America

Choose certainty.
Add value.

Report On

Application for Grant of Equipment Authorization of the
Novatel Wireless Inc.
MiFi 5510L Personal Wireless Router

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

Report No. SC1209591B **October 2012**

REPORT ON	Radio Testing of the Novatel Wireless Inc. Personal Wireless Router
TEST REPORT NUMBER	SC1209591B
PREPARED FOR	Novatel Wireless Inc. 9645 Scranton Road, Suite 205 San Diego, CA 92121-3030 USA
CONTACT PERSON	Todd Gallagher Regulatory Engineering Manager (403) 295-4891 tgallagher@nvt.com
PREPARED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: EMC/Wireless Test Engineer
APPROVED BY	Chip R. Fleury **Name** Authorized Signatory
DATED	October 26, 2012

Revision History

SC1209591B Novatel Wireless Inc. MiFi 5510L Personal Wireless Router					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
10/15/12	Initial Release				Ferdinand Custodio

CONTENTS

SECTION 1

REPORT SUMMARY

Radio Testing of the
Novatel Wireless Inc.
Personal Wireless Router

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Novatel Wireless Inc. MiFi 5510L Personal Wireless Router 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	Novatel Wireless Inc.
Model Number(s)	MiFi 5510L
FCC ID Number	PKRNVWMIFI5510
IC Number	N/A
Serial Number(s)	UB310812700012
Number of Samples Tested	1
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.247 (October 1, 2011). • 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).
Start of Test	October 05, 2012
Finish of Test	October 14, 2012
Name of Engineer(s)	Ferdinand Custodio Juan M. Gonzalez
Related Document(s)	• RF Exposure Lab Certificate Of Compliance SAR Evaluation Test Report Number: SAR.20121001 • 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	Compliant	
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 Restricted 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 a Novatel Wireless Inc. MiFi 5510L Personal Wireless Router. The EUT creates a personal Wi-Fi cloud, capable of sharing high-speed 4G LTE and 3G Mobile Broadband Internet connectivity with up to 10 Wi-Fi-enabled devices simultaneously. The EUT comes with an AC adapter Novatel Wireless model: SSW-2001PI-U.

1.3.2 EUT General Description

EUT Description	MiFi 5510L Personal Wireless Router
Rated Voltage	3.7 VDC Nominal voltage.
Mode Verified	802.11 b/g/n WLAN
Capability	800/1900 CDMA2000 1xRTT and 1xEV-DO Release 0 Revision A, Band 4 and 13 LTE, 802.11 b/g/n WLAN
Primary Unit (EUT)	☐ Production
	☒ Pre-Production
	☐ Engineering
Antenna Type	Integral Wi-Fi = Planar Inverted F Antenna (Ceramic Chip)
Antenna Gain	1.87 dBi

1.3.3 Maximum Conducted Peak Output Power

Mode	Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
802.11b	2412-2462	17.50	56.23
802.11g	2412-2462	15.00	31.62
802.11n HT20	2412-2462	14.80	30.19

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	EUT transmitting max power through integral antenna. 802.11b 1Mbps data rate.
B	EUT transmitting max power through integral antenna. 802.11g 6Mbps data rate.
C	EUT transmitting max power through integral antenna. 802.11n 6.5Mbps data rate.
D	EUT transmitting max power through antenna port. 802.11b 1Mbps data rate.
E	EUT transmitting max power through antenna port. 802.11g 6Mbps data rate.
F	EUT transmitting max power through antenna port. 802.11n 6.5Mbps data rate.

Note: Antenna port is for service function only and is not accessible to the end user.

1.4.2 EUT Exercise Software

Before each test, the EUT is configured using Qualcomm Radio Control Toolkit Version 2.4.78.0. The software allows configuration of channels, mode + data rate and power level. Power level is set according to manufacturer specification for each mode ("58" Forced gain for 802.11b and 15.0dBm for 802.11g/n).

1.4.3 Support Equipment and I/O cables

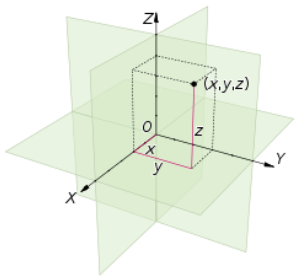
Manufacturer	Equipment/Cable	Description
Dell	Support Laptop	Novatel Wireless Test Configuration Support Laptop
LUXSHARE-ICT	USB cable	Shielded Type A to Micro USB (0.912 meter) USB Revision 2.

1.4.4 Worst Case Configuration

Worst-case configuration used in this test report verified during conducted power measurements and correlated with the SAR Test Report #: SAR.20121001 (RF Exposure Labs)

Mode	Channel	Data Rate
802.11b	11 (High Channel)	1Mbps
802.11g	6 (Mid Channel)	6Mbps
802.11n	6 (Mid Channel)	6.5Mbps

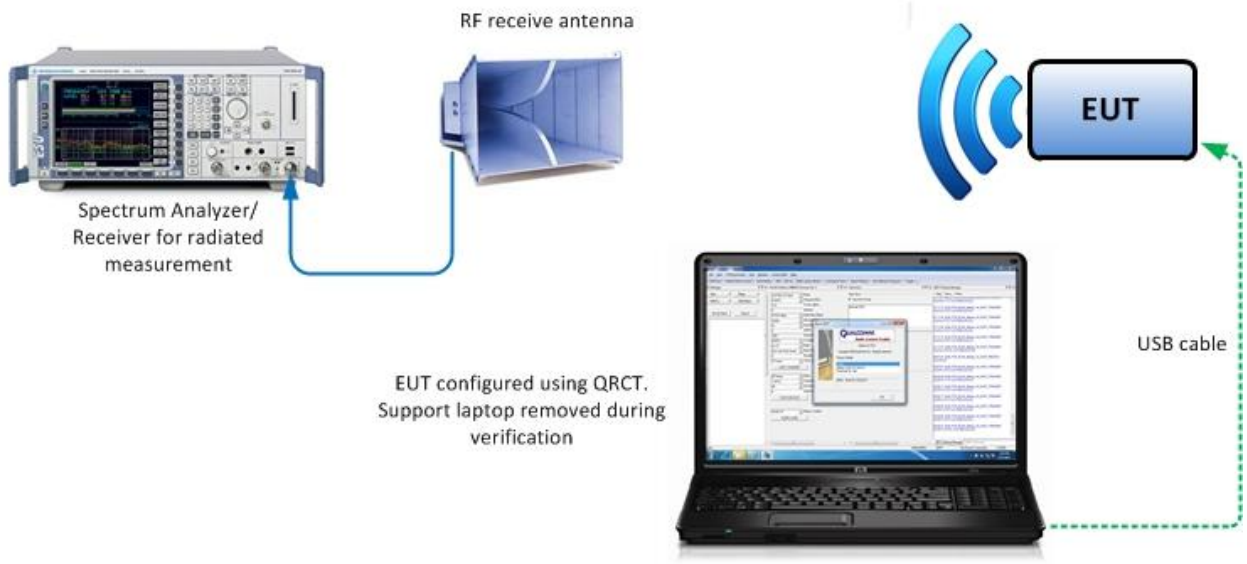
EUT is a portable device. For radiated measurements X, Y and Z orientations were verified. Worst case position is "X".



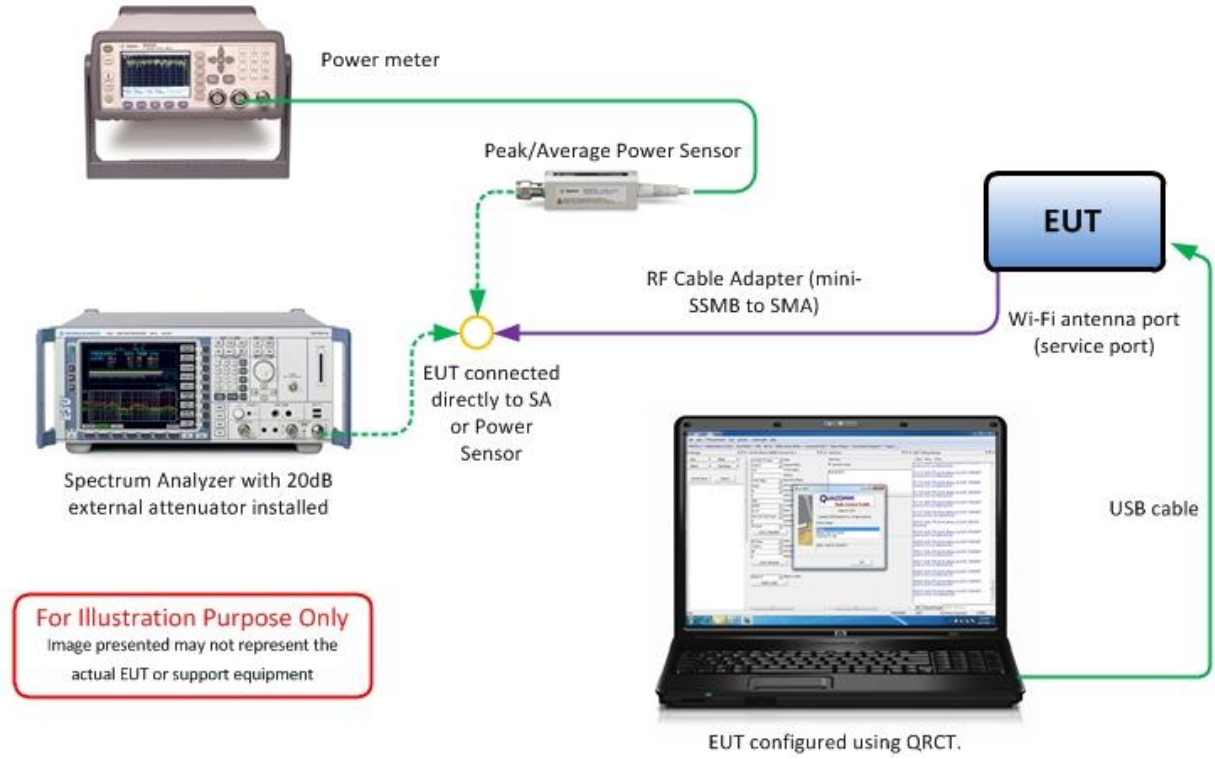
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364

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 UB310812700012		
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
Novatel Wireless Inc.
Personal Wireless Router

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

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: UB310812700012 / Test Configuration D,E and F

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

October 05, 2012/JMG

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	23.5°C
Relative Humidity	54.0%
ATM Pressure	99.8 kPa

2.1.7 Additional Observations

- This is a conducted test using direct connection to a power meter.
- An offset of 0.6dB was added to compensate for the external 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

Mode	Channel	Measured Average Power (dBm)	Measured Peak Power (dBm)
802.11b	1 (2412 MHz)	17.5	19.4
	6 (2437 MHz)	17.5	19.5
	11 (2462 MHz)	**17.5**	**19.6**
802.11g	1 (2412 MHz)	11.0	19.8
	6 (2437 MHz)	**15.0**	**21.5**
	11 (2462 MHz)	10.7	19.7
802.11n HT20	1 (2412 MHz)	10.8	19.8
	6 (2437 MHz)	**14.8**	**21.6**
	11 (2462 MHz)	10.9	19.9

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

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

Serial No: UB310812700012 / Test Configuration A,B and C

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

October 13, 2012/FSC

2.2.5 Test Equipment Used

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

2.2.6 Environmental Conditions

Ambient Temperature	23.5°C
Relative Humidity	54.0%
ATM Pressure	99.8 kPa

2.2.7 Additional Observations

- The EUT is a battery powered device however with provision to connect to public AC mains via supplied AC adapter/charger.
- The EUT was verified using worst case configuration (worst case channel/mode). The EUT was set to transmit max. power while plugged into the AC adapter.
- EUT verified using input voltage of 120VAC 60Hz.

- 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 2.2.8 for sample computation.

2.2.8 Sample Computation (Conducted Emission – Quasi Peak)

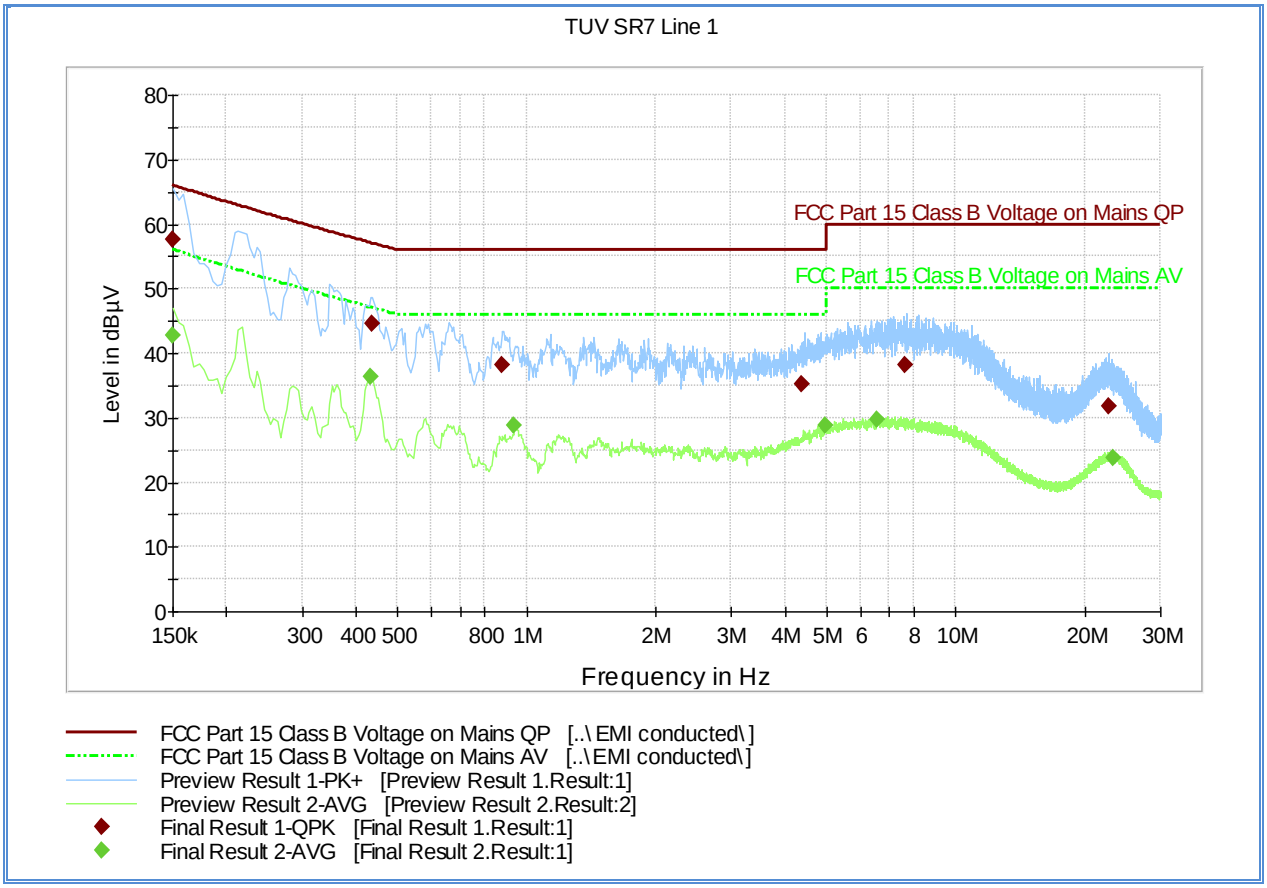
Measuring equipment raw measurement (dbµV) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7567 (LISN)	0.30	
Reported QuasiPeak Final Measurement (dbµV) @ 150kHz			**26.2**

2.2.9 Test Results

Compliant. See attached plots and tables.

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

2.2.10 Line 1 (Hot) 802.11b



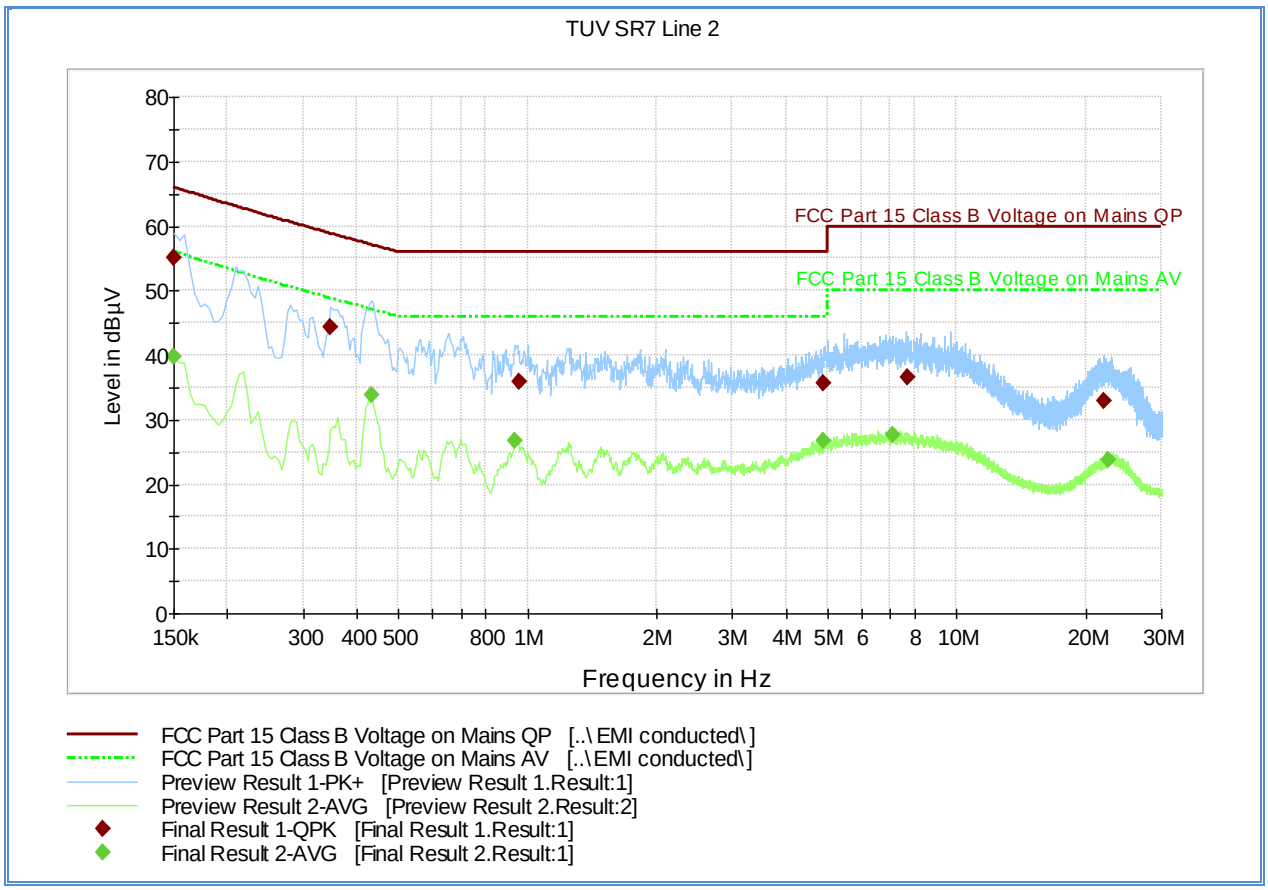
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	57.6	1000.0	9.000	Off	L1	19.6	8.4	66.0
0.438000	44.6	1000.0	9.000	Off	L1	19.4	12.4	57.0
0.879000	38.1	1000.0	9.000	Off	L1	19.6	17.9	56.0
4.366500	35.3	1000.0	9.000	Off	L1	20.4	20.7	56.0
7.620000	38.2	1000.0	9.000	Off	L1	20.5	21.8	60.0
22.659000	31.9	1000.0	9.000	Off	L1	20.9	28.1	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit – Ave (dBµV)
0.150000	42.6	1000.0	9.000	Off	L1	19.6	13.4	56.0
0.433500	36.4	1000.0	9.000	Off	L1	19.4	10.7	47.1
0.933000	28.9	1000.0	9.000	Off	L1	19.6	17.1	46.0
4.974000	28.9	1000.0	9.000	Off	L1	20.4	17.1	46.0
6.549000	29.7	1000.0	9.000	Off	L1	20.5	20.4	50.0
23.208000	23.7	1000.0	9.000	Off	L1	20.9	26.3	50.0

