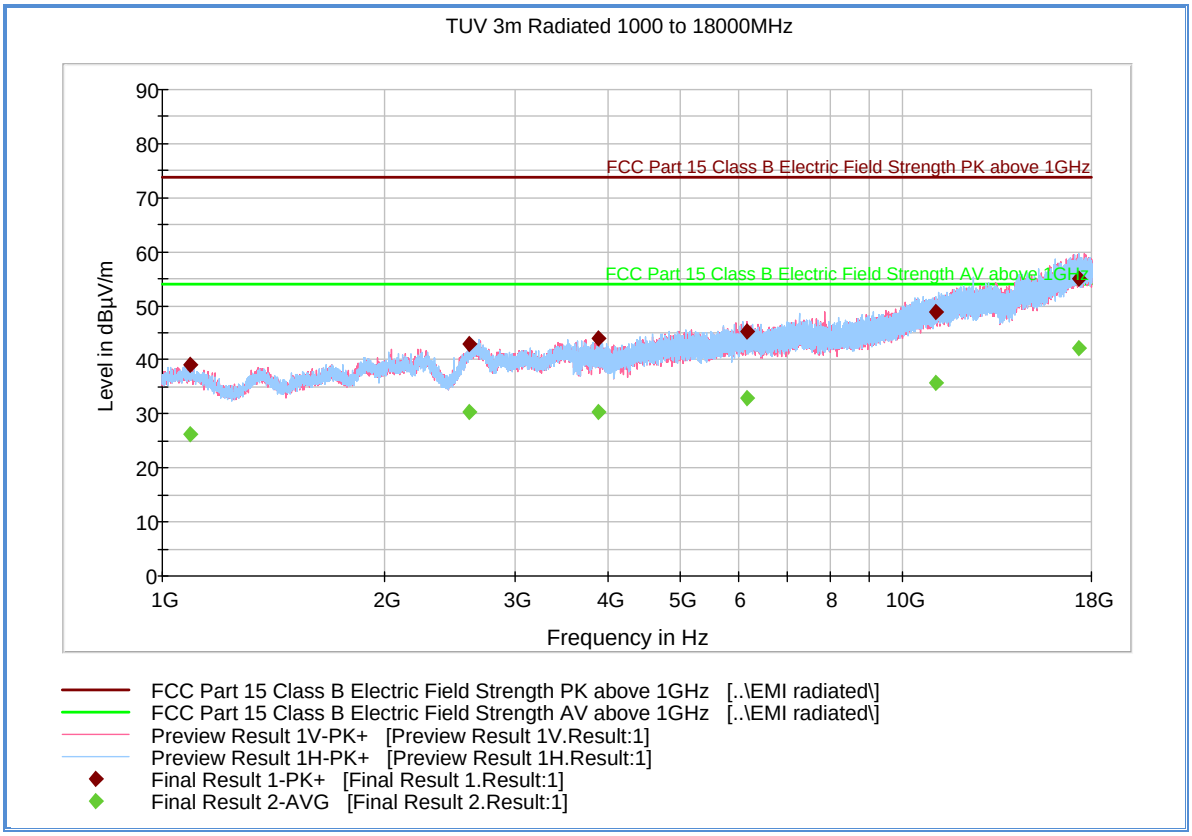
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1044.500000	40.1	1000.0	1000.000	100.6	H	230.0	-6.0	33.8	73.9
2609.633333	43.3	1000.0	1000.000	100.6	V	249.0	0.4	30.6	73.9
3729.580000	43.3	1000.0	1000.000	100.6	V	264.0	3.0	30.6	73.9
6395.940000	45.6	1000.0	1000.000	100.6	H	220.0	8.2	28.3	73.9
10636.586667	48.6	1000.0	1000.000	100.6	V	32.0	13.7	25.3	73.9
17187.053333	54.7	1000.0	1000.000	100.6	H	15.0	21.7	19.2	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1044.500000	26.3	1000.0	1000.000	100.6	H	230.0	-6.0	27.6	53.9
2609.633333	30.3	1000.0	1000.000	100.6	V	249.0	0.4	23.6	53.9
3729.580000	30.2	1000.0	1000.000	100.6	V	264.0	3.0	23.7	53.9
6395.940000	32.3	1000.0	1000.000	100.6	H	220.0	8.2	21.6	53.9
10636.586667	35.8	1000.0	1000.000	100.6	V	32.0	13.7	18.1	53.9
17187.053333	42.0	1000.0	1000.000	100.6	H	15.0	21.7	11.9	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz.

2.7.25 Test Results Above 1GHz (Bluetooth LE High Channel)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1092.546667	39.0	1000.0	1000.000	100.6	V	66.0	-5.7	34.9	73.9
2599.633333	43.0	1000.0	1000.000	100.6	H	290.0	0.3	30.9	73.9
3889.140000	44.0	1000.0	1000.000	100.6	H	245.0	3.2	29.9	73.9
6166.680000	45.4	1000.0	1000.000	100.6	V	89.0	8.3	28.5	73.9
11077.906667	48.8	1000.0	1000.000	100.6	H	309.0	14.6	25.1	73.9
17289.540000	54.9	1000.0	1000.000	100.6	H	358.0	21.8	19.0	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1092.546667	26.3	1000.0	1000.000	100.6	V	66.0	-5.7	27.6	53.9
2599.633333	30.2	1000.0	1000.000	100.6	H	290.0	0.3	23.7	53.9
3889.140000	30.4	1000.0	1000.000	100.6	H	245.0	3.2	23.5	53.9
6166.680000	32.9	1000.0	1000.000	100.6	V	89.0	8.3	21.0	53.9
11077.906667	35.7	1000.0	1000.000	100.6	H	309.0	14.6	18.2	53.9
17289.540000	42.3	1000.0	1000.000	100.6	H	358.0	21.8	11.6	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.8 RADIATED BAND EDGE MEASUREMENTS AND IMMEDIATE RESTRICTED BANDS

2.8.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.8.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

2.8.3 Equipment Under Test and Modification State

Serial No: 20130418001833 / Test Configuration B

2.8.4 Date of Test/Initial of test personnel who performed the test

April 29 to May 1, 2013/FSC

2.8.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.6 Environmental Conditions

Ambient Temperature	25.1-25.8°C
Relative Humidity	43.0-44.5%
ATM Pressure	98.7-99.0 kPa

2.8.7 Additional Observations

- This is a radiated test. The spectrum was searched from 2310MHz to 2390MHz for lower immediate restricted band and 2483.5MHz to 2500MHz for the upper immediate restricted band.
- Radiated band edge using 100 kHz RBW was also performed @ 2400 MHz band edge.
- There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.

- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.8.8 for sample computation.

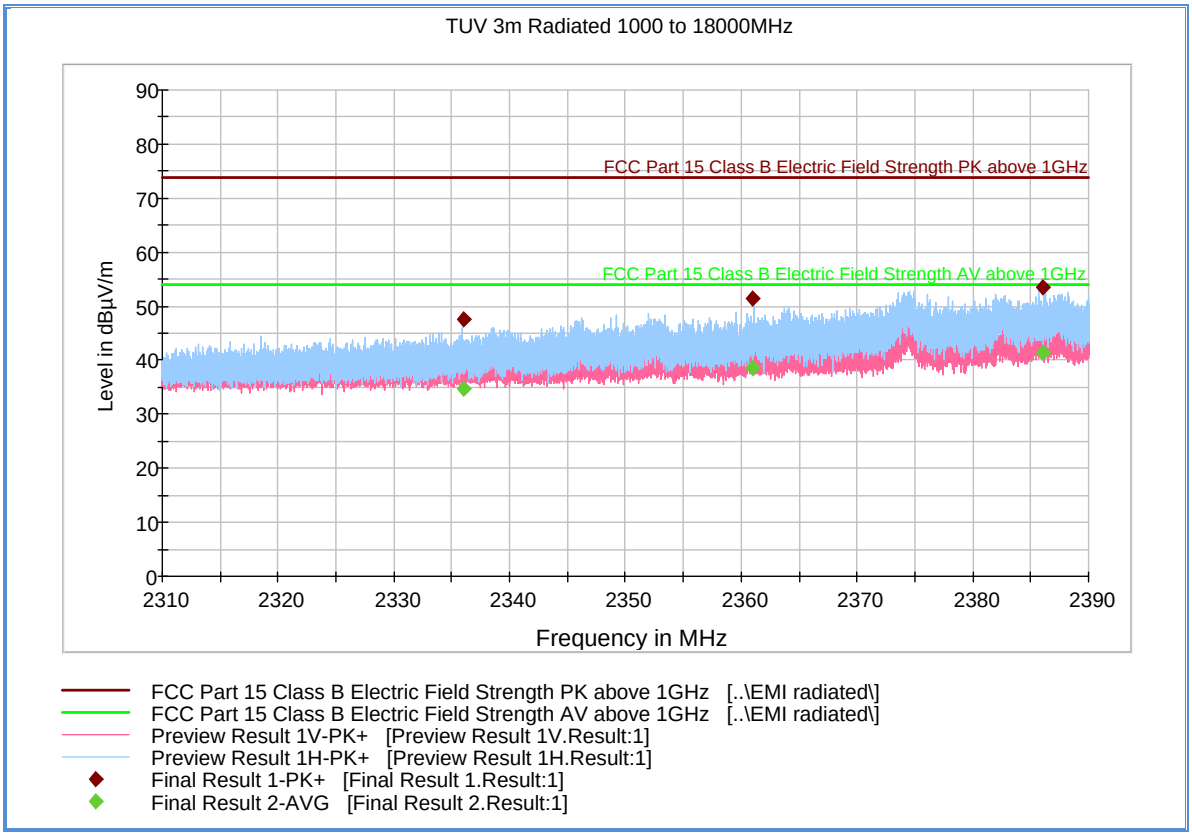
2.8.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dbµV) @ 2400 MHz			53.9
Correction Factor (dB)	Asset# 1153 (cable)	3.4	-0.4
	Asset# 8628(preamplifier)	-36.5	
	Asset#7575 (antenna)	32.7	
Reported Max Peak Final Measurement (dbµV/m) @ 2400 MHz			**53.5**

2.8.9 Test Results

See attached plots.