2.2.11 Line 2 (Neutral) 802.11b



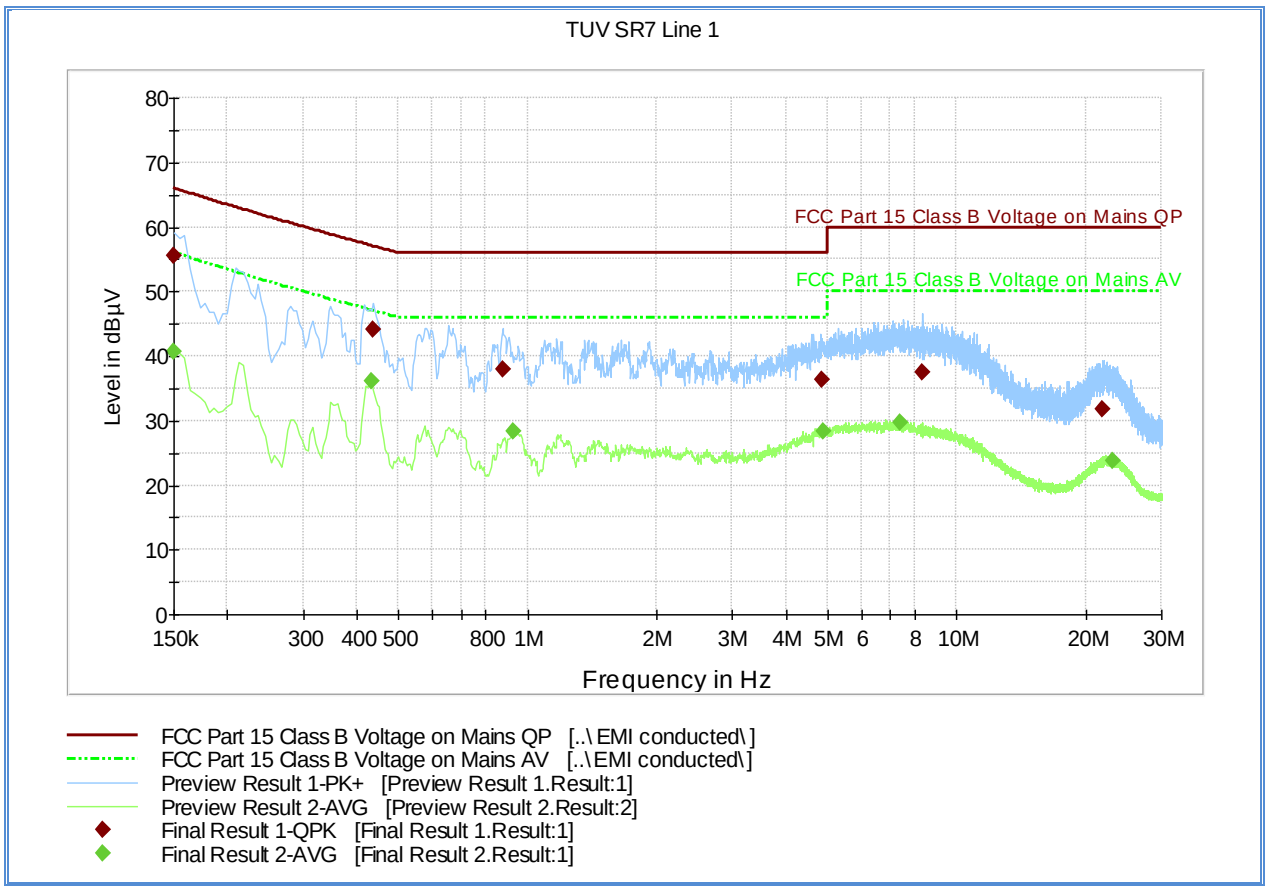
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	55.1	1000.0	9.000	Off	N	19.7	10.9	66.0
0.348000	44.3	1000.0	9.000	Off	N	19.5	14.6	58.8
0.955500	36.0	1000.0	9.000	Off	N	20.0	20.0	56.0
4.893000	35.6	1000.0	9.000	Off	N	21.2	20.4	56.0
7.705500	36.5	1000.0	9.000	Off	N	21.2	23.5	60.0
22.056000	33.0	1000.0	9.000	Off	N	21.6	27.0	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit – Ave (dBµV)
0.150000	39.8	1000.0	9.000	Off	N	19.7	16.2	56.0
0.433500	33.9	1000.0	9.000	Off	N	19.6	13.2	47.1
0.933000	26.8	1000.0	9.000	Off	N	20.0	19.2	46.0
4.893000	26.8	1000.0	9.000	Off	N	21.2	19.2	46.0
7.111500	27.7	1000.0	9.000	Off	N	21.2	22.3	50.0
22.501500	23.7	1000.0	9.000	Off	N	21.6	26.3	50.0

2.2.12 Line 1 (Hot) 802.11g



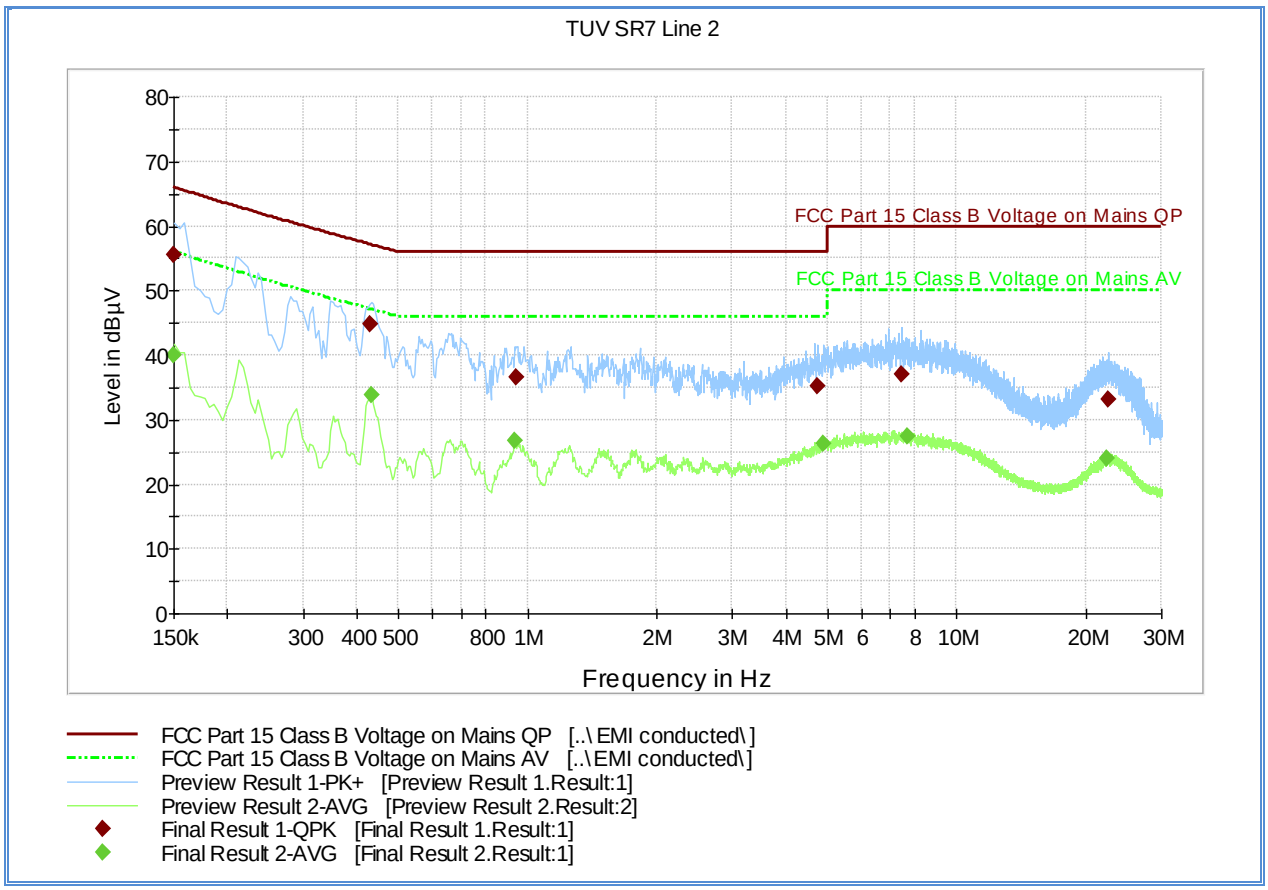
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	55.6	1000.0	9.000	Off	L1	19.6	10.4	66.0
0.438000	44.1	1000.0	9.000	Off	L1	19.4	12.9	57.0
0.874500	38.0	1000.0	9.000	Off	L1	19.6	18.0	56.0
4.834500	36.2	1000.0	9.000	Off	L1	20.4	19.8	56.0
8.340000	37.6	1000.0	9.000	Off	L1	20.5	22.4	60.0
21.804000	31.8	1000.0	9.000	Off	L1	20.8	28.2	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit – Ave (dBµV)
0.150000	40.7	1000.0	9.000	Off	L1	19.6	15.3	56.0
0.433500	36.0	1000.0	9.000	Off	L1	19.4	11.0	47.1
0.928500	28.4	1000.0	9.000	Off	L1	19.6	17.6	46.0
4.888500	28.4	1000.0	9.000	Off	L1	20.4	17.6	46.0
7.390500	29.7	1000.0	9.000	Off	L1	20.5	20.3	50.0
23.077500	23.7	1000.0	9.000	Off	L1	20.9	26.3	50.0

2.2.13 Line 2 (Neutral) 802.11g



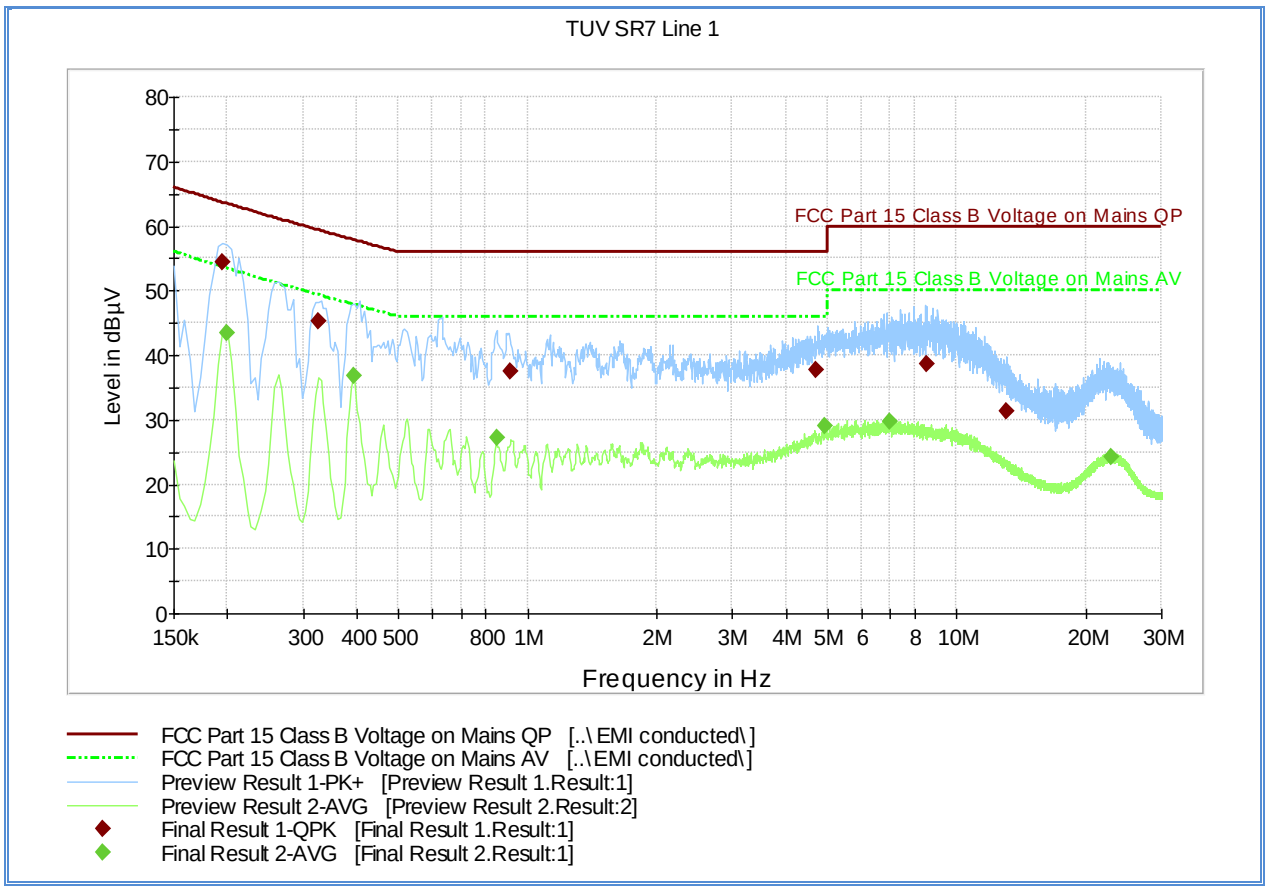
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	55.6	1000.0	9.000	Off	N	19.7	10.4	66.0
0.429000	44.7	1000.0	9.000	Off	N	19.6	12.5	57.2
0.942000	36.5	1000.0	9.000	Off	N	20.0	19.5	56.0
4.722000	35.2	1000.0	9.000	Off	N	21.1	20.8	56.0
7.422000	36.9	1000.0	9.000	Off	N	21.2	23.1	60.0
22.641000	33.2	1000.0	9.000	Off	N	21.6	26.8	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit – Ave (dBµV)
0.150000	40.0	1000.0	9.000	Off	N	19.7	16.0	56.0
0.433500	33.9	1000.0	9.000	Off	N	19.6	13.2	47.1
0.933000	26.7	1000.0	9.000	Off	N	20.0	19.3	46.0
4.888500	26.3	1000.0	9.000	Off	N	21.2	19.7	46.0
7.660500	27.5	1000.0	9.000	Off	N	21.2	22.5	50.0
22.402500	23.9	1000.0	9.000	Off	N	21.6	26.1	50.0

2.2.14 Line 1 (Hot) 802.11n



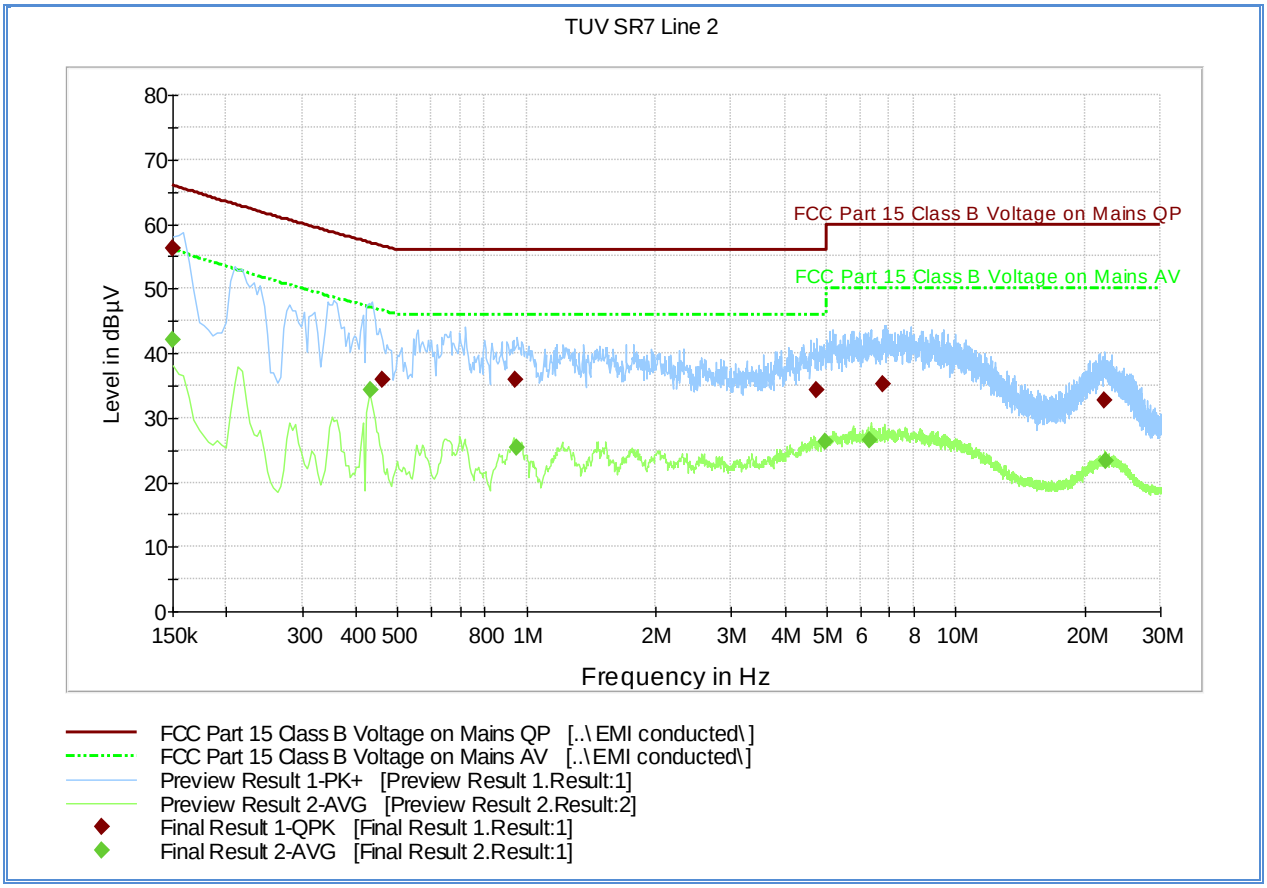
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.195000	54.4	1000.0	9.000	Off	L1	19.5	9.2	63.7
0.325500	45.4	1000.0	9.000	Off	L1	19.4	14.0	59.4
0.915000	37.4	1000.0	9.000	Off	L1	19.6	18.6	56.0
4.690500	37.6	1000.0	9.000	Off	L1	20.4	18.4	56.0
8.493000	38.7	1000.0	9.000	Off	L1	20.5	21.3	60.0
13.015500	31.3	1000.0	9.000	Off	L1	20.6	28.7	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit – Ave (dBµV)
0.199500	43.3	1000.0	9.000	Off	L1	19.5	10.1	53.5
0.393000	36.7	1000.0	9.000	Off	L1	19.4	11.1	47.8
0.852000	27.2	1000.0	9.000	Off	L1	19.6	18.8	46.0
4.929000	29.1	1000.0	9.000	Off	L1	20.4	16.9	46.0
6.963000	29.7	1000.0	9.000	Off	L1	20.5	20.3	50.0
22.870500	24.3	1000.0	9.000	Off	L1	20.9	25.7	50.0

2.2.15 Line 2 (Neutral) 802.11n



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	56.2	1000.0	9.000	Off	N	19.7	9.8	66.0
0.460500	36.0	1000.0	9.000	Off	N	19.6	20.6	56.6
0.942000	35.8	1000.0	9.000	Off	N	20.0	20.2	56.0
4.726500	34.3	1000.0	9.000	Off	N	21.1	21.7	56.0
6.765000	35.2	1000.0	9.000	Off	N	21.2	24.8	60.0
22.195500	32.8	1000.0	9.000	Off	N	21.6	27.2	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit – Ave (dBµV)
0.150000	42.0	1000.0	9.000	Off	N	19.7	14.0	56.0
0.433500	34.3	1000.0	9.000	Off	N	19.6	12.7	47.1
0.951000	25.3	1000.0	9.000	Off	N	20.0	20.7	46.0
4.965000	26.3	1000.0	9.000	Off	N	21.2	19.7	46.0
6.297000	26.5	1000.0	9.000	Off	N	21.2	23.5	50.0
22.321500	23.2	1000.0	9.000	Off	N	21.6	26.8	50.0

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

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: UB310812700012 / Test Configuration D,E and F

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

October 11, 2012/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	22.2°C
Relative Humidity	53.0%
ATM Pressure	99.4 kPa

2.3.7 Additional Observations

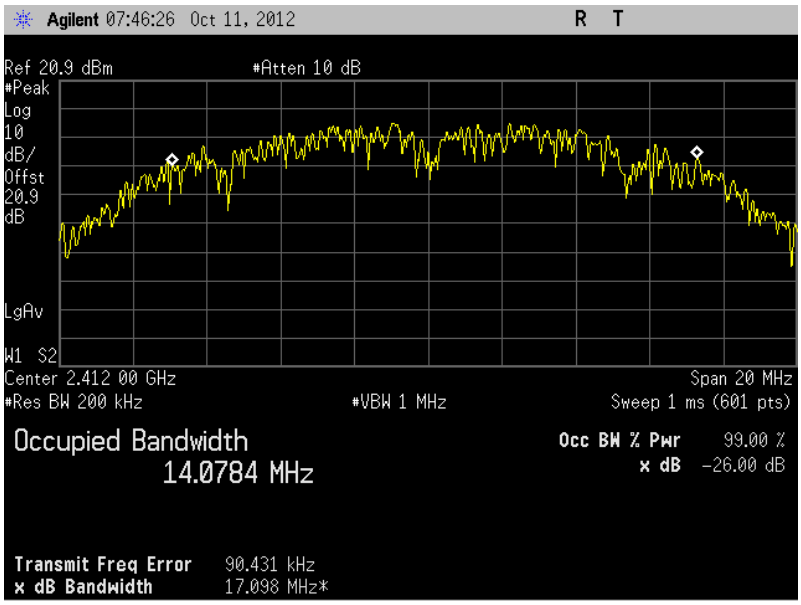
- This is a conducted test.
- An offset of 20.9dB was added to compensate for the external attenuator and cable used.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.

- 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.

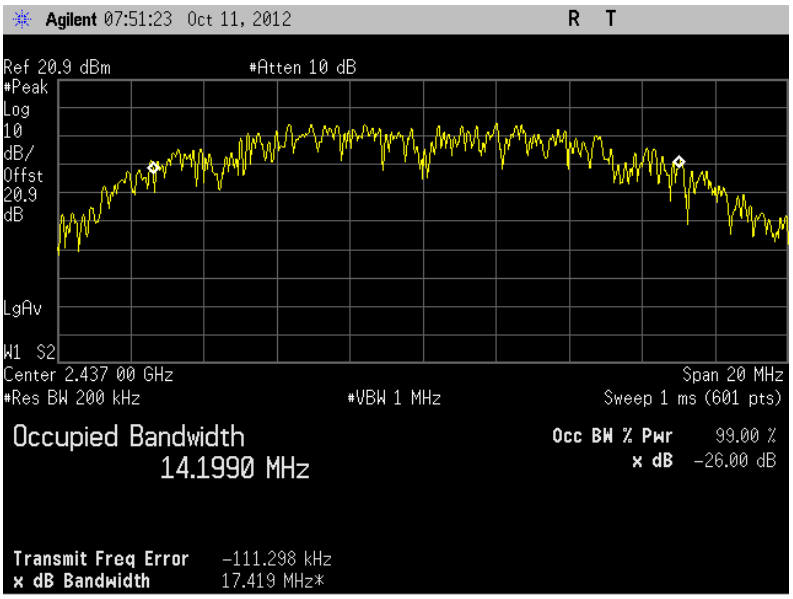
2.3.8 Test Results (For reporting purposes only)

Mode	Channel	Measured 99% Bandwidth (MHz)
802.11b	1 (2412 MHz)	14.0784
	6 (2437 MHz)	14.1990
	11 (2462 MHz)	14.0687
802.11g	1 (2412 MHz)	16.3900
	6 (2437 MHz)	16.4010
	11 (2462 MHz)	16.4260
802.11n HT20	1 (2412 MHz)	17.6027
	6 (2437 MHz)	17.5205
	11 (2462 MHz)	17.6165

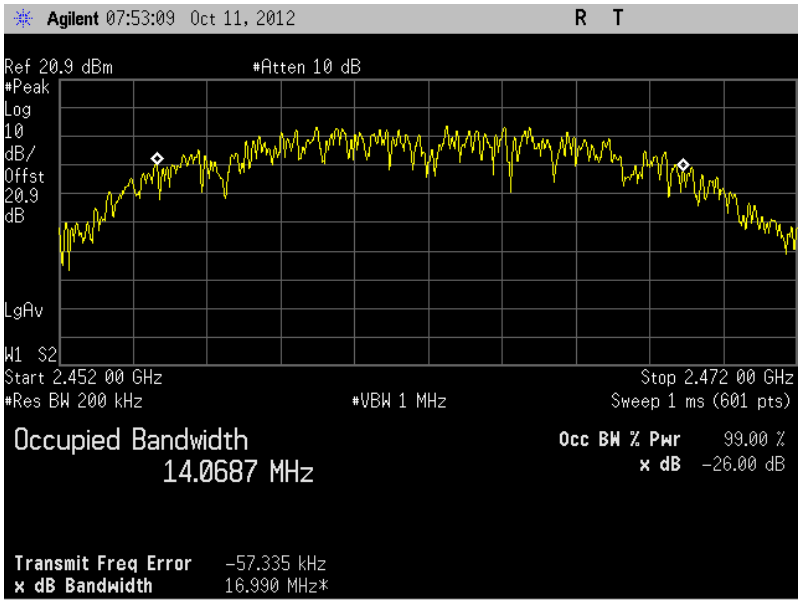
2.3.9 Test Results Plots



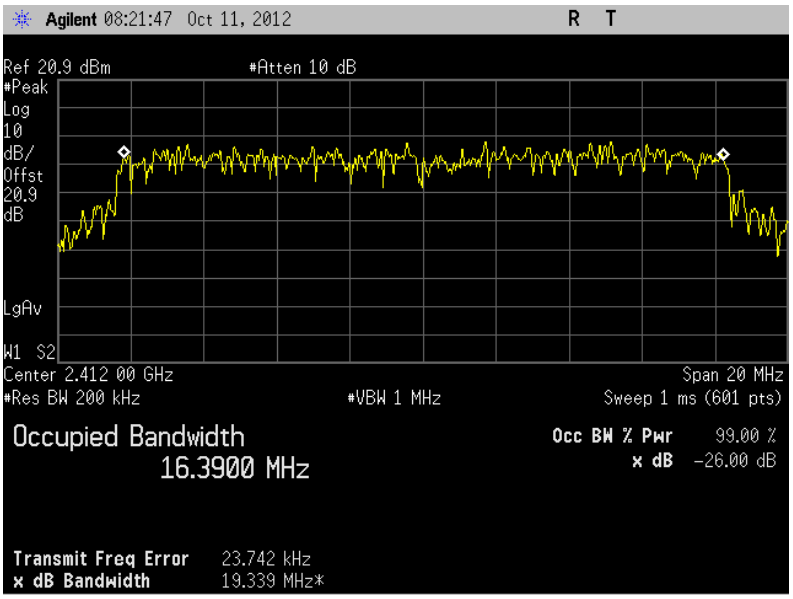
802.11b Low Channel



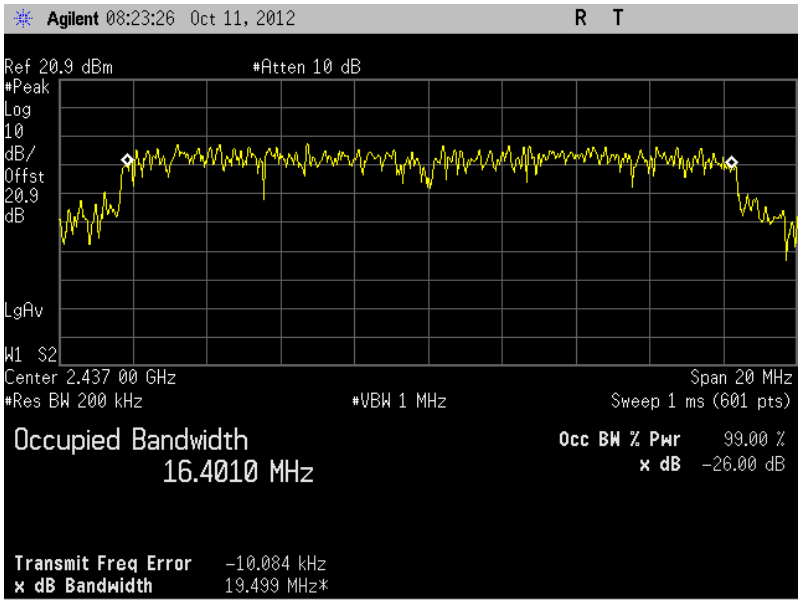
802.11b Mid Channel



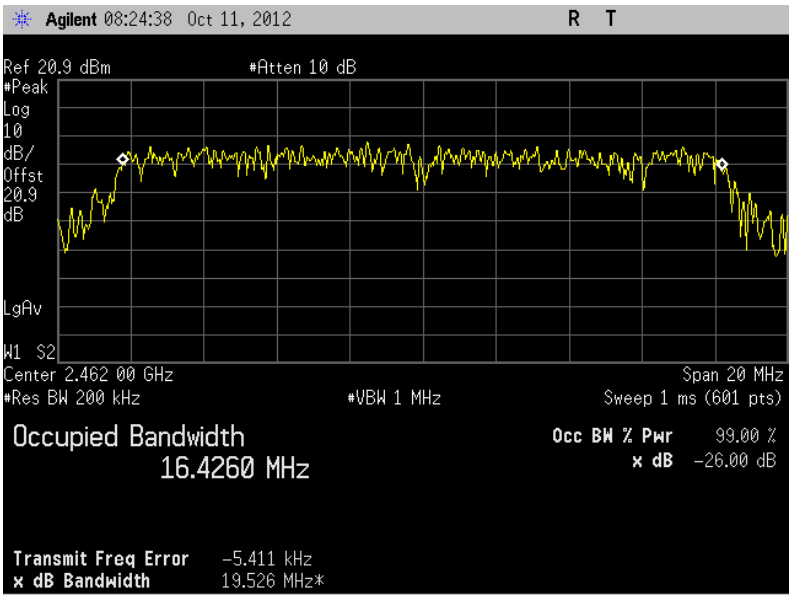
802.11b High Channel



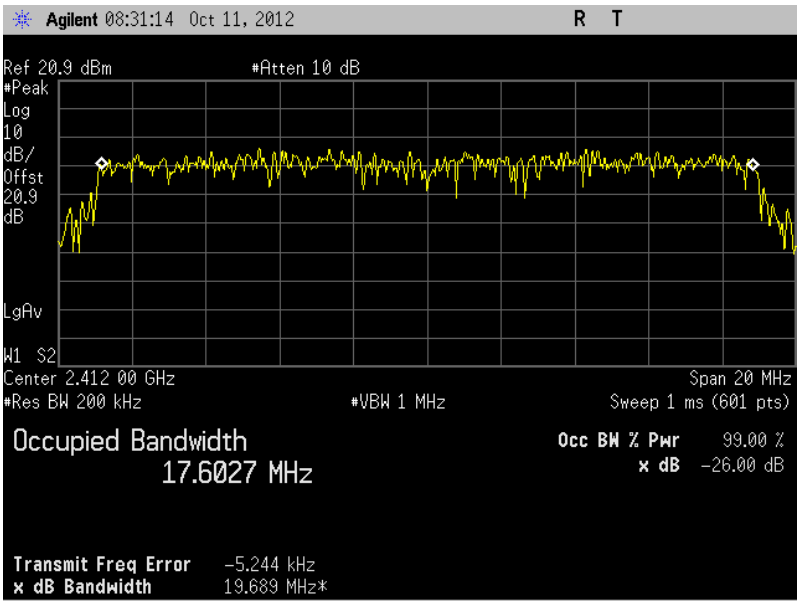
802.11g Low Channel



802.11g Mid Channel

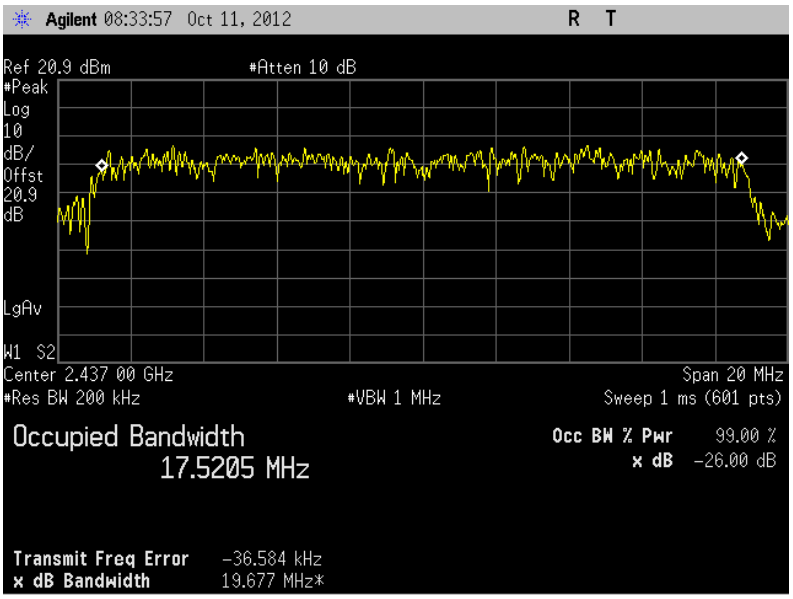


802.11g High Channel

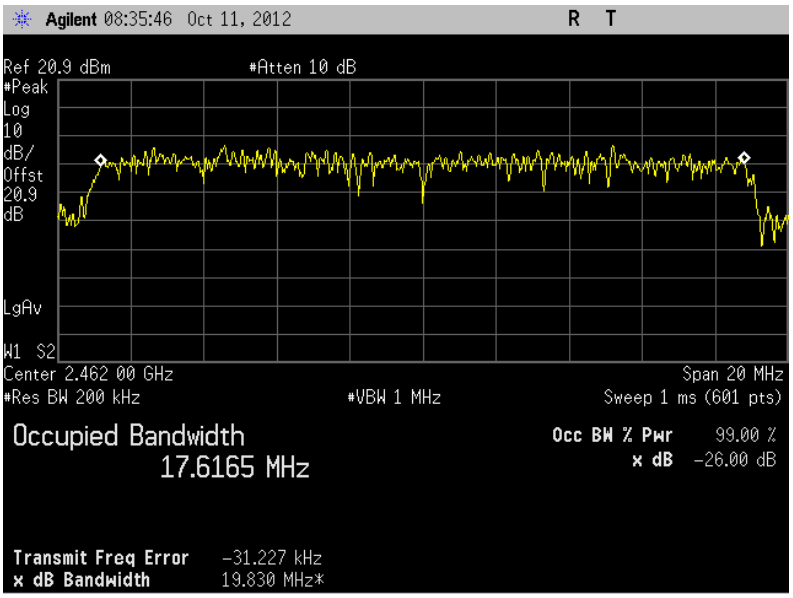


802.11n Low Channel

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



802.11n Mid Channel



802.11n High Channel

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

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: UB310812700012 / Test Configuration D,E and F

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

October 11, 2012/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	22.2°C
Relative Humidity	53.0%
ATM Pressure	99.4 kPa

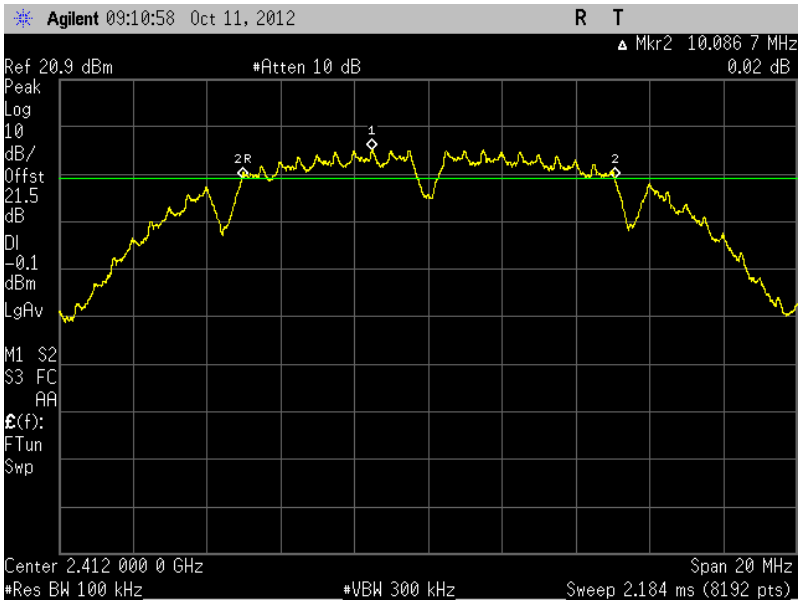
2.4.7 Additional Observations

- This is a conducted test.
- An offset of 21.5dB was added to compensate for the external attenuator and cable used.
- A peak output reading was taken. A display line was drawn 6dB below the peak level.
- 6dB bandwidth verified using delta-marker measurements from the line drawn.
- Span is wide enough to capture the channel transmission.
- RBW is 100kHz.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.
- Trace is max hold.