2.8.10 Test Results 2310MHz to 2390MHz (802.11b Low Channel)



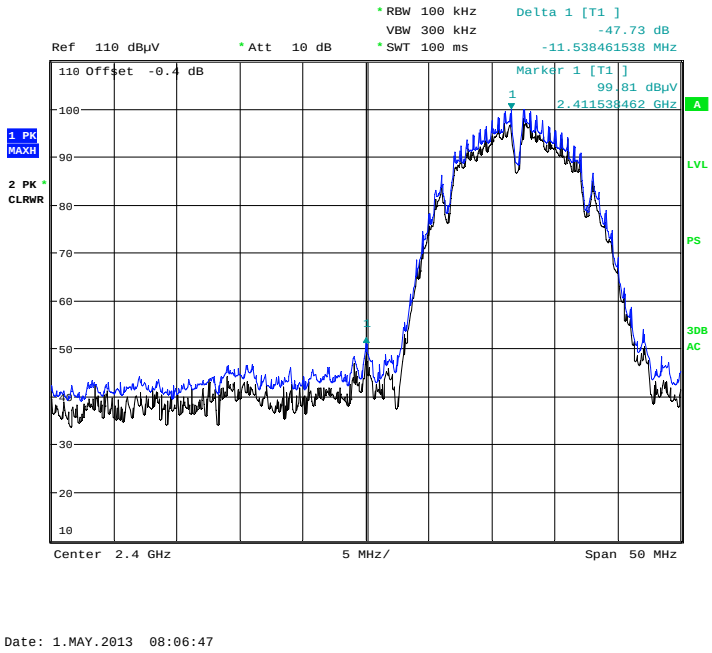
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2336.036000	47.7	1000.0	1000.000	101.8	H	352.0	-0.7	26.2	73.9
2360.977333	51.3	1000.0	1000.000	99.8	H	352.0	-0.6	22.6	73.9
2385.990667	53.5	1000.0	1000.000	100.8	H	352.0	-0.5	20.4	73.9

Average Data

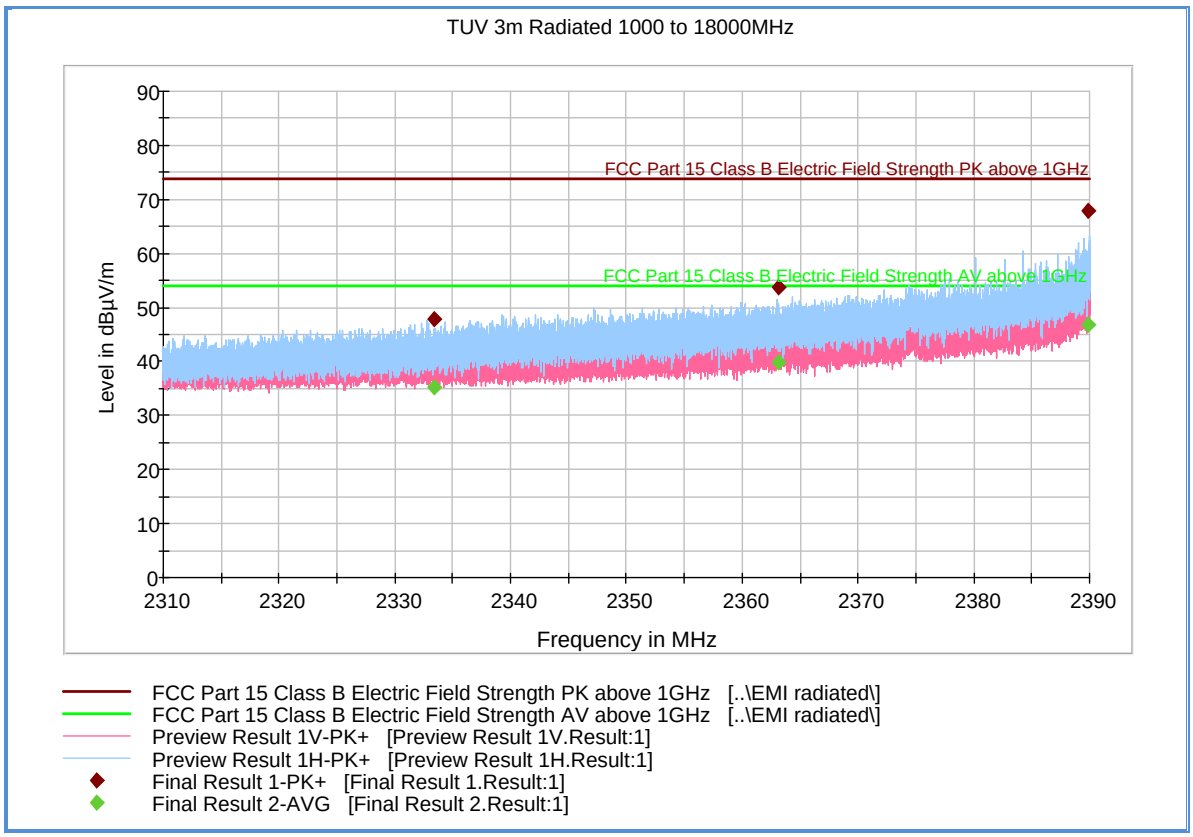
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2336.036000	34.7	1000.0	1000.000	101.8	H	352.0	-0.7	19.2	53.9
2360.977333	38.7	1000.0	1000.000	99.8	H	352.0	-0.6	15.2	53.9
2385.990667	41.4	1000.0	1000.000	100.8	H	352.0	-0.5	12.5	53.9

2.8.11 Test Results Lower Band Edge for 802.11b (Radiated - Low Channel using 100 kHz RBW)



Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of -0.4dB is from the cable, antenna and preamp used. Limit for this test is -20dBc. The highest measured emission close to the lower band edge is -47.73. EUT complies.

2.8.12 Test Results 2310MHz to 2390MHz (802.11g Low Channel)



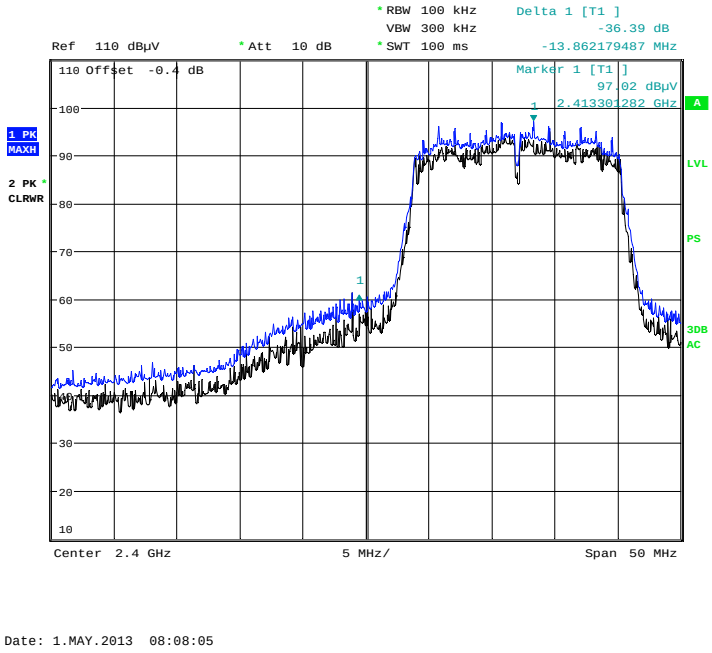
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2333.369333	47.9	1000.0	1000.000	101.8	H	352.0	-0.7	26.0	73.9
2363.182667	53.7	1000.0	1000.000	99.8	H	352.0	-0.6	20.2	73.9
2389.865333	67.8	1000.0	1000.000	183.6	H	22.0	-0.5	6.1	73.9