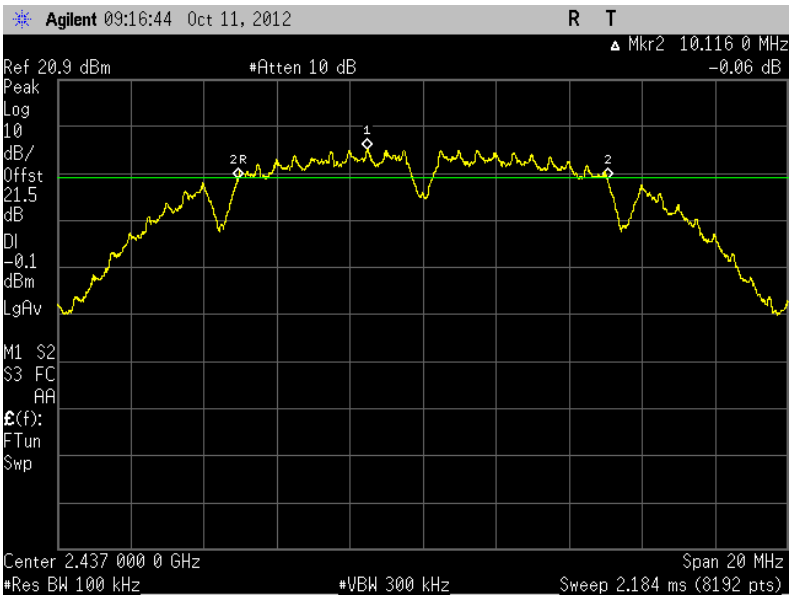
2.4.8 Test Results

Mode	Channel	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Compliance
802.11b	1 (2412 MHz)	10.0867	0.500	Complies
	6 (2437 MHz)	10.1160	0.500	Complies
	11 (2462 MHz)	9.9939	0.500	Complies
802.11g	1 (2412 MHz)	16.3545	0.500	Complies
	6 (2437 MHz)	16.3116	0.500	Complies
	11 (2462 MHz)	16.3150	0.500	Complies
802.11n HT20	1 (2412 MHz)	17.2965	0.500	Complies
	6 (2437 MHz)	17.3017	0.500	Complies
	11 (2462 MHz)	17.5434	0.500	Complies

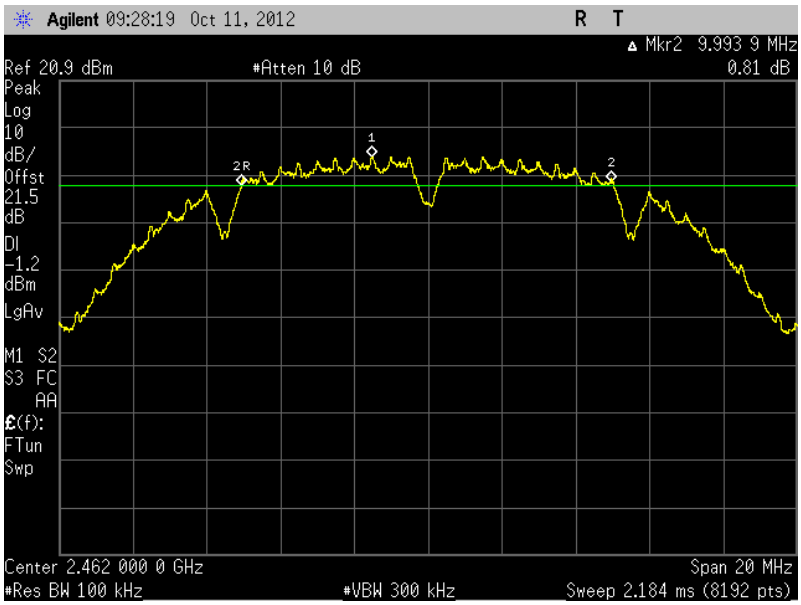
2.4.9 Test Results Plots



802.11b Low Channel

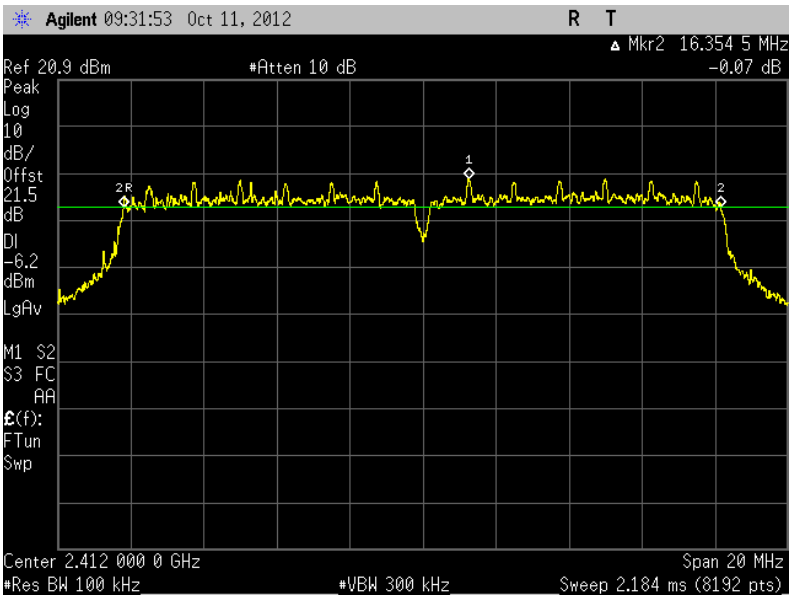


802.11b Mid Channel

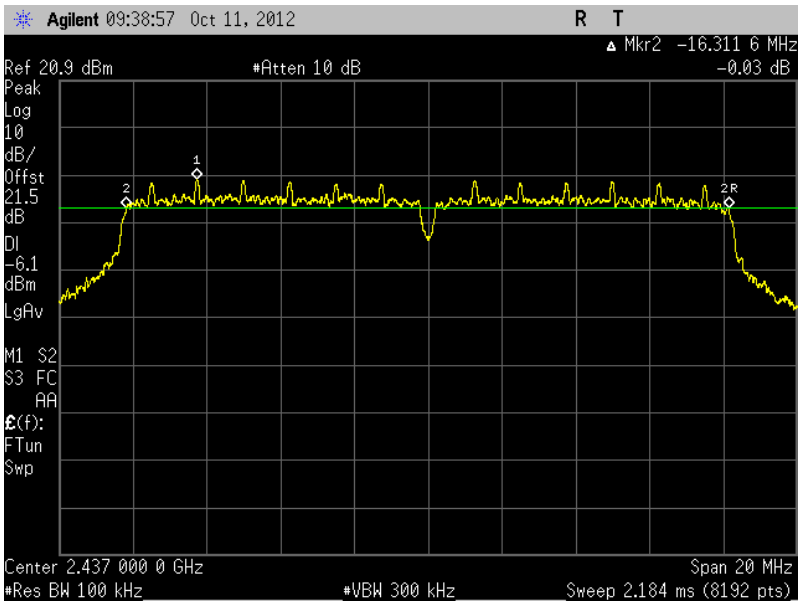


802.11b High Channel

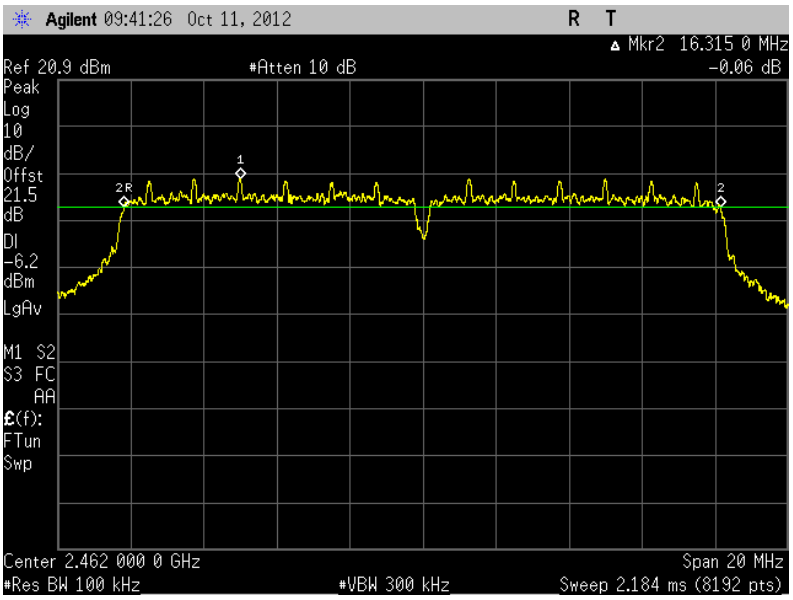
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364



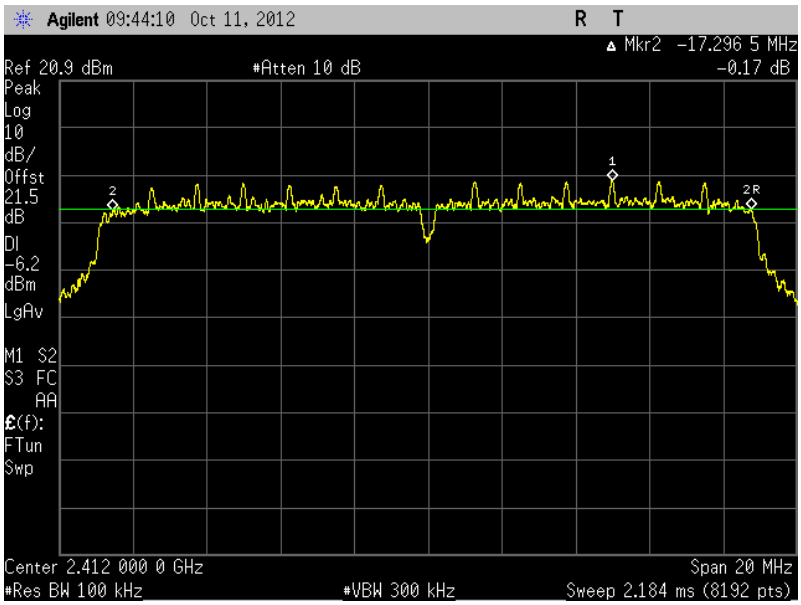
802.11g Low Channel



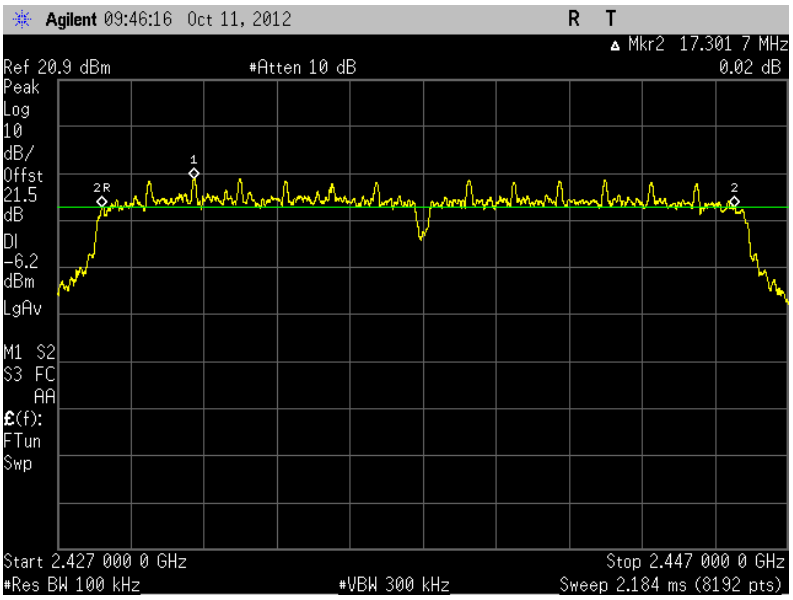
802.11g Mid Channel



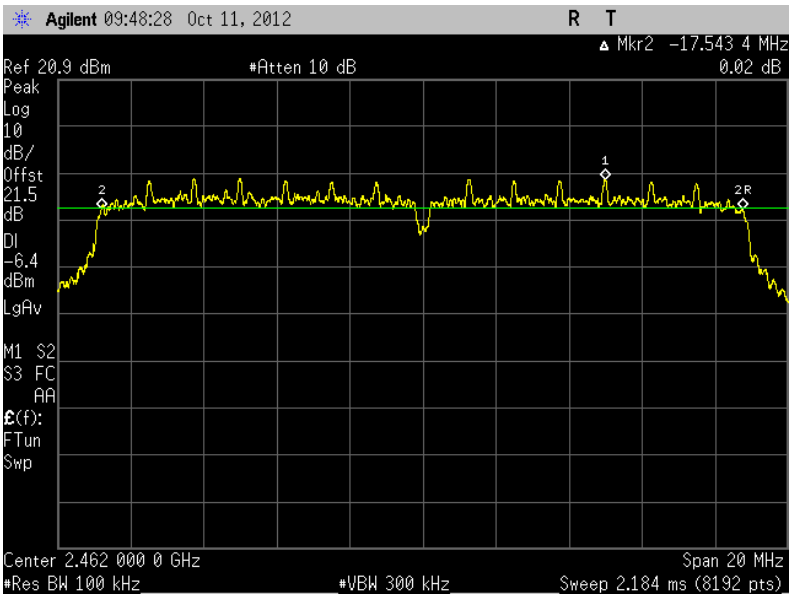
802.11g High Channel



802.11n Low Channel



802.11n Mid Channel



802.11n High Channel

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

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: UB310812700012 / Test Configuration D,E and F

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

October 11, 2012/FSC

2.5.5 Test Equipment Used

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

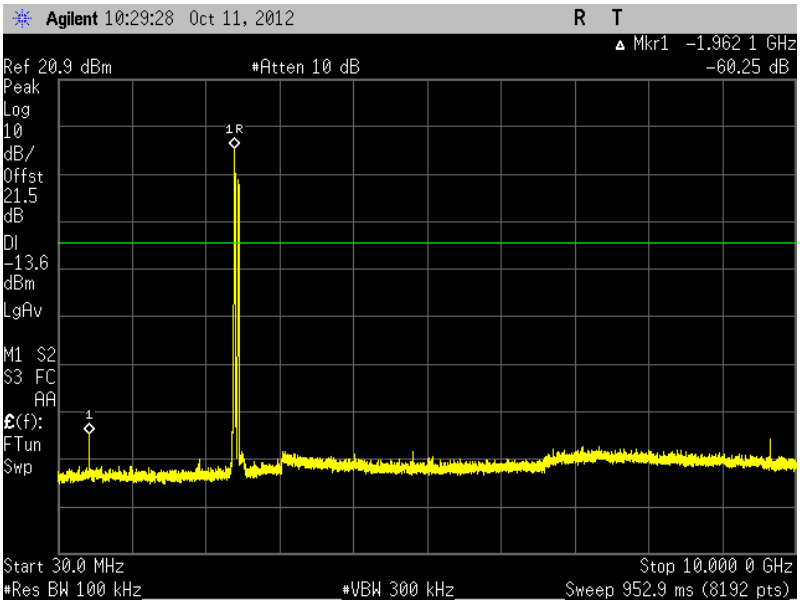
2.5.6 Environmental Conditions

Ambient Temperature	22.2°C
Relative Humidity	53.0%
ATM Pressure	99.4 kPa

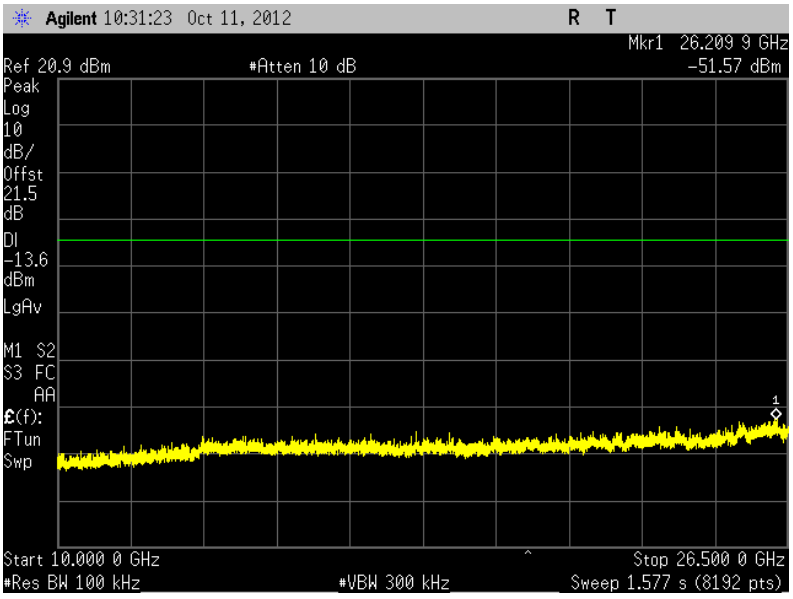
2.5.7 Additional Observations

- This is a conducted test.
- An offset of 21.5dB 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.

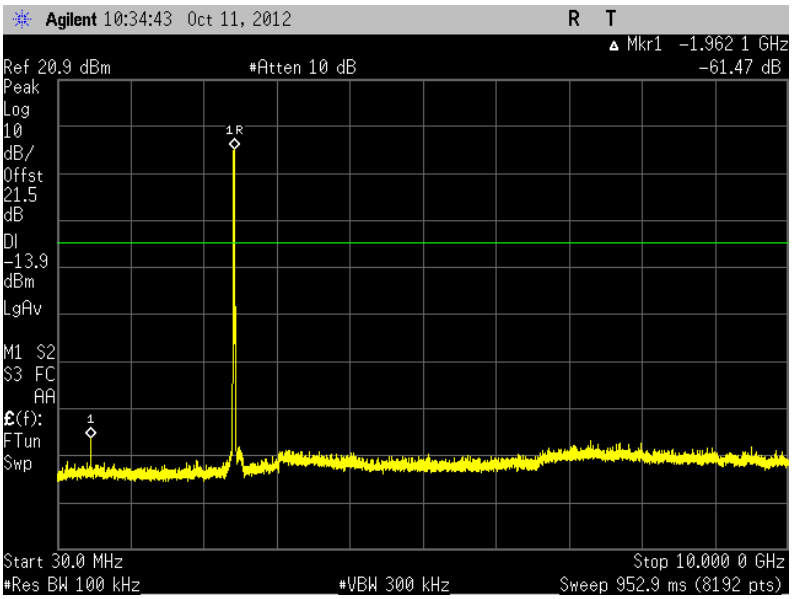
2.5.8 Test Results Plots



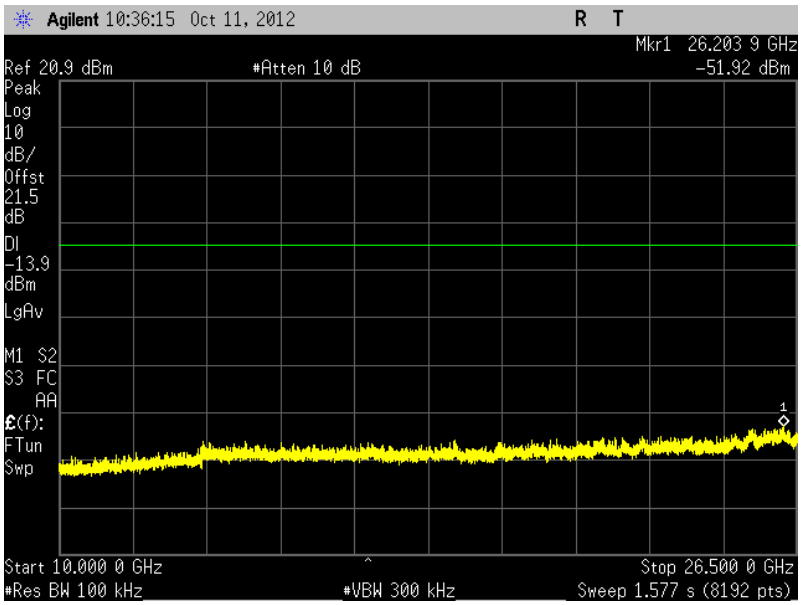
802.11b Low Channel (30MHz to 10GHz)



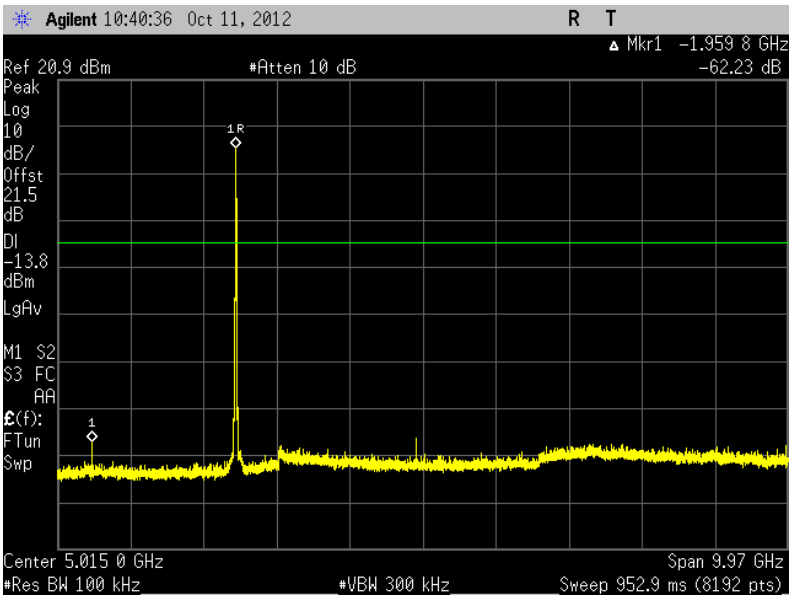
802.11b Low Channel (10GHz to 25GHz)



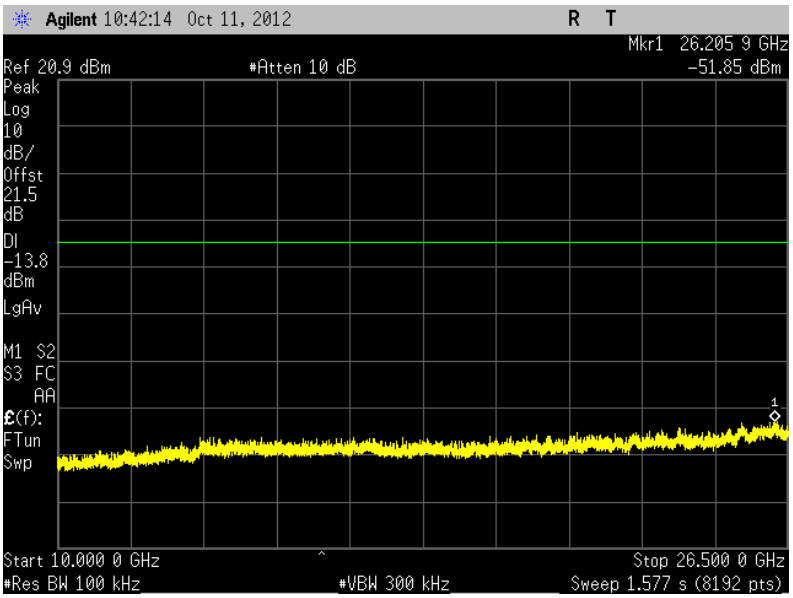
802.11b Mid Channel (30MHz to 10GHz)



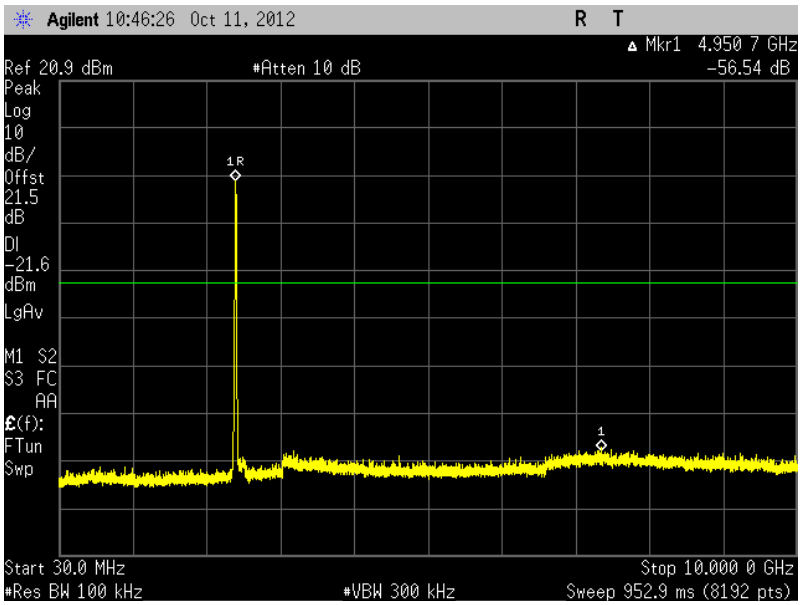
802.11b Mid Channel (10GHz to 25GHz)



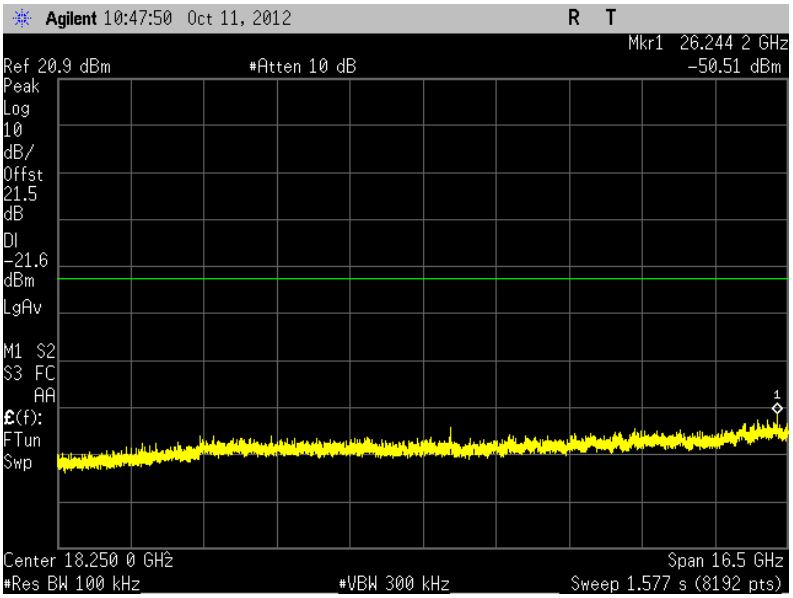
802.11b High Channel (30MHz to 10GHz)



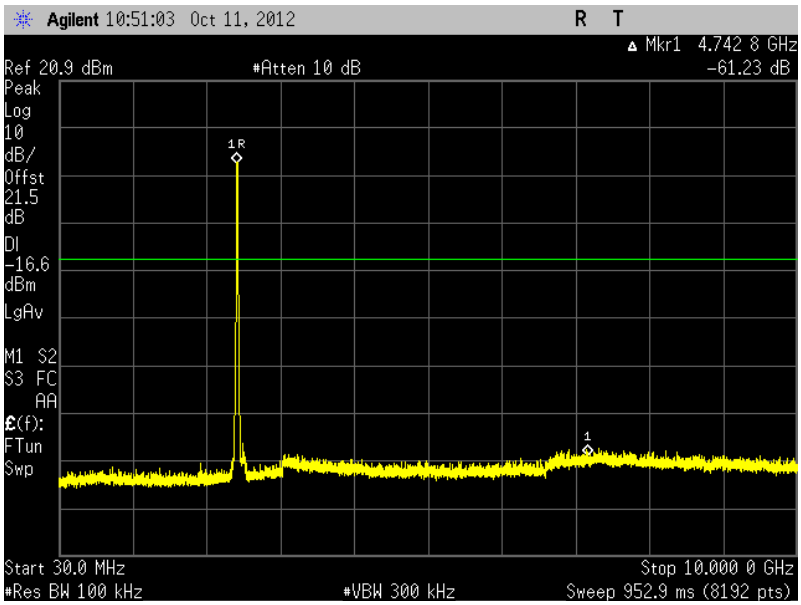
802.11b High Channel (10GHz to 25GHz)



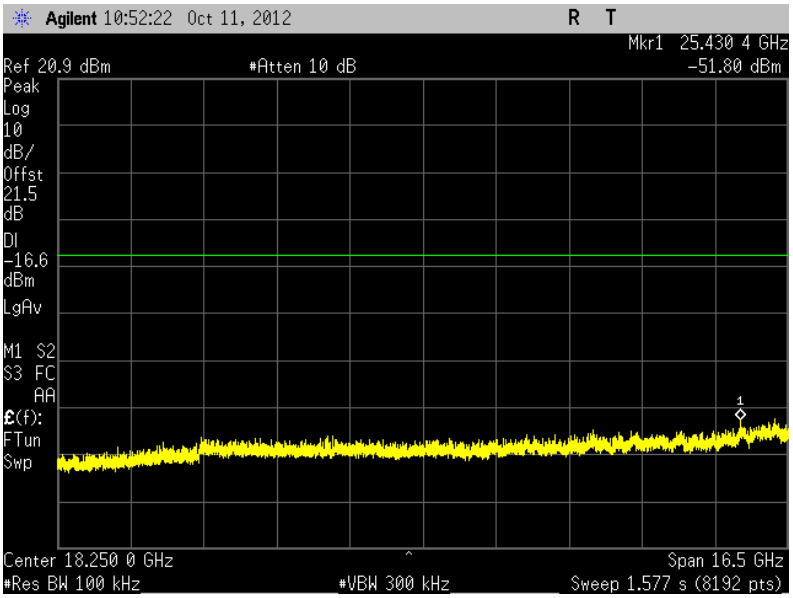
802.11g Low Channel (30MHz to 10GHz)



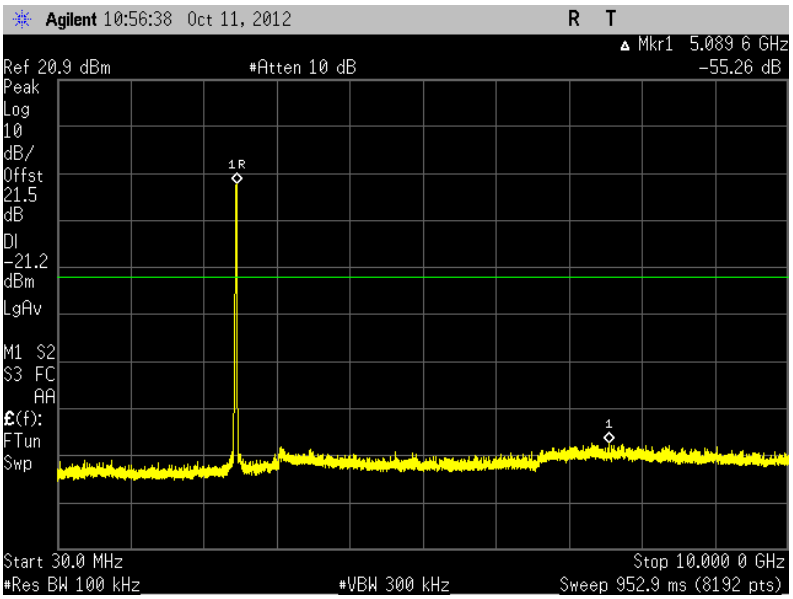
802.11g Low Channel (10GHz to 25GHz)



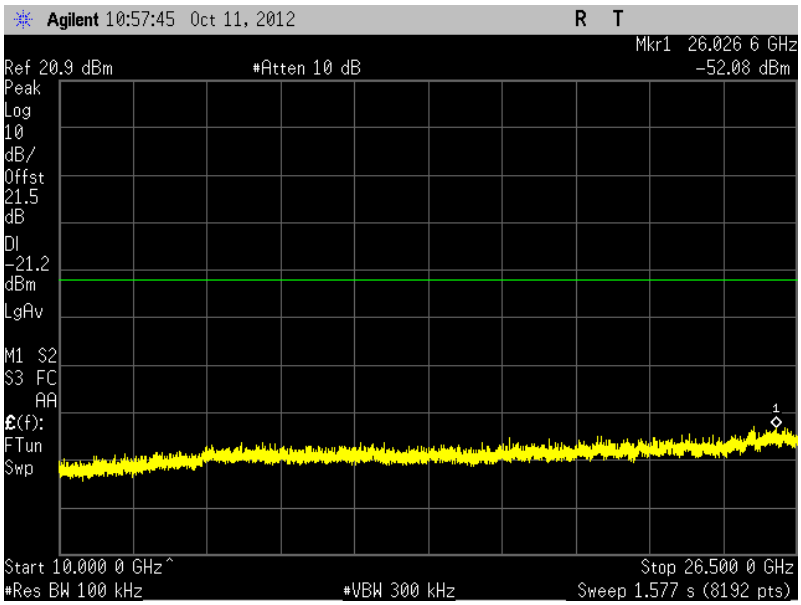
802.11g Mid Channel (30MHz to 10GHz)



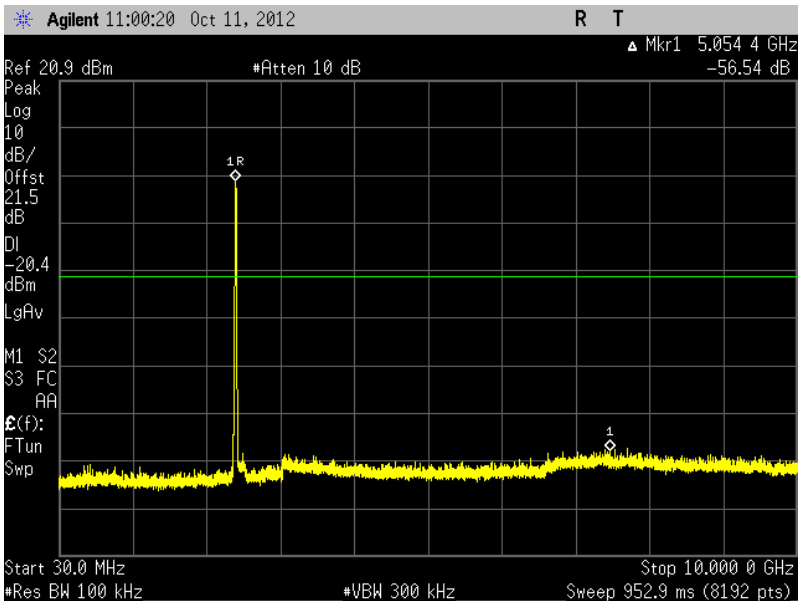
802.11g Mid Channel (10GHz to 25GHz)