Average Data

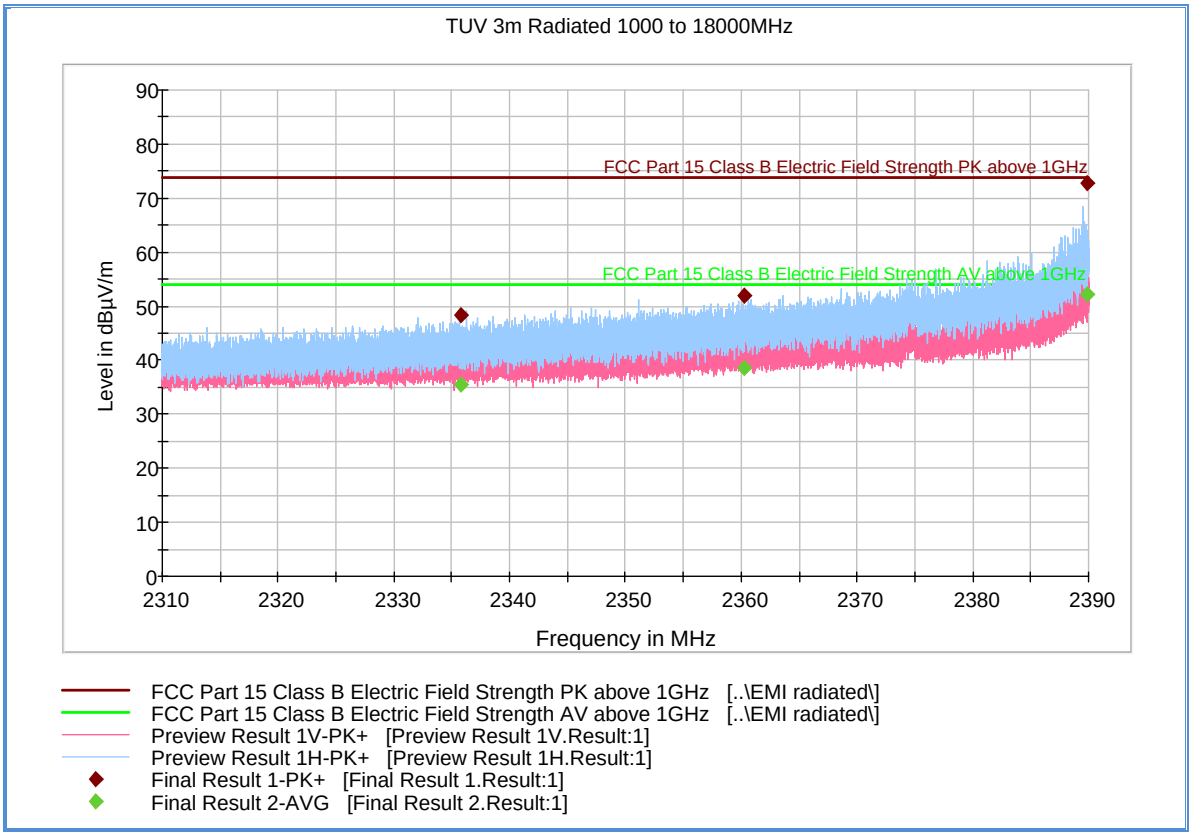
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2333.369333	35.1	1000.0	1000.000	101.8	H	352.0	-0.7	18.8	53.9
2363.182667	39.8	1000.0	1000.000	99.8	H	352.0	-0.6	14.1	53.9
2389.865333	46.7	1000.0	1000.000	183.6	H	22.0	-0.5	7.2	53.9

2.8.13 Test Results Lower Band Edge for 802.11g (Radiated - Low Channel using 100 kHz RBW)



Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of -0.4dB is from the cable, antenna and preamp used. Limit for this test is -20dBc. The highest measured emission close to the lower band edge is -36.39. EUT complies.

2.8.14 Test Results 2310MHz to 2390MHz (802.11n Low Channel)



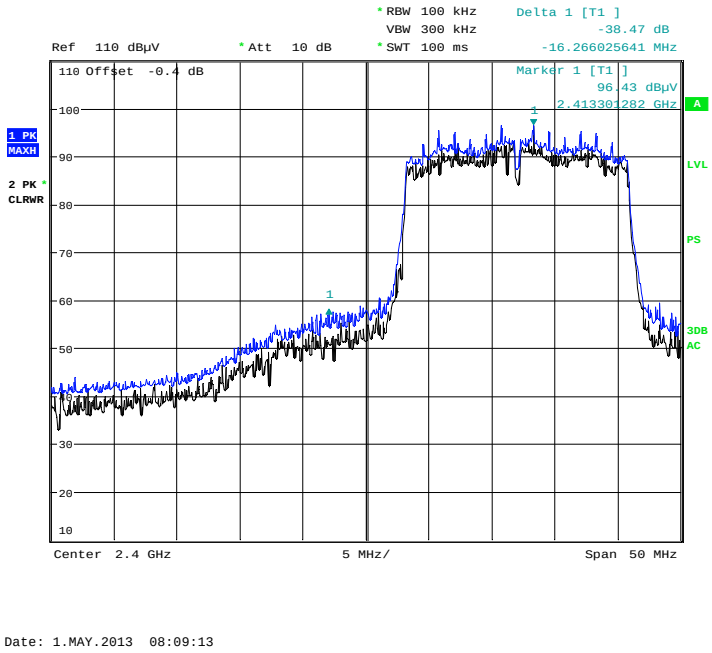
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2335.732000	48.4	1000.0	1000.000	100.8	H	352.0	-0.7	25.5	73.9
2360.297333	51.8	1000.0	1000.000	101.8	H	356.0	-0.6	22.1	73.9
2389.841333	72.7	1000.0	1000.000	99.8	H	352.0	-0.5	1.2	73.9

Average Data

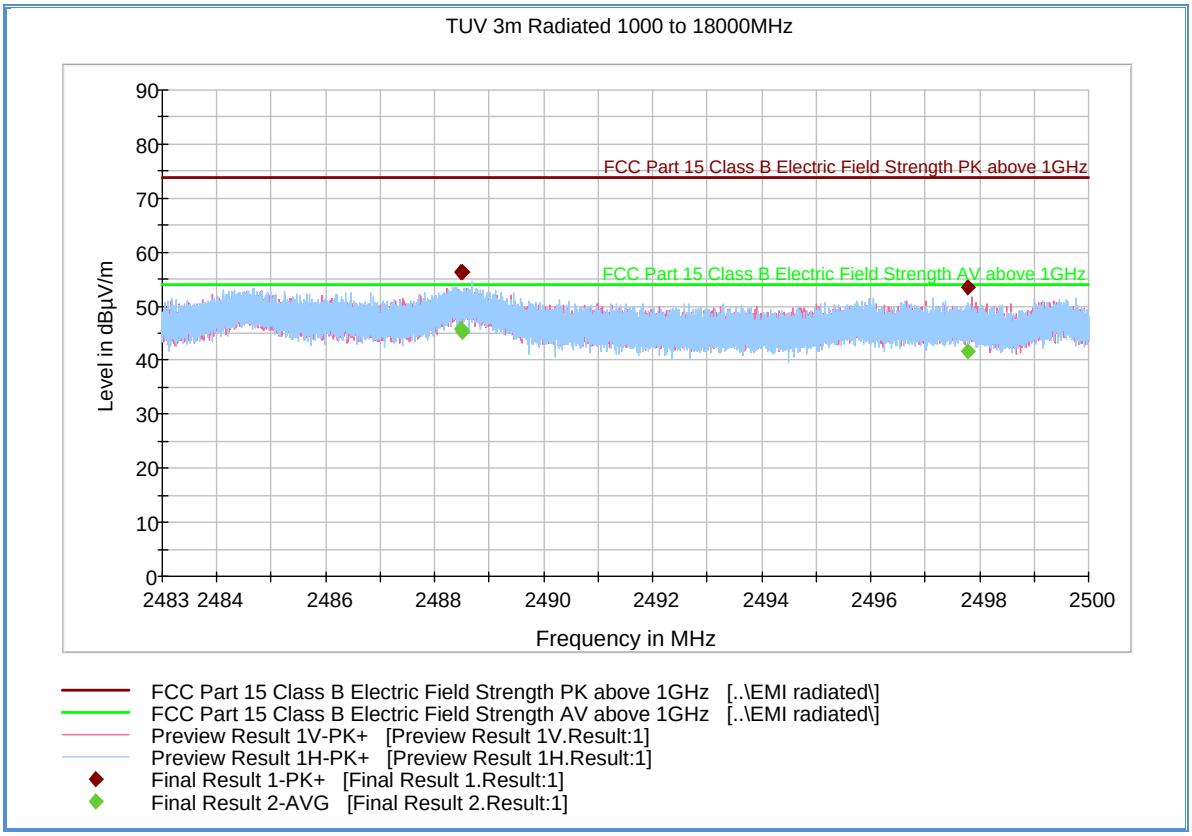
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2335.732000	35.6	1000.0	1000.000	100.8	H	352.0	-0.7	18.3	53.9
2360.297333	38.5	1000.0	1000.000	101.8	H	356.0	-0.6	15.4	53.9
2389.841333	52.1	1000.0	1000.000	99.8	H	352.0	-0.5	1.8	53.9

2.8.15 Test Results Lower Band Edge for 802.11n (Radiated - Low Channel using 100 kHz RBW)



Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of -0.4dB is from the cable, antenna and preamp used. Limit for this test is -20dBc. The highest measured emission close to the lower band edge is -38.47. EUT complies.