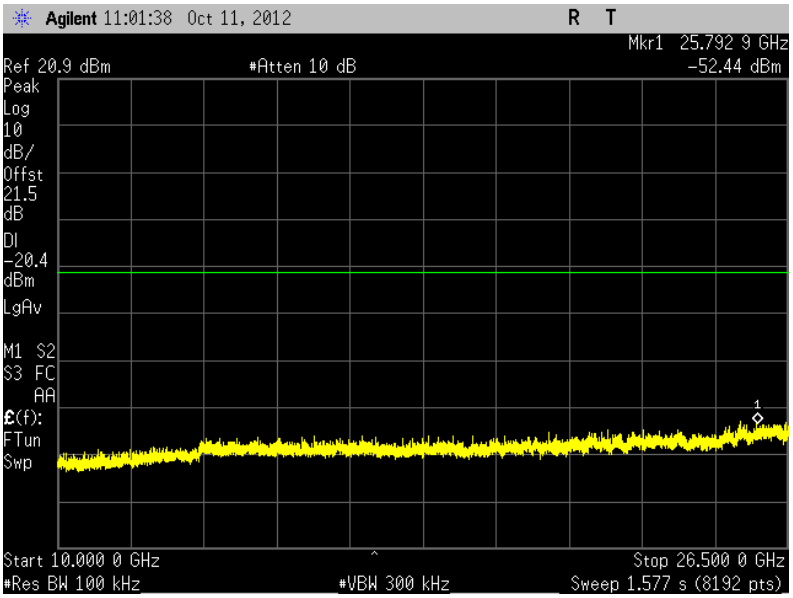
802.11g High Channel (30MHz to 10GHz)



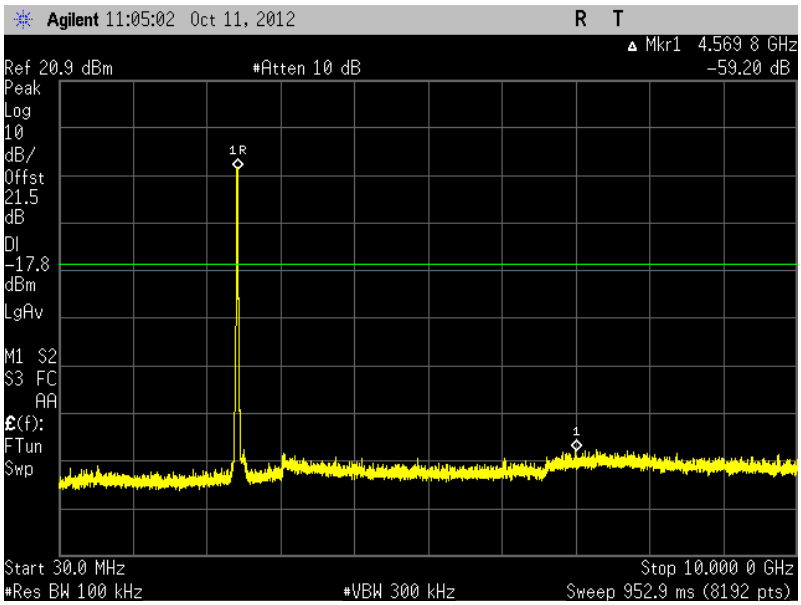
802.11g High Channel (10GHz to 25GHz)



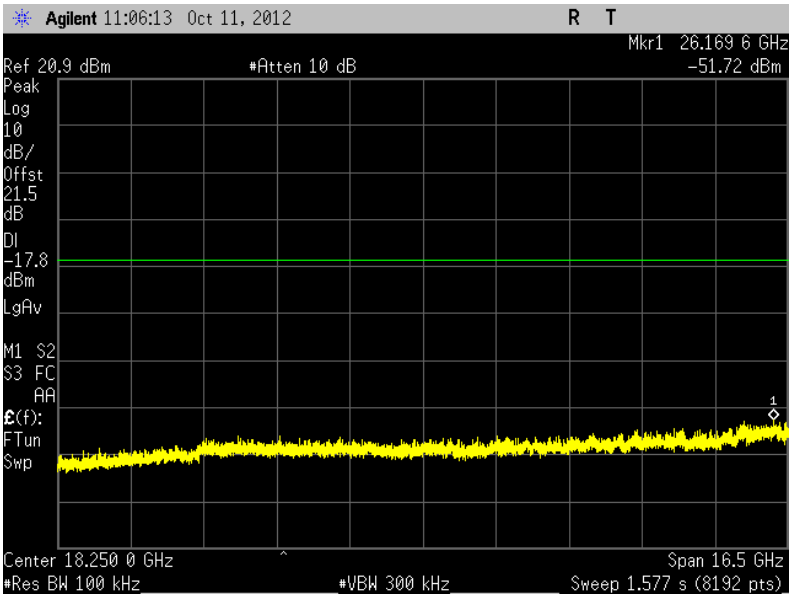
802.11n Low Channel (30MHz to 10GHz)



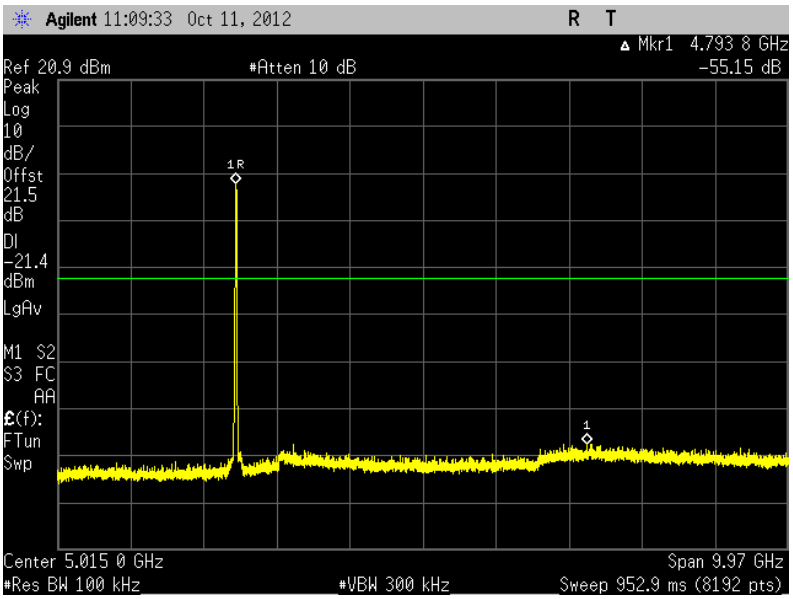
802.11n Low Channel (10GHz to 25GHz)



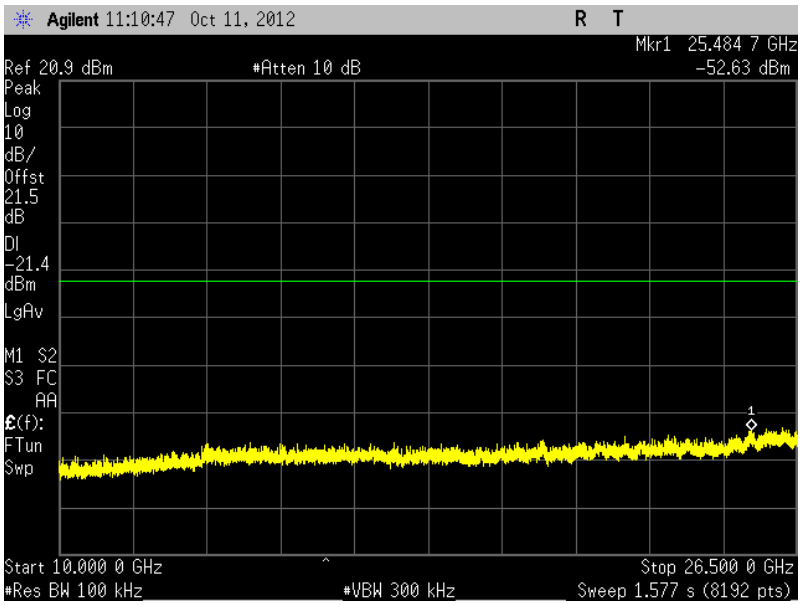
802.11n Mid Channel (30MHz to 10GHz)



802.11n Mid Channel (10GHz to 25GHz)



802.11n High Channel (30MHz to 10GHz)



802.11n High Channel (10GHz to 25GHz)

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: UB310812700012 / Test Configuration D,E and F

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

October 11, 2012/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	22.2°C
Relative Humidity	53.0%
ATM Pressure	99.4 kPa

2.6.7 Additional Observations

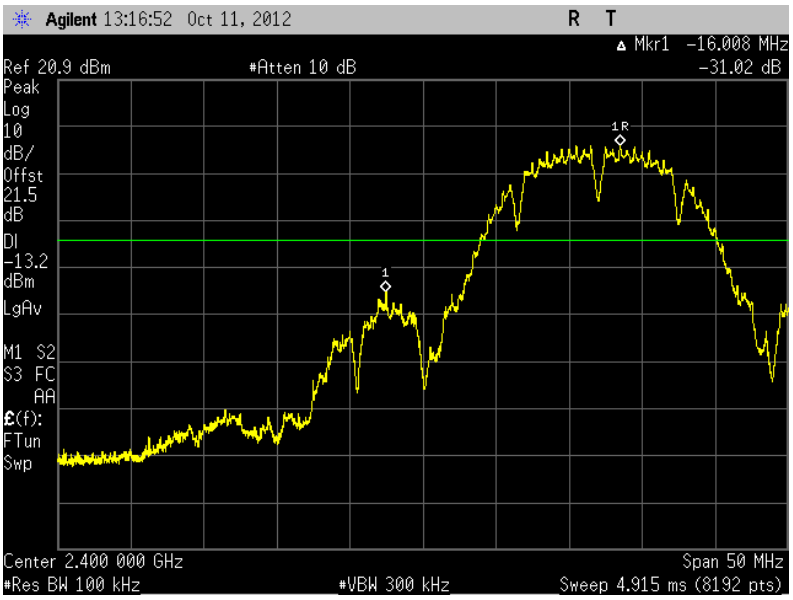
- Setup is identical to “Out-of-Band Emissions – Conducted“ test (previous test).
- Band-edge (2400MHz and 2483.5MHz) emissions were verified in this test.
- The spectrum analyzer was centred on the band-edge frequency while setting the EUT to the corresponding transmit channel (i.e. Low Channel for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

2.6.8 Test Results

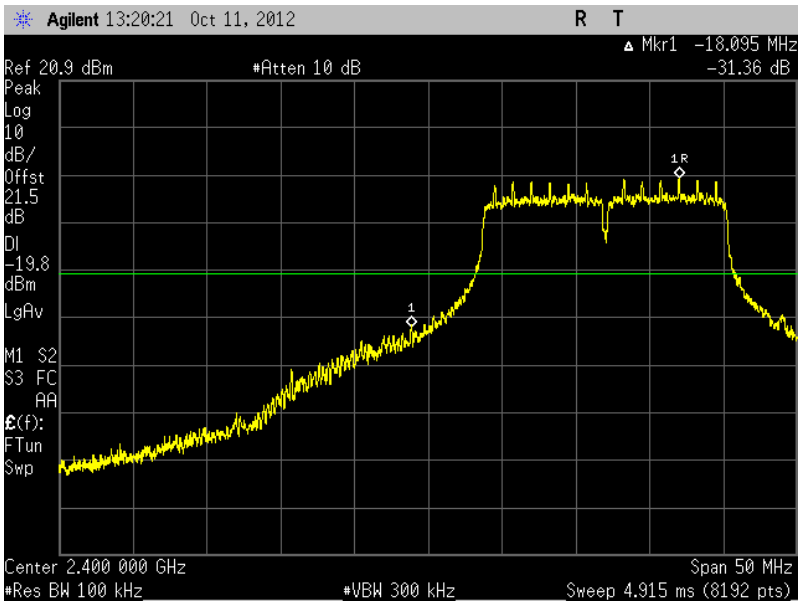
Complies.

See attached plots.

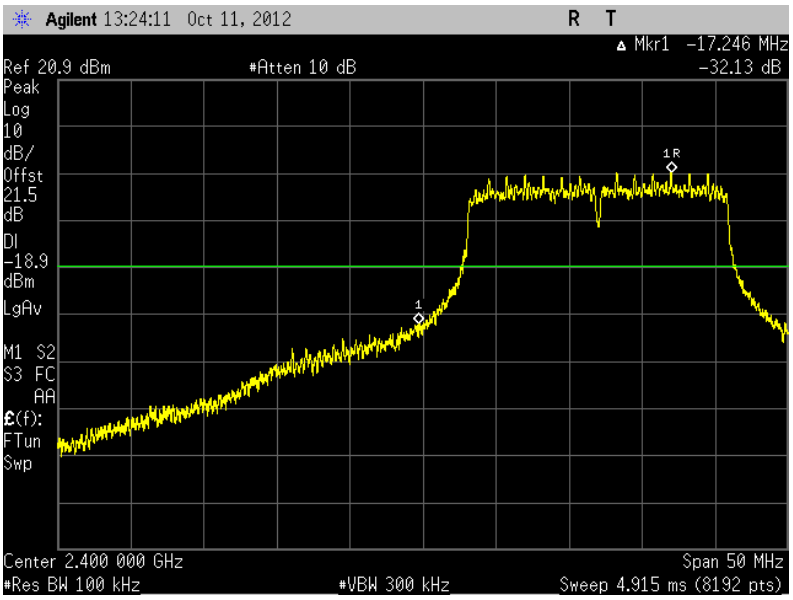
TÜV SÜD AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone: 858 678 1400 FAX: 858 546 0364



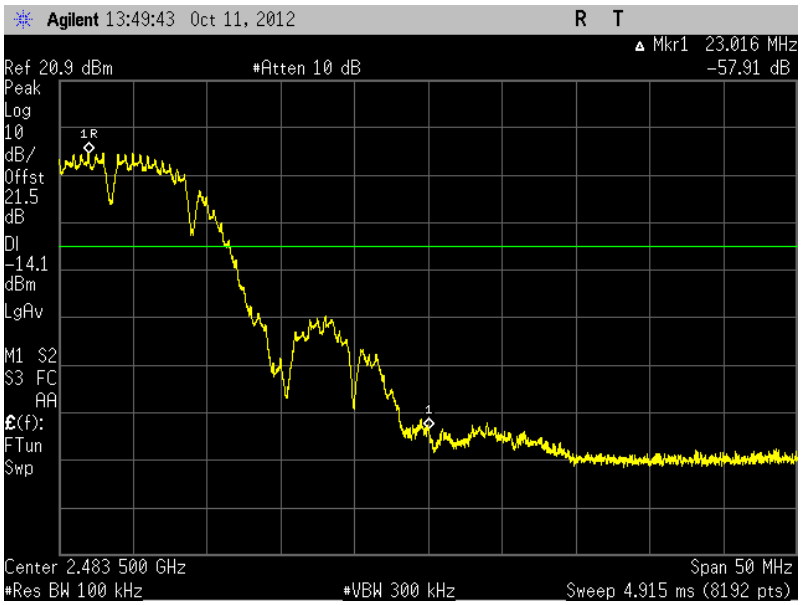
802.11b Low Channel (2412 MHz)



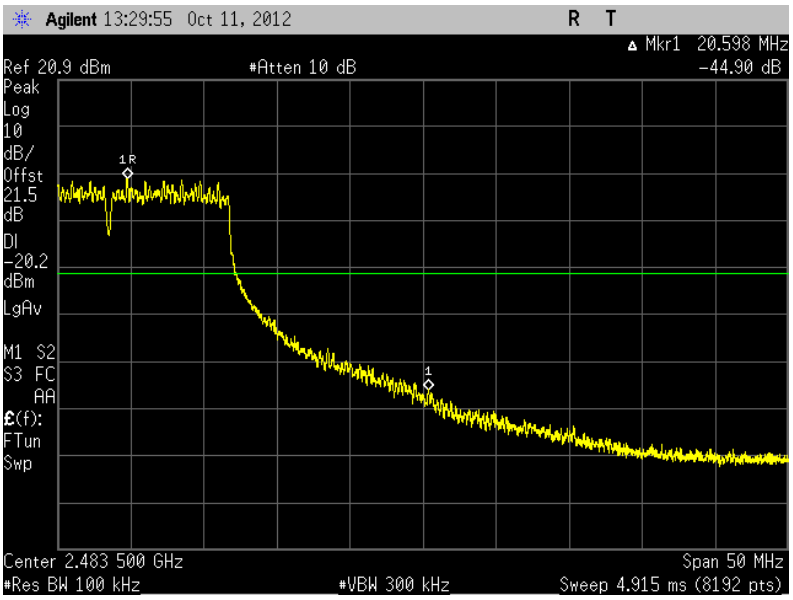
802.11g Low Channel (2412 MHz)



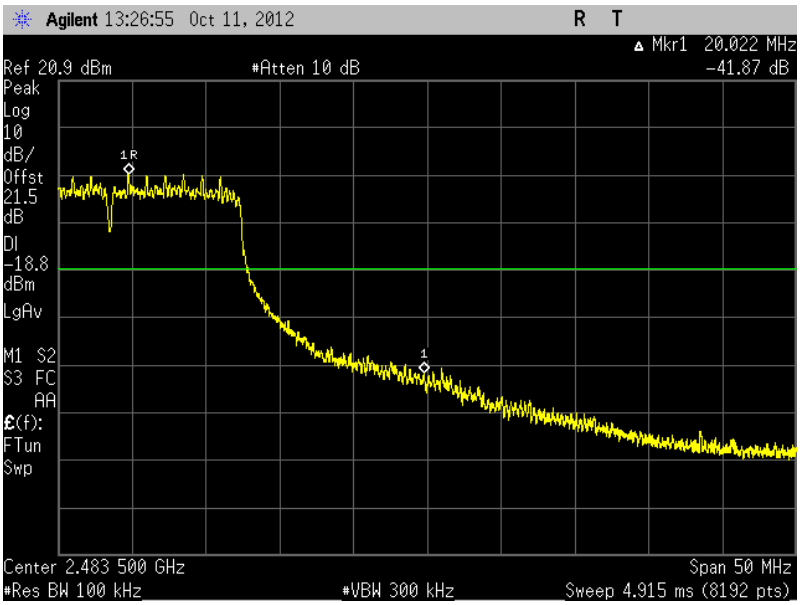
802.11n Low Channel (2412 MHz)



802.11b High Channel (2462 MHz)



802.11g High Channel (2462 MHz)



802.11n High Channel (2462 MHz)

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: UB310812700012 / Test Configuration A,B and C

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

October 13 and 14, 2012/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	22.4-23.5°C
Relative Humidity	48.7-49.56%
ATM Pressure	99.4 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 worst case configuration (802.11b, High Channel, 1Mbps) presented for radiated emissions below 1GHz.