2.8.16 Test Results 2483.5MHz to 2500MHz (802.11b High Channel)



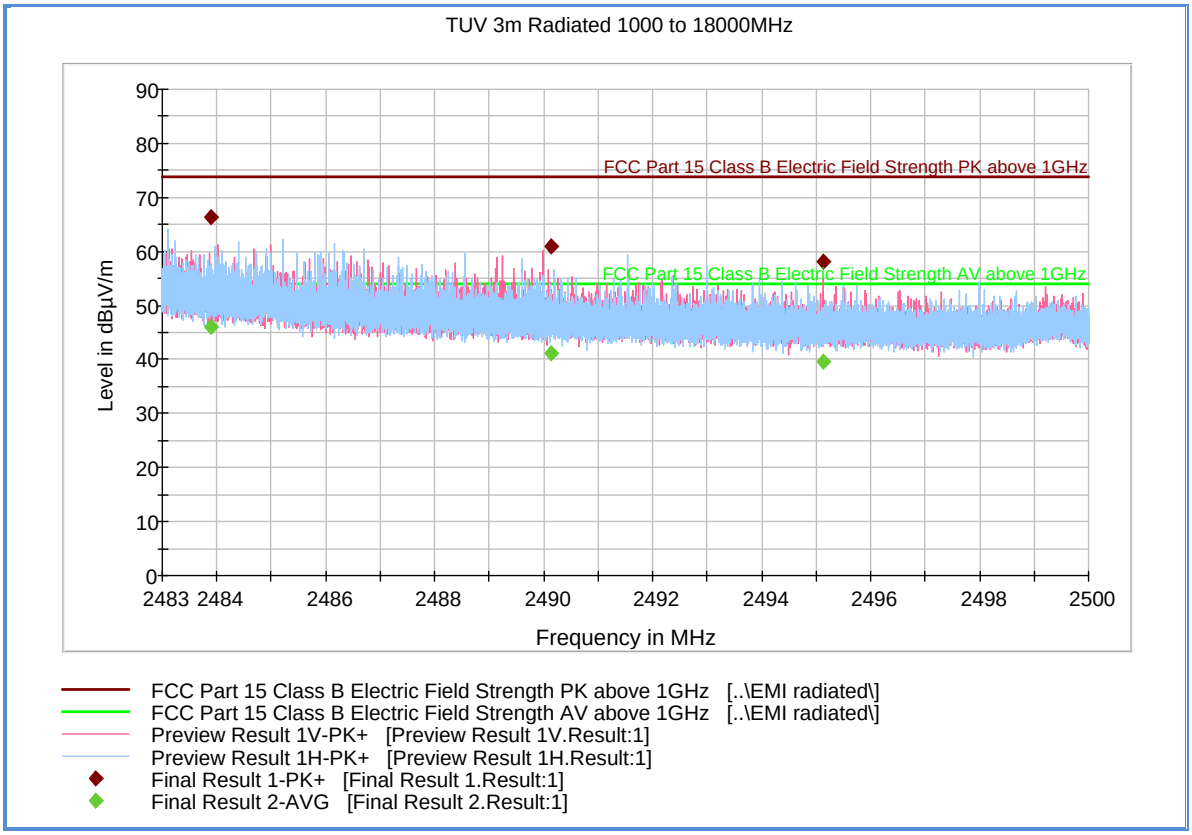
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2488.482767	56.4	1000.0	1000.000	100.8	H	39.0	-0.2	17.5	73.9
2488.506500	56.2	1000.0	1000.000	101.8	H	40.0	-0.2	17.7	73.9
2497.795167	53.5	1000.0	1000.000	99.8	V	107.0	-0.1	20.4	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2488.482767	45.9	1000.0	1000.000	100.8	H	39.0	-0.2	8.0	53.9
2488.506500	45.3	1000.0	1000.000	101.8	H	40.0	-0.2	8.6	53.9
2497.795167	41.7	1000.0	1000.000	99.8	V	107.0	-0.1	12.2	53.9

2.8.17 Test Results 2483.5MHz to 2500MHz (802.11g High Channel)



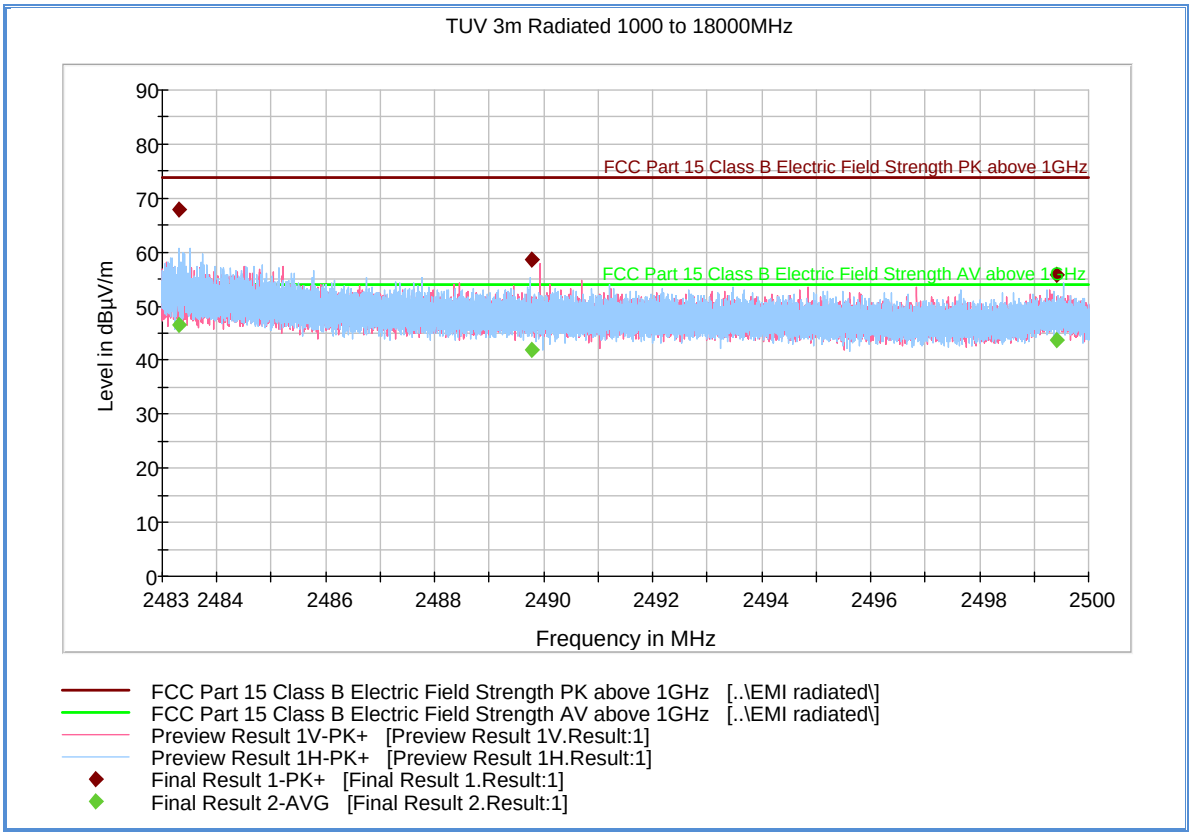
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2483.900000	66.3	1000.0	1000.000	121.8	H	44.0	-0.2	7.6	73.9
2490.128700	61.0	1000.0	1000.000	135.7	V	110.0	-0.2	12.9	73.9
2495.139867	58.2	1000.0	1000.000	99.8	V	111.0	-0.1	15.7	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2483.900000	46.0	1000.0	1000.000	121.8	H	44.0	-0.2	7.9	53.9
2490.128700	41.1	1000.0	1000.000	135.7	V	110.0	-0.2	12.8	53.9
2495.139867	39.7	1000.0	1000.000	99.8	V	111.0	-0.1	14.2	53.9

2.8.18 Test Results 2483.5MHz to 2500MHz (802.11n High Channel)



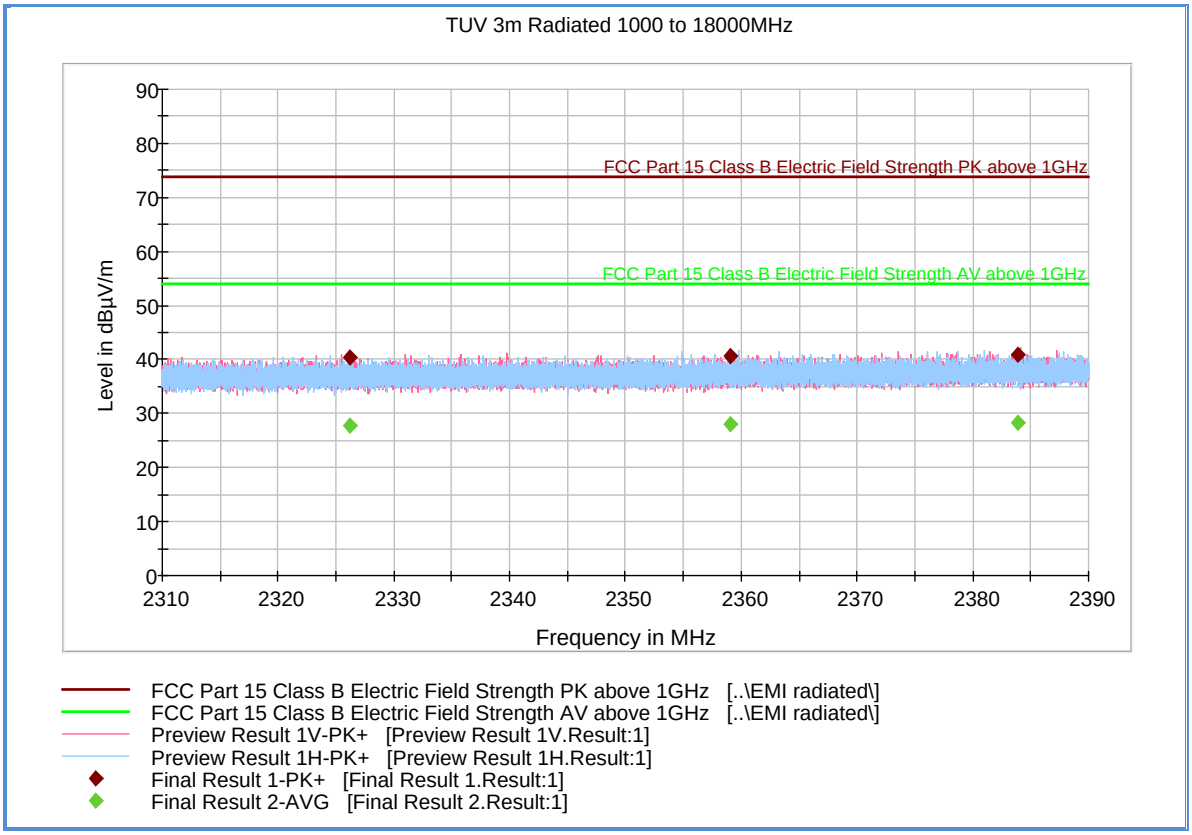
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2483.300000	67.8	1000.0	1000.000	121.8	H	41.0	-0.2	6.1	73.9
2489.790900	58.6	1000.0	1000.000	135.7	V	110.0	-0.2	15.3	73.9
2499.410633	55.7	1000.0	1000.000	120.8	H	29.0	-0.1	18.2	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2483.300000	46.4	1000.0	1000.000	121.8	H	41.0	-0.2	7.5	53.9
2489.790900	41.9	1000.0	1000.000	135.7	V	110.0	-0.2	12.0	53.9
2499.410633	43.7	1000.0	1000.000	120.8	H	29.0	-0.1	10.2	53.9