- Before each test, a new set of battery (freshly charged) is installed.
- 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.

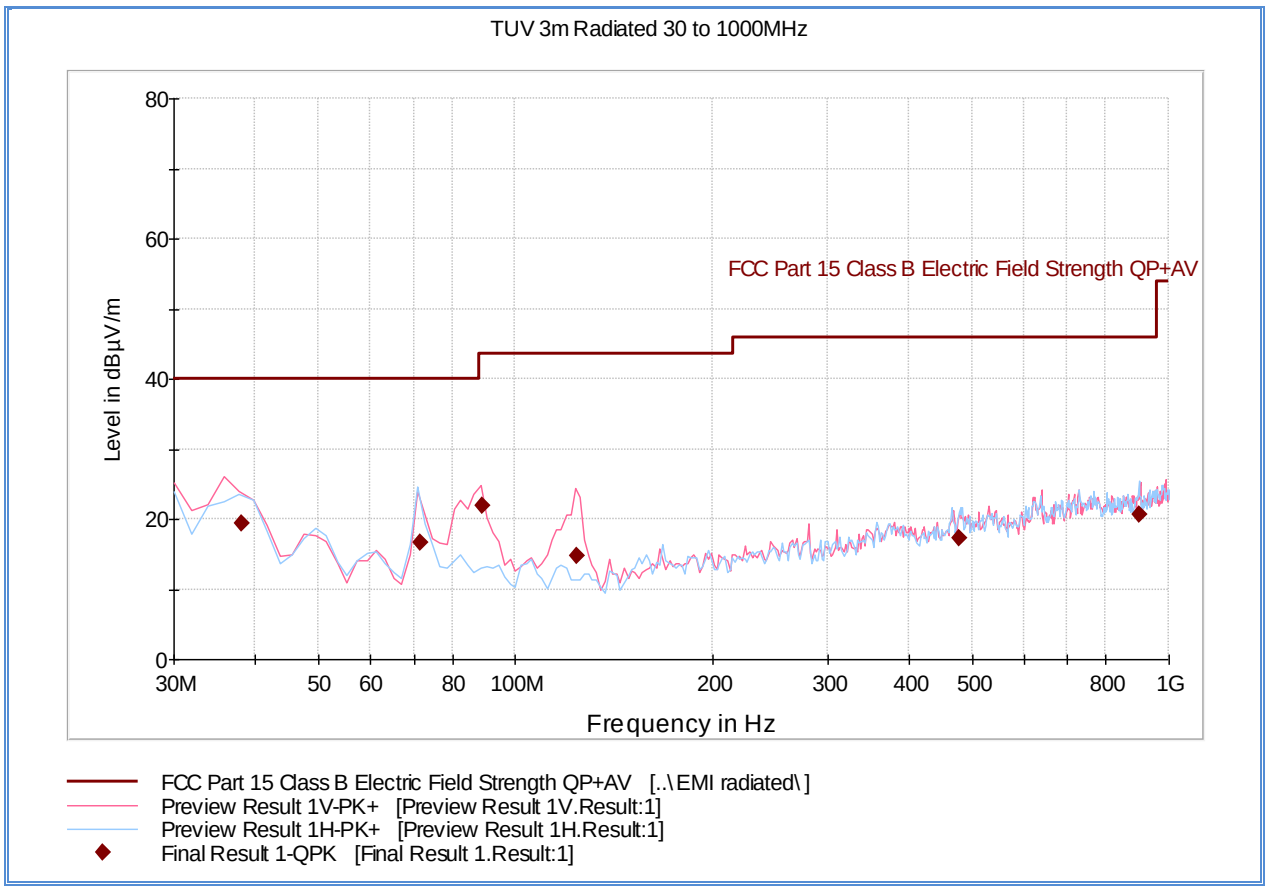
2.7.8 Sample Computation (Radiated Emission)

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.

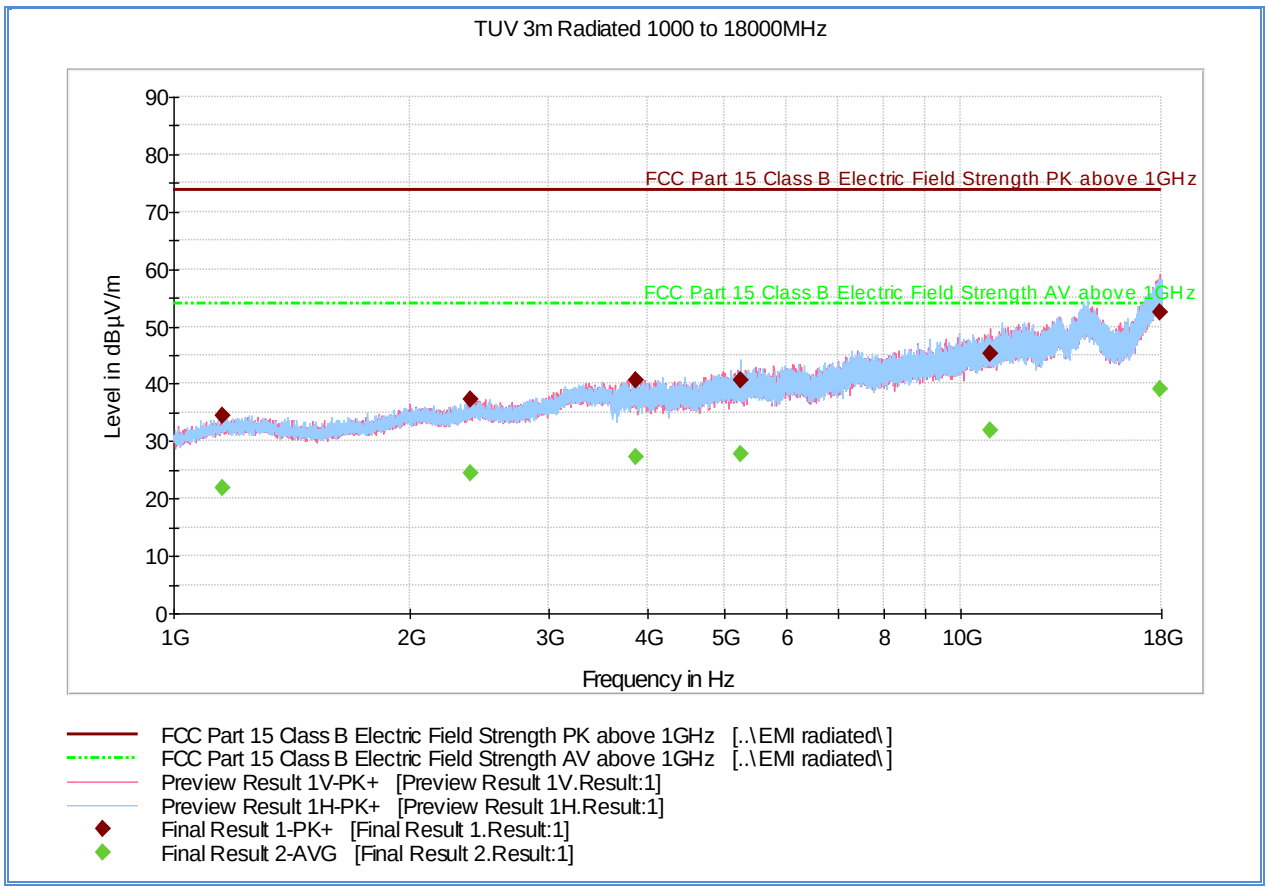
2.7.10 Test Results Below 1GHz (Receive Mode)



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)
38.111663	19.4	1000.0	120.000	117.0	V	18.0	-16.2	20.6	40.0
71.421643	16.7	1000.0	120.000	150.0	H	67.0	-21.9	23.3	40.0
88.772745	21.8	1000.0	120.000	100.0	V	127.0	-21.1	21.7	43.5
124.130501	14.8	1000.0	120.000	150.0	V	296.0	-20.7	28.7	43.5
477.998076	17.3	1000.0	120.000	190.0	H	286.0	-6.4	28.7	46.0
899.197836	20.6	1000.0	120.000	104.0	H	159.0	0.3	25.4	46.0

2.7.11 Test Results Above 1GHz (Receive Mode)



Peak Data

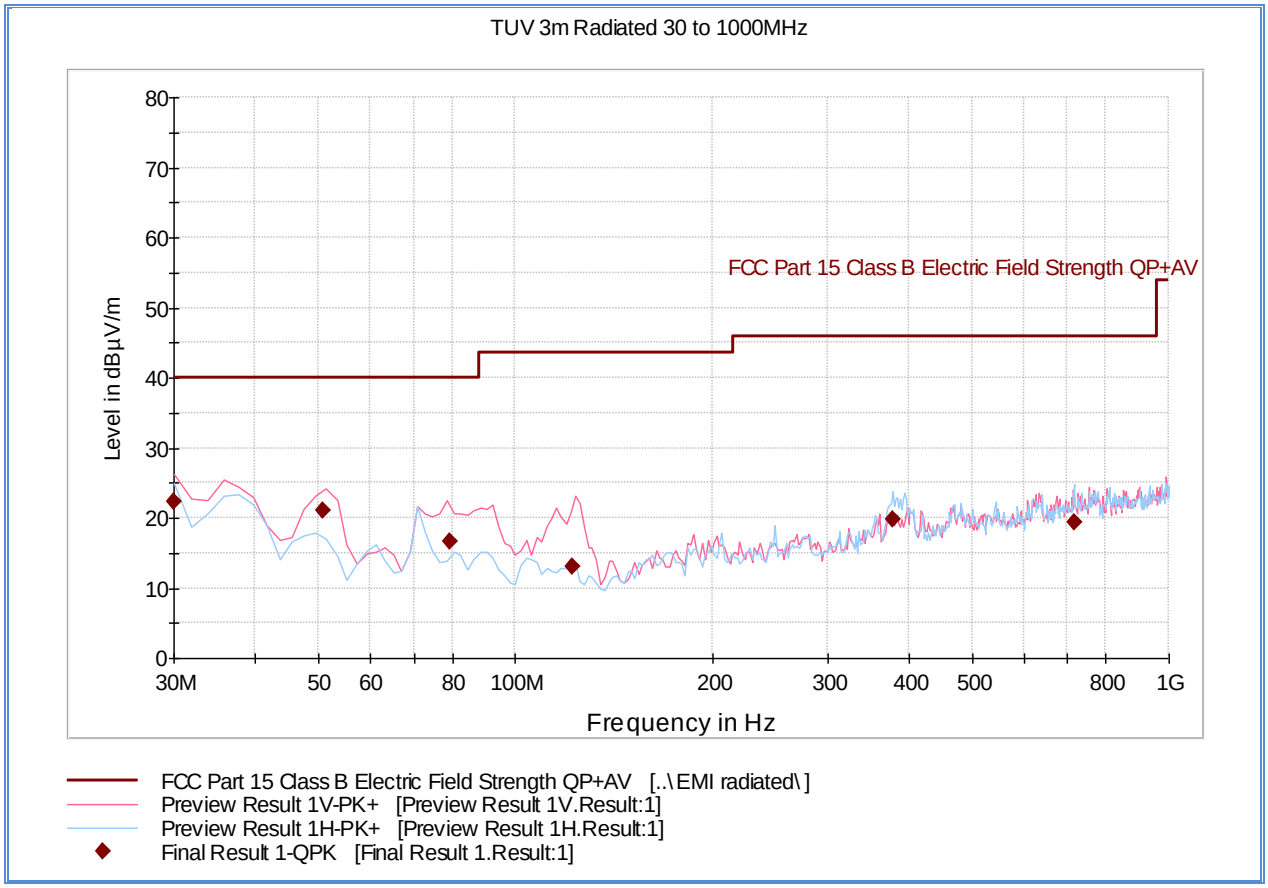
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1154.520000	34.4	1000.0	1000.000	154.0	V	94.0	-10.0	39.5	73.9
2379.173333	37.2	1000.0	1000.000	298.0	H	4.0	-5.0	36.7	73.9
3871.646667	40.7	1000.0	1000.000	215.0	H	31.0	1.1	33.2	73.9
5252.573333	40.5	1000.0	1000.000	360.0	H	13.0	3.6	33.4	73.9
10916.20666	45.3	1000.0	1000.000	201.0	V	15.0	11.4	28.6	73.9
17929.46666	52.5	1000.0	1000.000	107.0	V	158.0	21.5	21.4	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)
1154.520000	21.8	1000.0	1000.000	154.0	V	94.0	-10.0	32.1	53.9
2379.173333	24.4	1000.0	1000.000	298.0	H	4.0	-5.0	29.5	53.9
3871.646667	27.3	1000.0	1000.000	215.0	H	31.0	1.1	26.6	53.9
5252.573333	27.8	1000.0	1000.000	360.0	H	13.0	3.6	26.1	53.9
10916.20666	31.8	1000.0	1000.000	201.0	V	15.0	11.4	22.1	53.9
17929.46666	39.0	1000.0	1000.000	107.0	V	158.0	21.5	14.9	53.9

Test Notes: No significant emissions observed. All emissions presented are noise-floor measurements.

2.7.12 Test Results Below 1GHz (Worst Case Configuration)

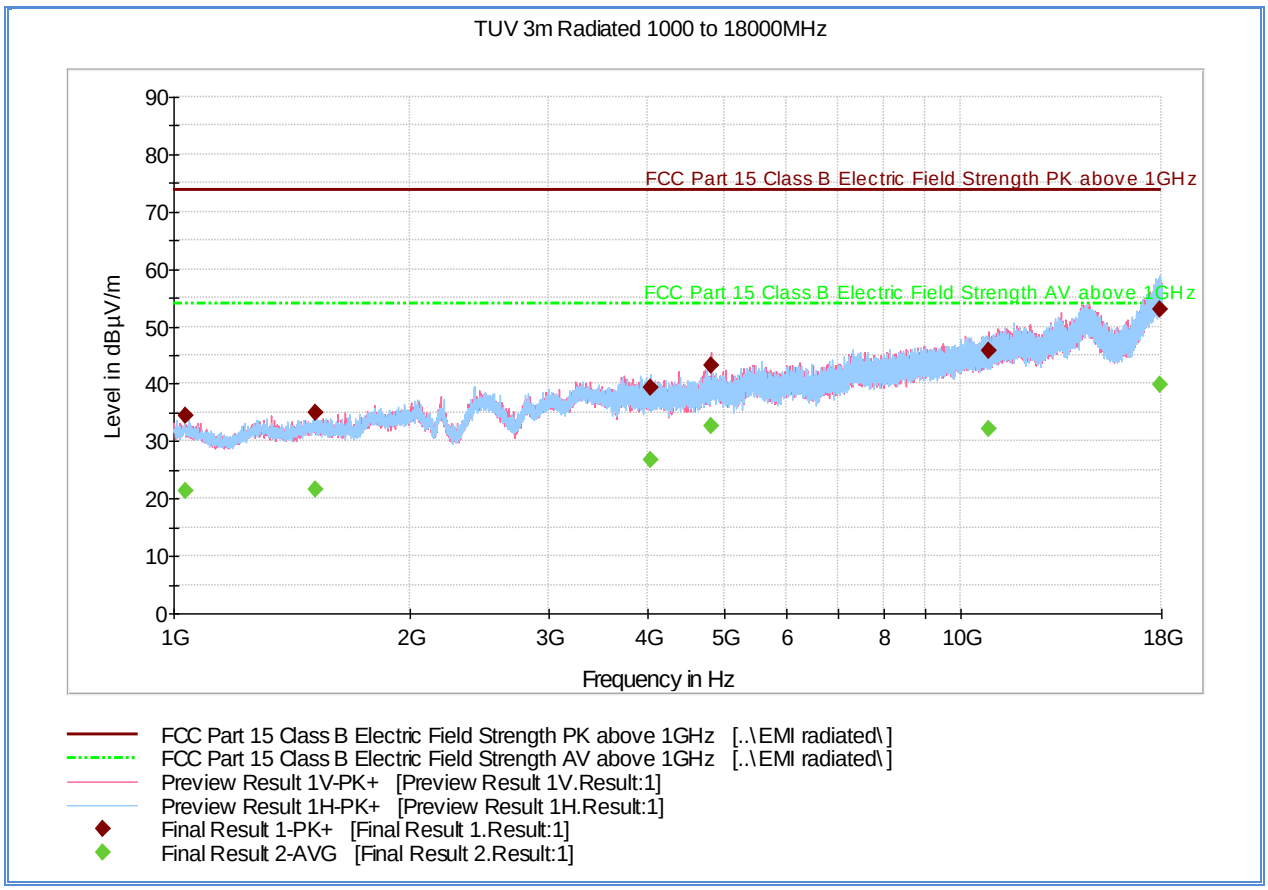


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.040000	22.4	1000.0	120.000	232.0	V	308.0	-12.0	17.6	40.0
50.782766	21.1	1000.0	120.000	100.0	V	139.0	-20.3	18.9	40.0
79.357194	16.6	1000.0	120.000	100.0	V	259.0	-21.8	23.4	40.0
122.426613	13.1	1000.0	120.000	106.0	V	122.0	-20.7	30.4	43.5
378.475912	19.7	1000.0	120.000	106.0	H	56.0	-8.6	26.3	46.0
715.192385	19.4	1000.0	120.000	258.0	H	308.0	-2.4	26.6	46.0