2.8.19 Test Results 2310MHz to 2390MHz (Bluetooth LE Low Channel)



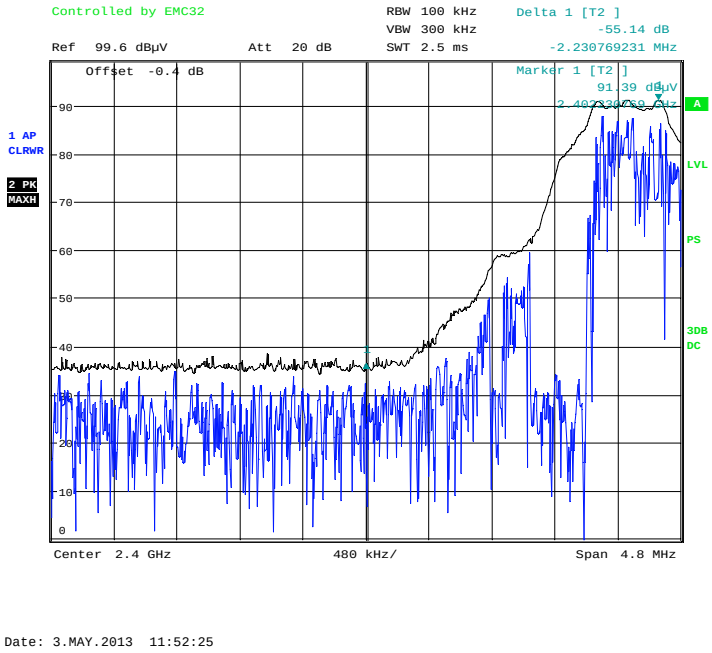
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2326.244000	40.4	1000.0	1000.000	100.6	V	133.0	-0.8	33.5	73.9
2359.030667	40.6	1000.0	1000.000	100.6	H	89.0	-0.6	33.3	73.9
2383.854667	40.8	1000.0	1000.000	100.6	V	243.0	-0.5	33.1	73.9

Average Data

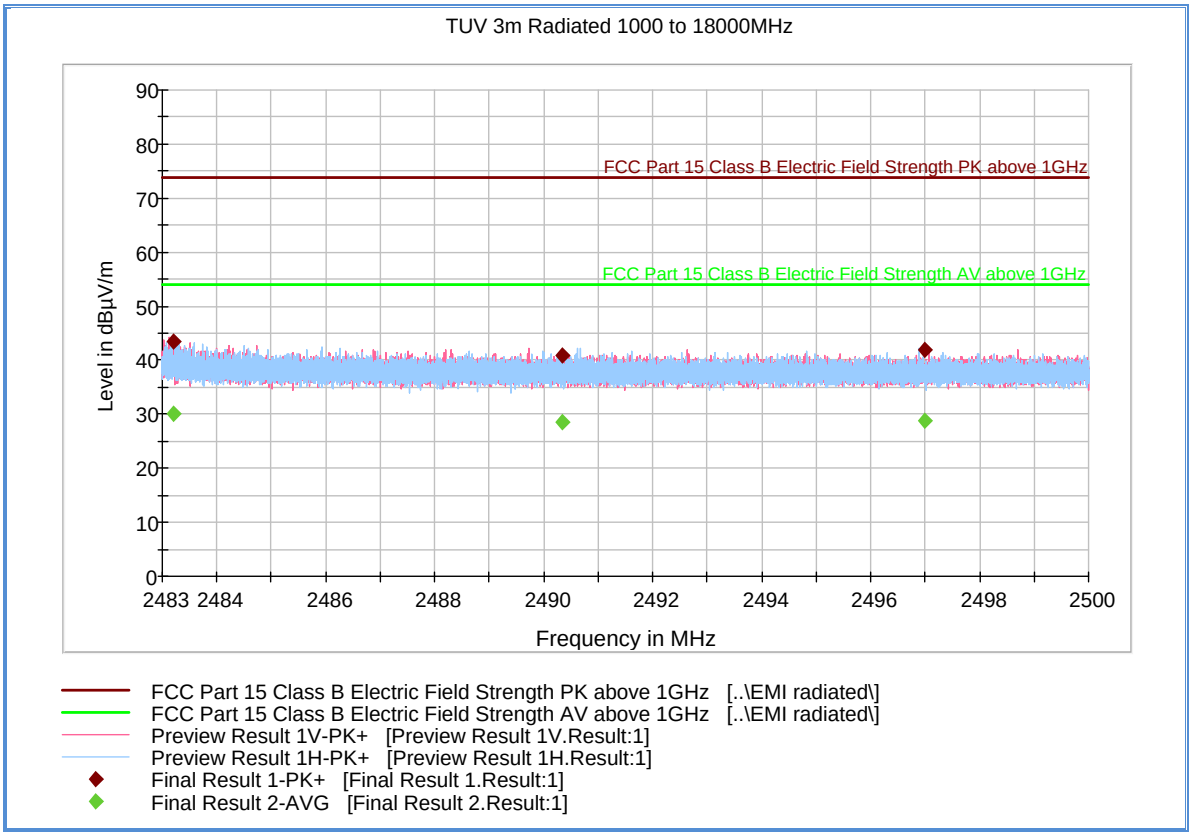
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2326.244000	27.8	1000.0	1000.000	100.6	V	133.0	-0.8	26.1	53.9
2359.030667	28.1	1000.0	1000.000	100.6	H	89.0	-0.6	25.8	53.9
2383.854667	28.3	1000.0	1000.000	100.6	V	243.0	-0.5	25.6	53.9

2.8.20 Test Results Lower Band Edge for Bluetooth LE (Radiated - Low Channel using 100 kHz RBW)



Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of -0.4dB is from the cable, antenna and preamp used. Limit for this test is -20dBc. The highest measured emission close to the lower band edge is -55.14. EUT complies.

2.8.21 Test Results 2483.5MHz to 2500MHz (Bluetooth LE High Channel)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2483.200000	43.4	1000.0	1000.000	99.8	V	123.0	-0.2	30.5	73.9
2490.338400	40.9	1000.0	1000.000	286.3	V	331.0	-0.2	33.0	73.9
2496.982200	42.0	1000.0	1000.000	101.8	H	35.0	-0.1	31.9	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2483.200000	30.0	1000.0	1000.000	99.8	V	123.0	-0.2	23.9	53.9
2490.338400	28.5	1000.0	1000.000	286.3	V	331.0	-0.2	25.4	53.9
2496.982200	28.8	1000.0	1000.000	101.8	H	35.0	-0.1	25.1	53.9

2.9 POWER SPECTRAL DENSITY

2.9.1 Specification Reference

Part 15 Subpart C §15.247(e)

2.9.2 Standard Applicable

(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

2.9.3 Equipment Under Test and Modification State

Serial No: 20130418001829 / Test Configuration A

2.9.4 Date of Test/Initial of test personnel who performed the test

May 02, 2013/FSC

2.9.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.6 Environmental Conditions

Ambient Temperature	25.3°C
Relative Humidity	40.4.%
ATM Pressure	99.5 kPa

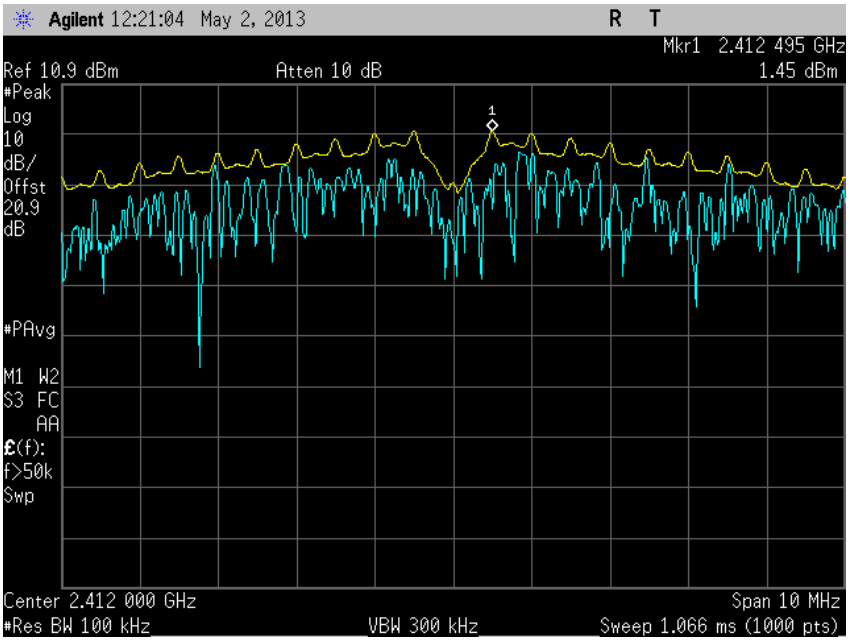
2.9.7 Additional Observations

- This is a conducted test.
- Test procedure is per Section 10.2 of KDB 558074 (April 09, 2013).
- An offset of 20.9dB was added to compensate for the external attenuator and cable used.
- Detector is Peak.
- Trace mode is Max Hold.
- Sweep time is Auto Couple.
- Bandwidth Correction Factor BWCF is from 10log (3 kHz/100kHz).
- EUT complies with 100 kHz RBW, calculated PSD level @ 3 kHz is for information only.

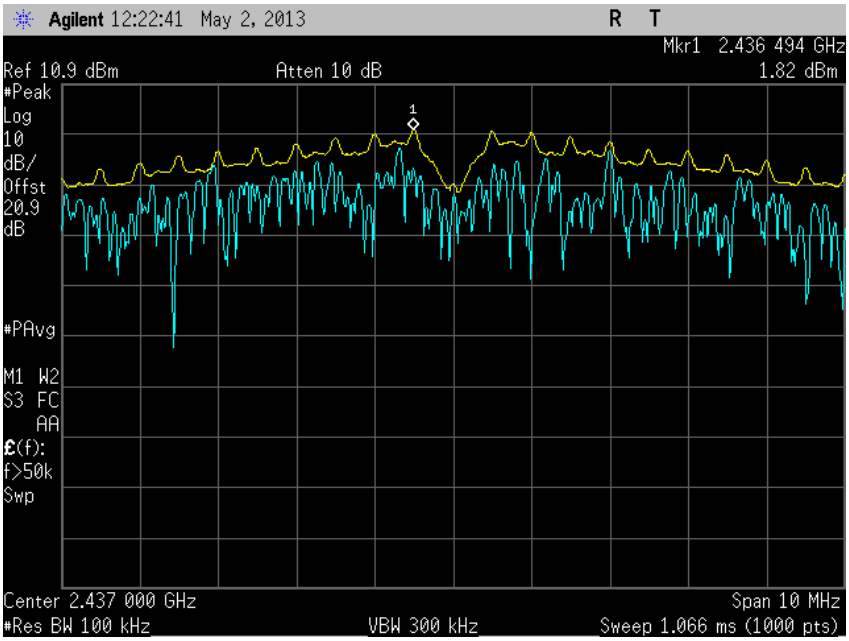
2.9.8 Test Results Summary

Mode	Channel	Marker Reading (dBm)	Bandwidth Correction Factor (BWCF)	PSD Level (dBm)	Limit (dBm)	Compliance
802.11b	1 (2412 MHz)	1.45	15.228	-13.778	8	Complies
	6 (2437 MHz)	1.82	15.228	-13.408	8	Complies
	11 (2462 MHz)	1.29	15.228	-13.938	8	Complies
802.11g	1 (2412 MHz)	-1.67	15.228	-16.898	8	Complies
	6 (2437 MHz)	-1.34	15.228	-16.568	8	Complies
	11 (2462 MHz)	-1.72	15.228	-16.948	8	Complies
802.11n	1 (2412 MHz)	-1.96	15.228	-17.188	8	Complies
	6 (2437 MHz)	-0.88	15.228	-16.108	8	Complies
	11 (2462 MHz)	-0.81	15.228	-16.038	8	Complies
Bluetooth LE	37 (2402 MHz)	2.54	15.228	-12.688	8	Complies
	17 (2440 MHz)	3.30	15.228	-11.928	8	Complies
	39 (2480 MHz)	3.53	15.228	-11.698	8	Complies

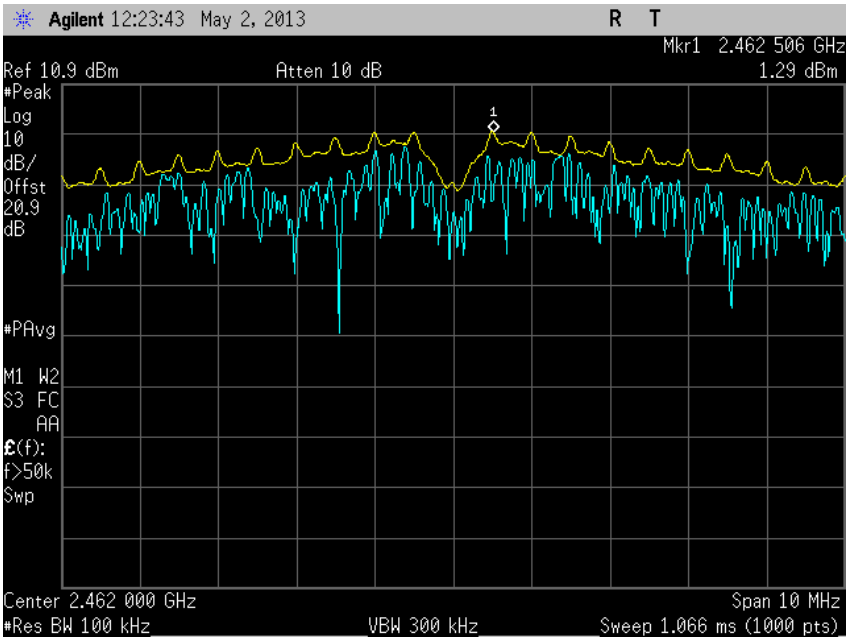
2.9.9 Test Results Plots



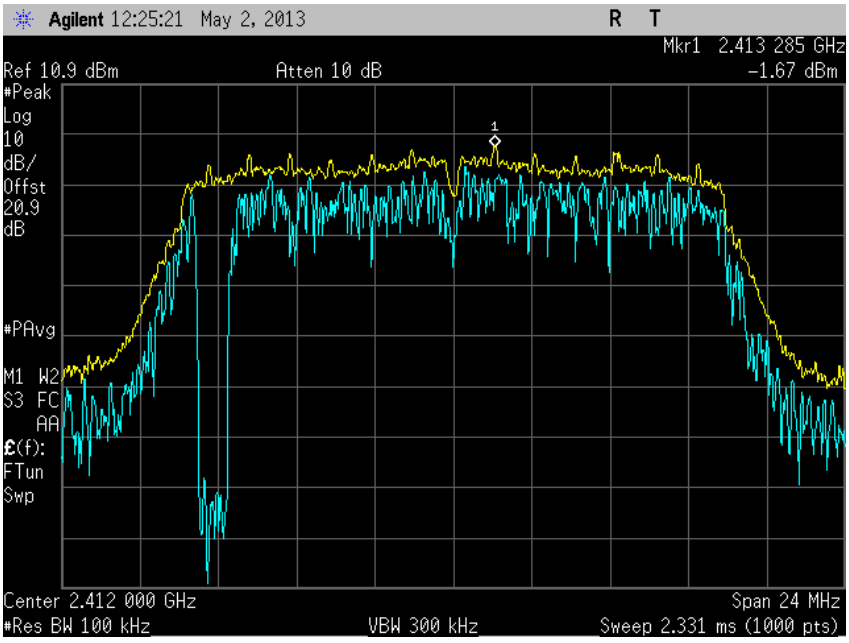
802.11 b Low Channel



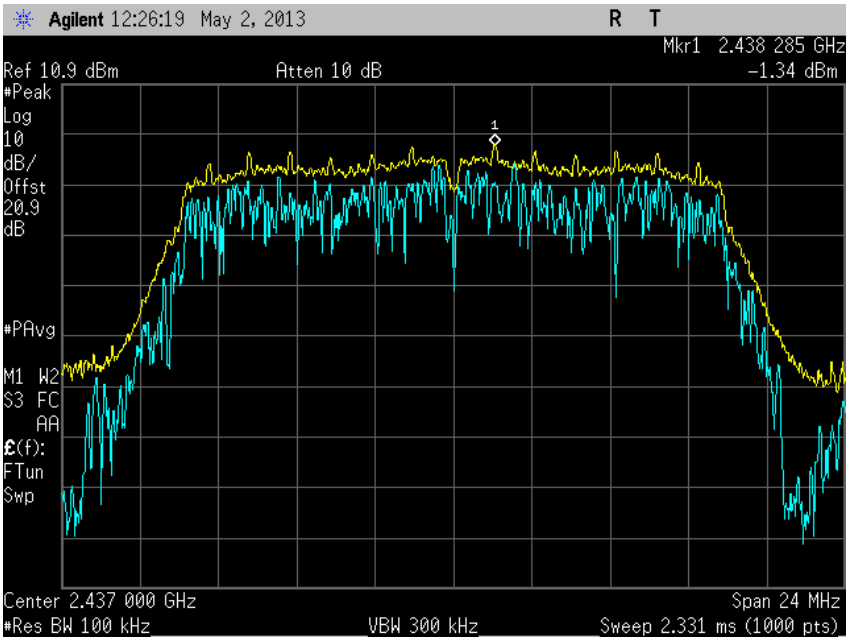
802.11 b Mid Channel



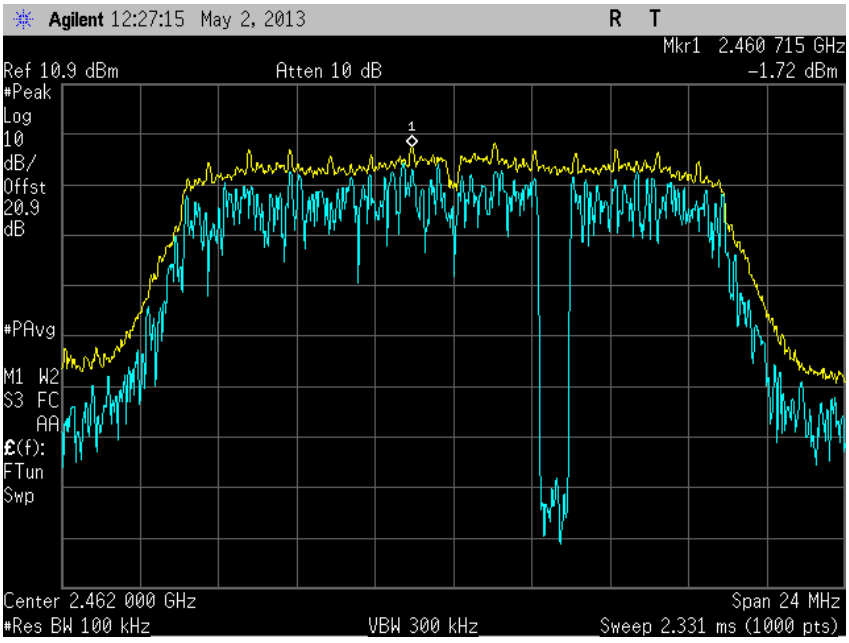
802.11 b High Channel



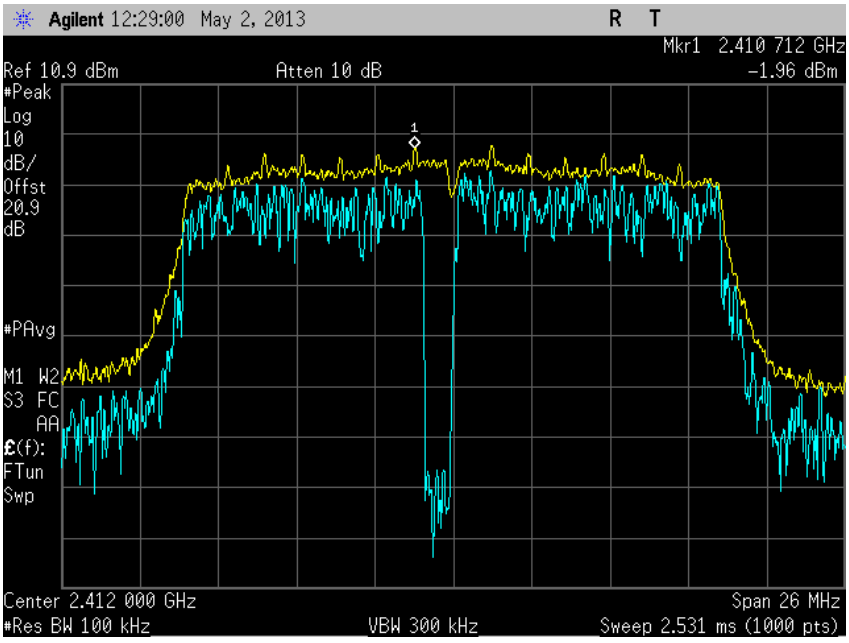
802.11 g Low Channel



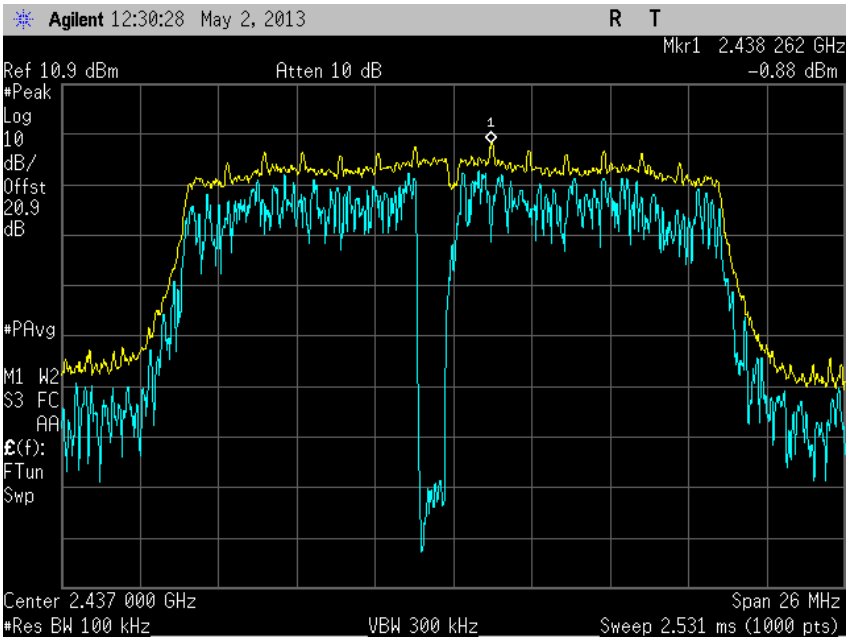
802.11 g Mid Channel



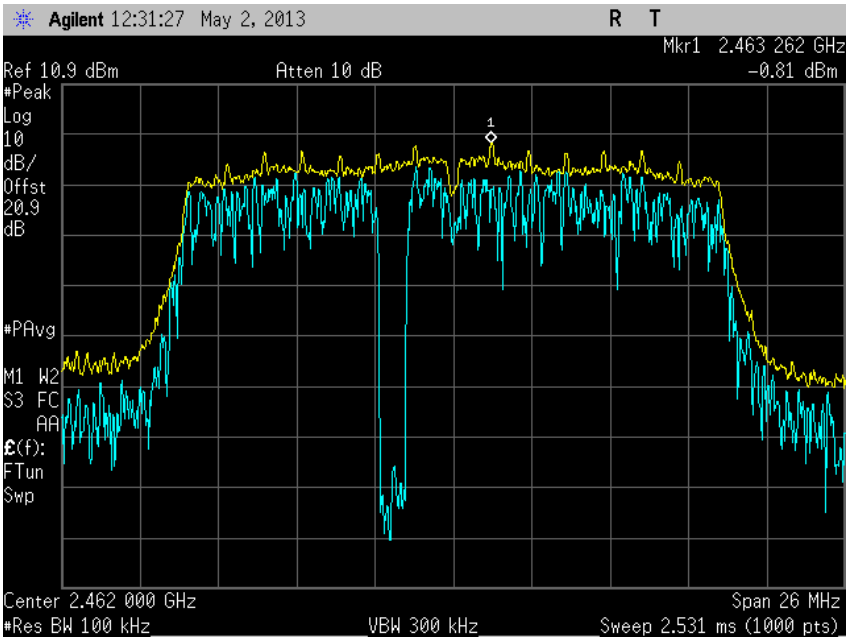
802.11 g High Channel



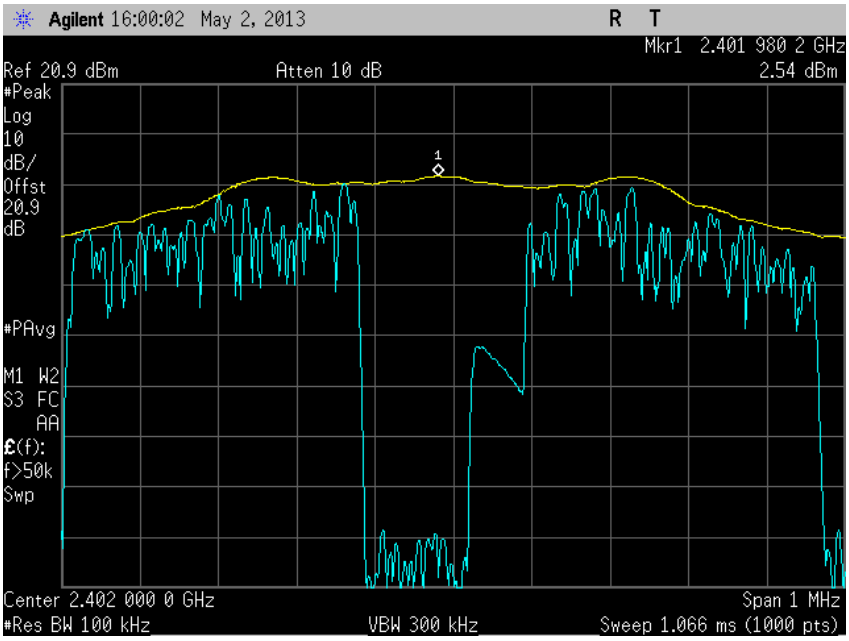
802.11 n Low Channel



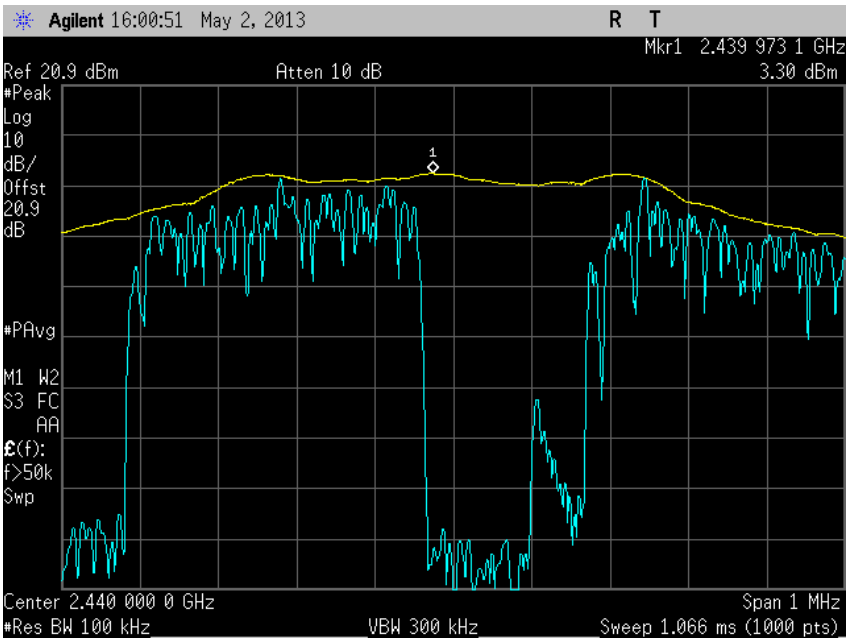
802.11 n Mid Channel



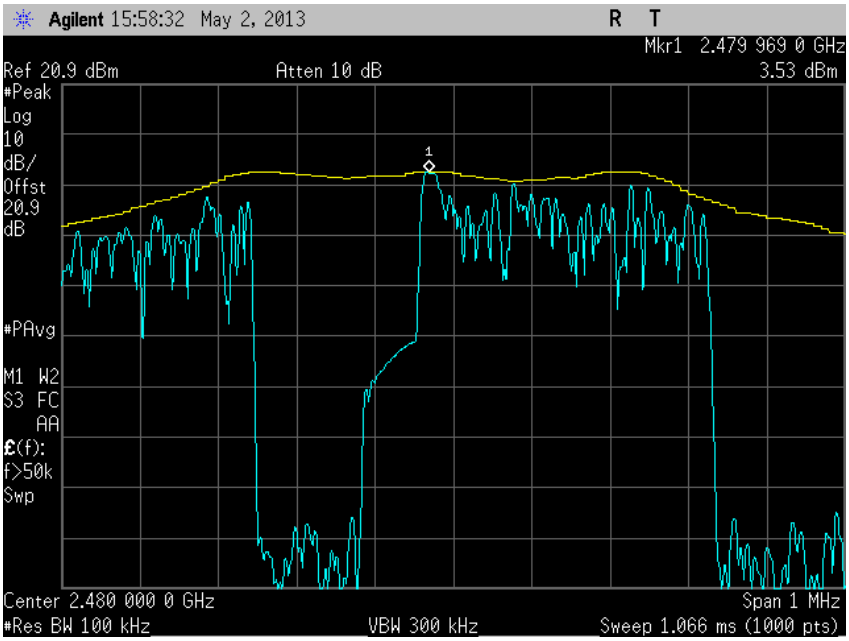
802.11 n High Channel



Bluetooth LE Low Channel



Bluetooth LE Mid Channel



Bluetooth LE High Channel

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Conducted Port Setup						
7569	Series Power Meter	N1911A P-	MY45100625	Agilent	04/15/13	04/15/14
5217 (loaner from Techmaster)	50MHz-18GHz Wideband Power Sensor	N1921A	MY45240180	Agilent	10/18/12	02/18/14
6814	PSA Series Spectrum Analyzer	E4440A	MY42510441	Agilent	11/07/12	11/07/13
	20dB Attenuator	34-20-34	BP4180	MCE/Weinschel	Verified by 6814 and 1003	
8686	20dB Attenuator	0846	BW-N20W5+	MCL	Verified by 6814 and 1003	
Radiated Test Setup						
1033	Bilog Antenna	3142C	00044556	EMCO	05/23/12	05/23/13
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	03/25/13	03/25/14
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	09/21/12	09/21/13
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	09/21/12	09/21/13
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	08/10/12	08/10/13
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	06/13/12	06/13/13
1016	Pre-amplifier	PAM-0202	187	PAM	09/24/12	09/24/13
Miscellaneous						
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	11/12/12	11/12/13
6452	Multimeter	3478A	2911A52177	Hewlett Packard	07/16/12	07/16/13
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	11/19/12	11/19/13
7539	DC Power Supply	6434B	1140A01866	Hewlett Packard	Verified by 6452	

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Radiated Emission Measurements (Below 1GHz)

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	2.41
				Coverage Factor (k):	2
				Expanded Uncertainty:	4.82

3.2.2 Radiated Emission Measurements (Above 1GHz)

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	2.40
				Coverage Factor (k):	2
				Expanded Uncertainty:	4.81

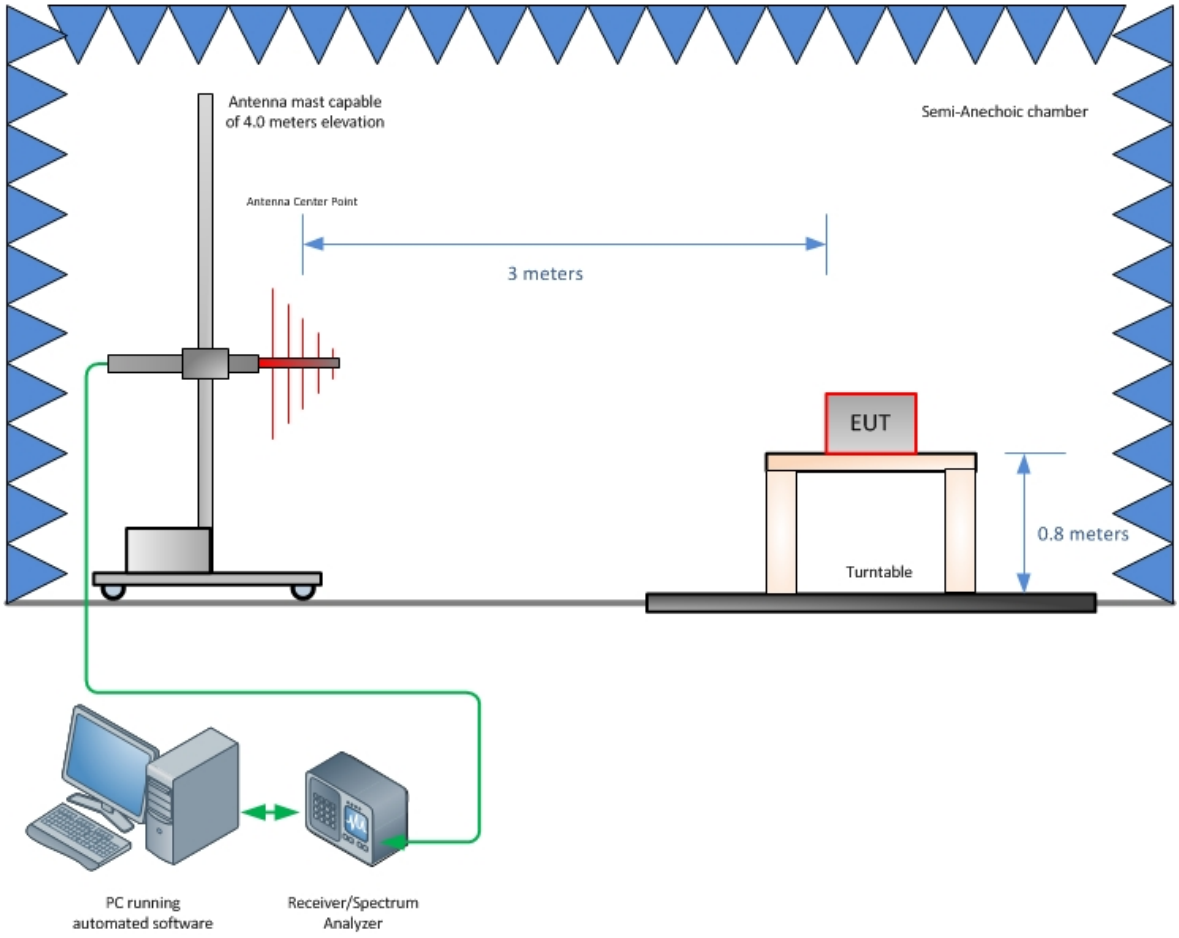
3.2.3 Conducted Antenna Port Measurement

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.50	0.29	0.08
3	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	0.72
				Coverage Factor (k):	2
				Expanded Uncertainty:	1.45

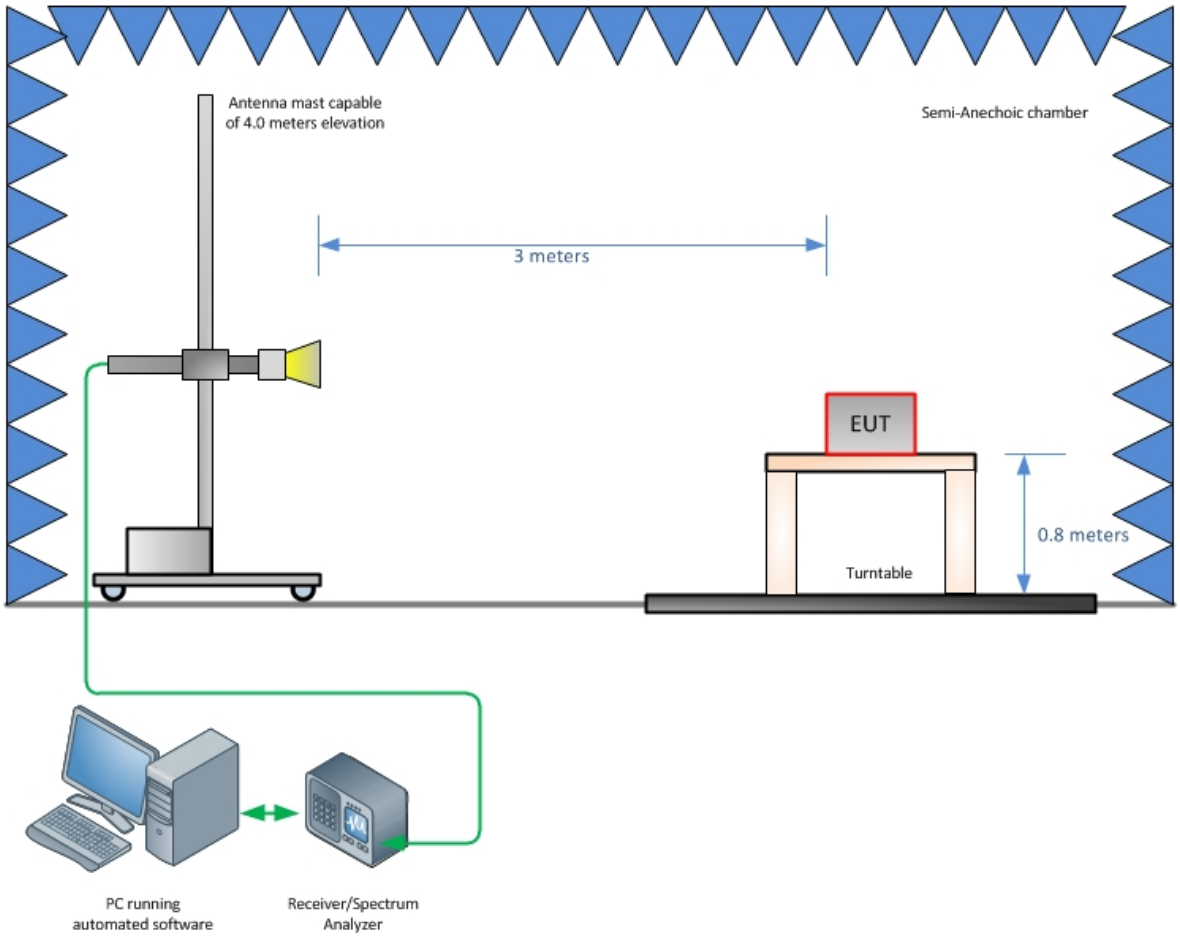
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364