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

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



Peak Data

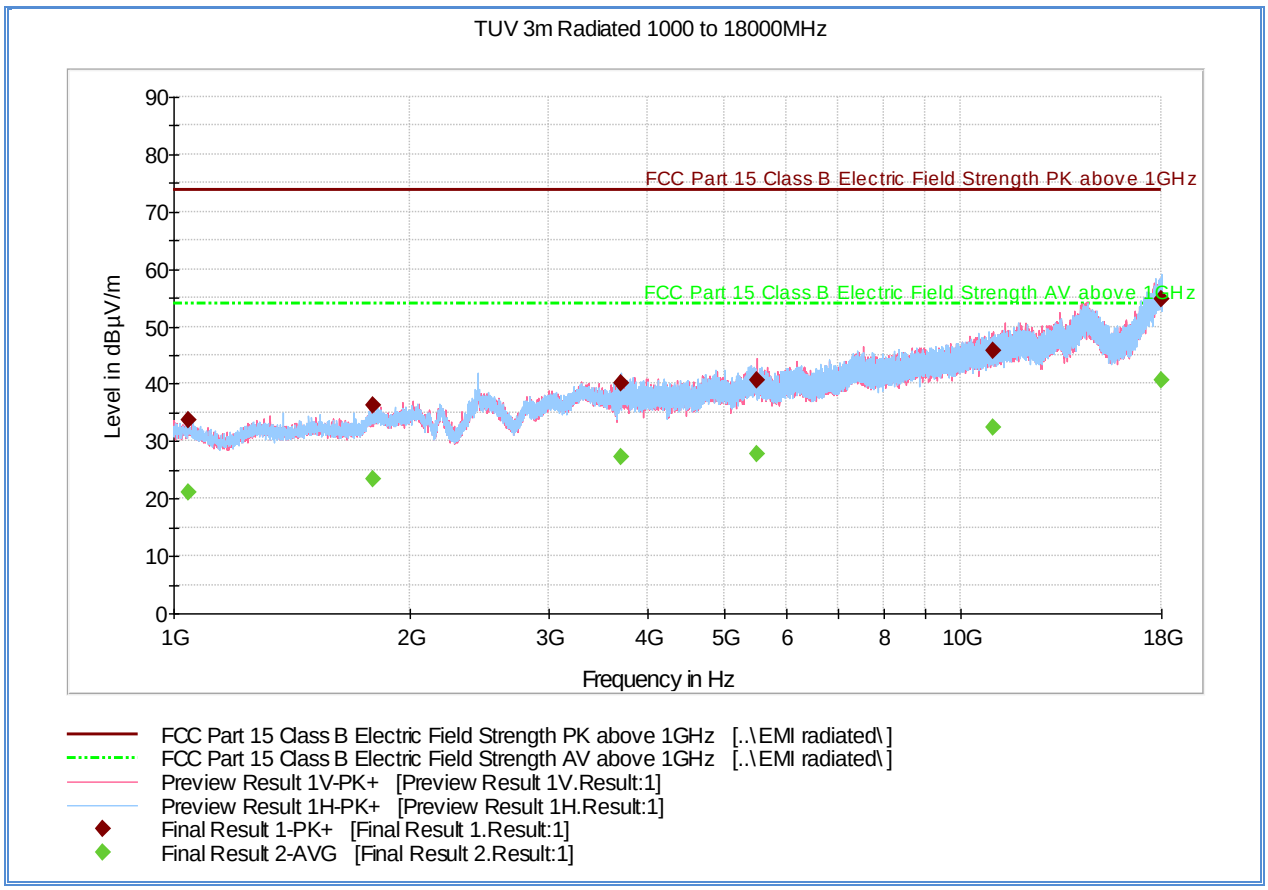
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1035.760000	34.3	1000.0	1000.000	258.0	V	265.0	-10.9	39.6	73.9
1510.946667	34.9	1000.0	1000.000	288.0	H	273.0	-9.0	39.0	73.9
4040.866667	39.2	1000.0	1000.000	265.0	H	37.0	1.0	34.7	73.9
4823.966667	43.2	1000.0	1000.000	112.0	V	137.0	1.9	30.7	73.9
10870.660000	45.8	1000.0	1000.000	225.0	V	123.0	11.3	28.1	73.9
17897.700000	52.9	1000.0	1000.000	400.0	H	221.0	21.3	21.0	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)
1035.760000	21.2	1000.0	1000.000	258.0	V	265.0	-10.9	32.7	53.9
1510.946667	21.7	1000.0	1000.000	288.0	H	273.0	-9.0	32.2	53.9
4040.866667	26.8	1000.0	1000.000	265.0	H	37.0	1.0	27.1	53.9
4823.966667	32.6	1000.0	1000.000	112.0	V	137.0	1.9	21.3	53.9
10870.660000	32.3	1000.0	1000.000	225.0	V	123.0	11.3	21.6	53.9
17897.700000	39.8	1000.0	1000.000	400.0	H	221.0	21.3	14.1	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 5GHz. Measurements above 5GHz are noise floor figures.

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



Peak Data

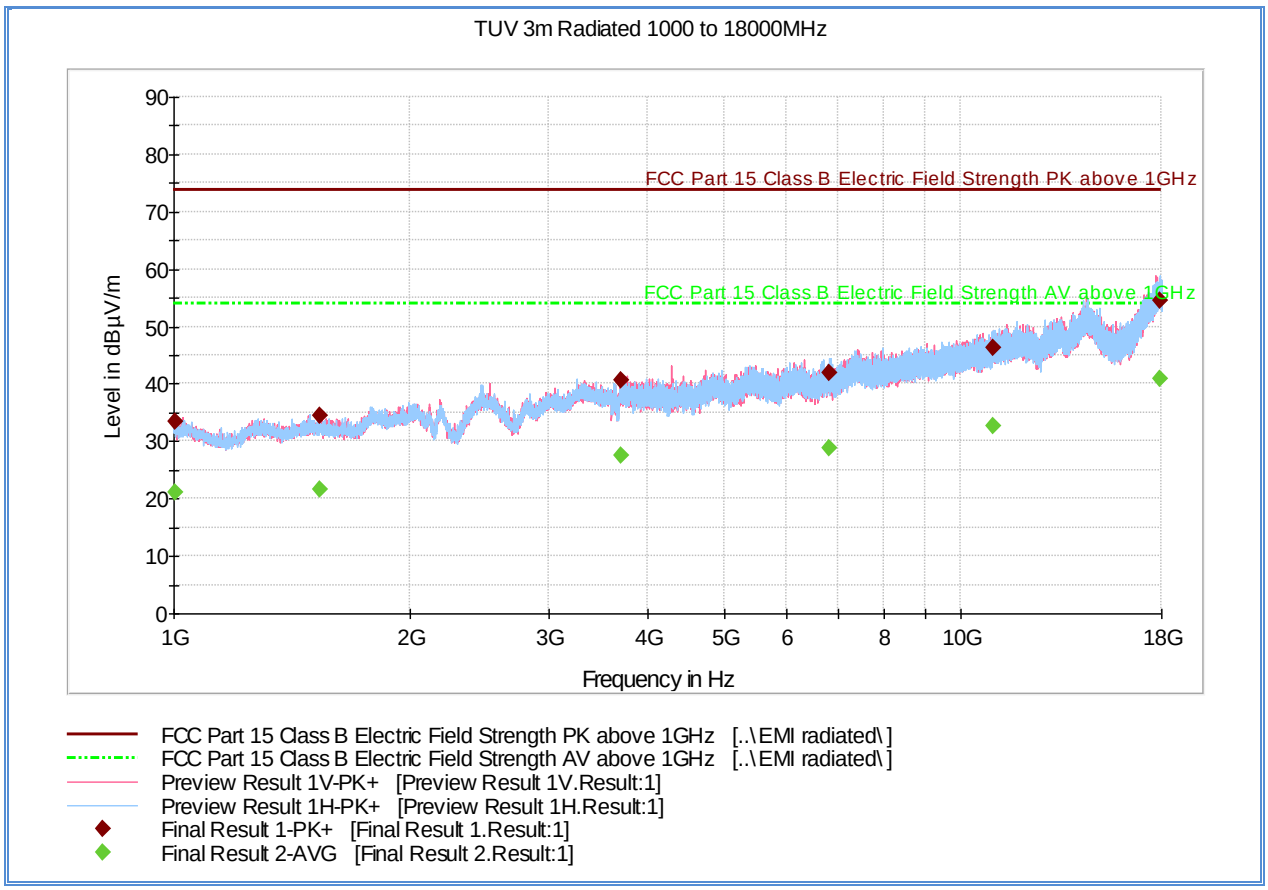
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1042.760000	33.7	1000.0	1000.000	100.0	H	132.0	-10.9	40.2	73.9
1793.160000	36.2	1000.0	1000.000	138.0	V	302.0	-7.1	37.7	73.9
3700.833333	40.1	1000.0	1000.000	157.0	H	331.0	0.3	33.8	73.9
5502.880000	40.7	1000.0	1000.000	400.0	V	15.0	4.1	33.2	73.9
11009.700000	45.7	1000.0	1000.000	202.0	V	265.0	11.5	28.2	73.9
17979.860000	54.8	1000.0	1000.000	212.0	H	45.0	21.7	19.1	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)
1042.760000	21.0	1000.0	1000.000	100.0	H	132.0	-10.9	32.9	53.9
1793.160000	23.4	1000.0	1000.000	138.0	V	302.0	-7.1	30.5	53.9
3700.833333	27.2	1000.0	1000.000	157.0	H	331.0	0.3	26.7	53.9
5502.880000	27.9	1000.0	1000.000	400.0	V	15.0	4.1	26.0	53.9
11009.700000	32.4	1000.0	1000.000	202.0	V	265.0	11.5	21.5	53.9
17979.860000	40.7	1000.0	1000.000	212.0	H	45.0	21.7	13.2	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 6GHz. Measurements above 6GHz are noise floor figures.

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



Peak Data

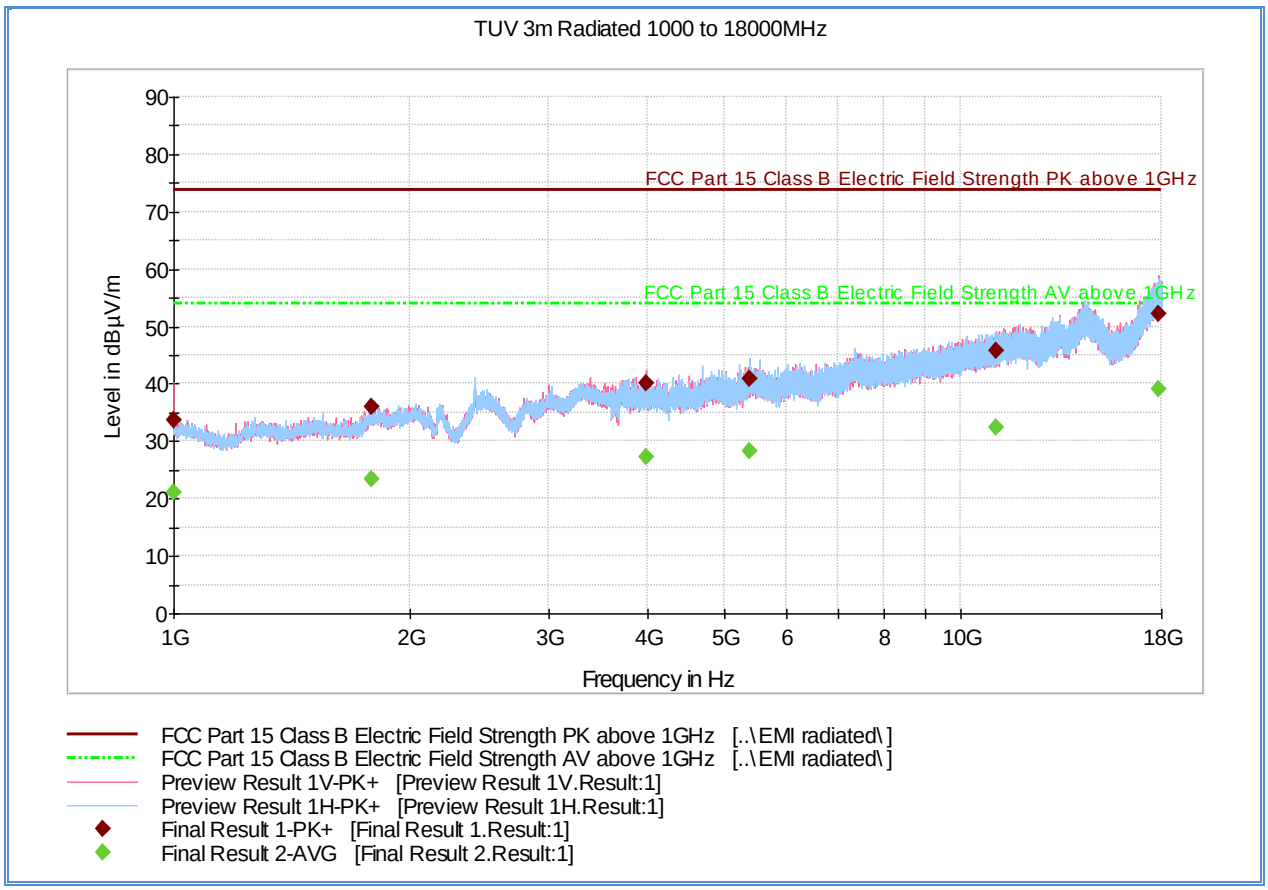
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1006.173333	33.5	1000.0	1000.000	341.0	V	78.0	-11.3	40.4	73.9
1536.366667	34.6	1000.0	1000.000	141.0	V	168.0	-9.0	39.3	73.9
3702.900000	40.5	1000.0	1000.000	348.0	V	229.0	0.3	33.4	73.9
6808.880000	42.0	1000.0	1000.000	299.0	H	309.0	5.3	31.9	73.9
11006.226667	46.3	1000.0	1000.000	400.0	V	309.0	11.5	27.6	73.9
17946.386667	54.4	1000.0	1000.000	358.0	H	300.0	21.6	19.5	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)
1006.173333	21.0	1000.0	1000.000	341.0	V	78.0	-11.3	32.9	53.9
1536.366667	21.5	1000.0	1000.000	141.0	V	168.0	-9.0	32.4	53.9
3702.900000	27.5	1000.0	1000.000	348.0	V	229.0	0.3	26.4	53.9
6808.880000	28.9	1000.0	1000.000	299.0	H	309.0	5.3	25.0	53.9
11006.226667	32.6	1000.0	1000.000	400.0	V	309.0	11.5	21.3	53.9
17946.386667	41.0	1000.0	1000.000	358.0	H	300.0	21.6	12.9	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 1GHz. Measurements above 1GHz are noise floor figures.

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



Peak Data

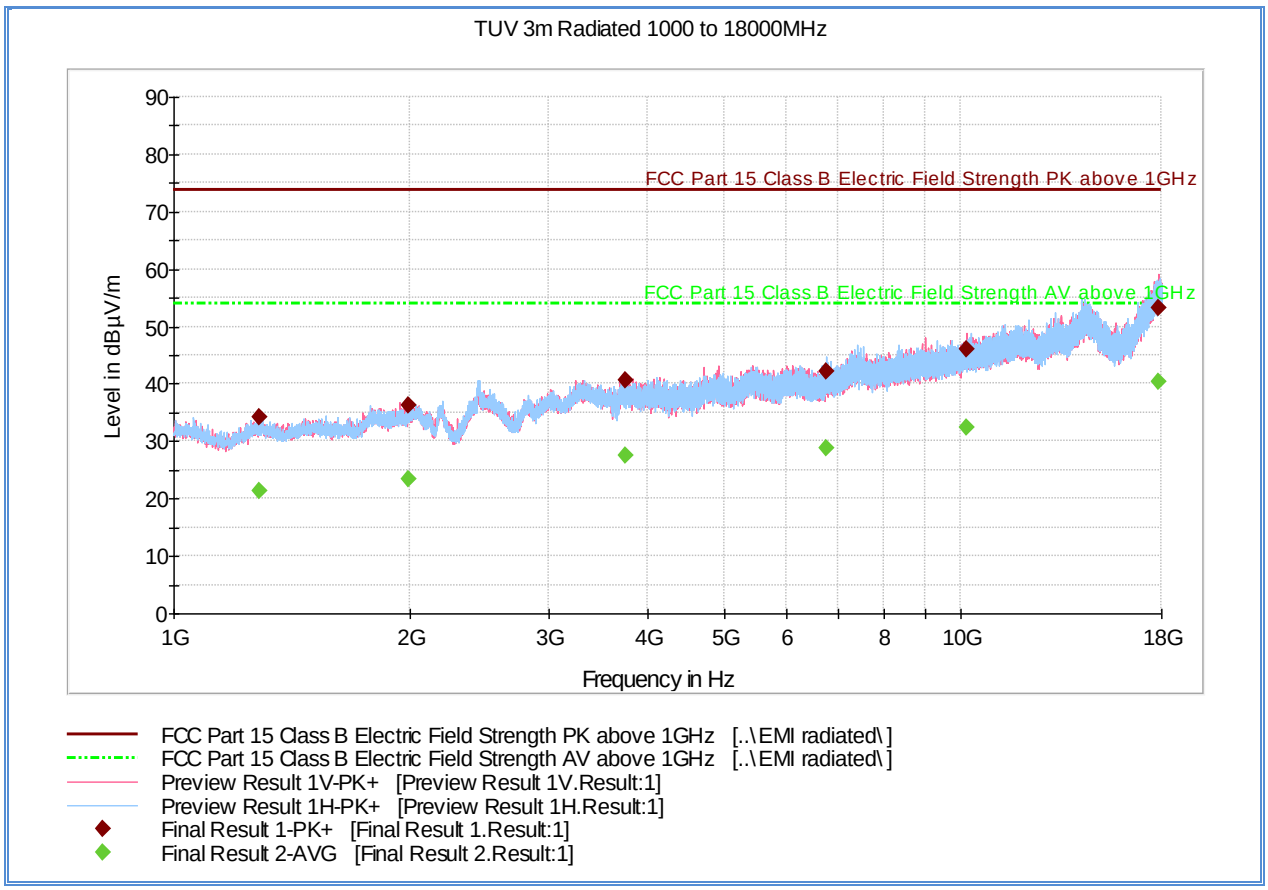
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.220000	33.8	1000.0	1000.000	271.0	V	109.0	-11.4	40.1	73.9
1787.400000	36.1	1000.0	1000.000	386.0	H	186.0	-7.2	37.8	73.9
3990.973333	40.1	1000.0	1000.000	389.0	V	321.0	1.3	33.8	73.9
5403.460000	40.8	1000.0	1000.000	371.0	H	37.0	3.9	33.1	73.9
11093.493333	45.7	1000.0	1000.000	160.0	V	315.0	11.7	28.2	73.9
17847.820000	52.3	1000.0	1000.000	184.0	V	232.0	21.2	21.6	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)
1000.220000	21.2	1000.0	1000.000	271.0	V	109.0	-11.4	32.7	53.9
1787.400000	23.4	1000.0	1000.000	386.0	H	186.0	-7.2	30.5	53.9
3990.973333	27.2	1000.0	1000.000	389.0	V	321.0	1.3	26.7	53.9
5403.460000	28.2	1000.0	1000.000	371.0	H	37.0	3.9	25.7	53.9
11093.493333	32.5	1000.0	1000.000	160.0	V	315.0	11.7	21.4	53.9
17847.820000	39.2	1000.0	1000.000	184.0	V	232.0	21.2	14.7	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 1GHz. Measurements above 1GHz are noise floor figures.

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



Peak Data

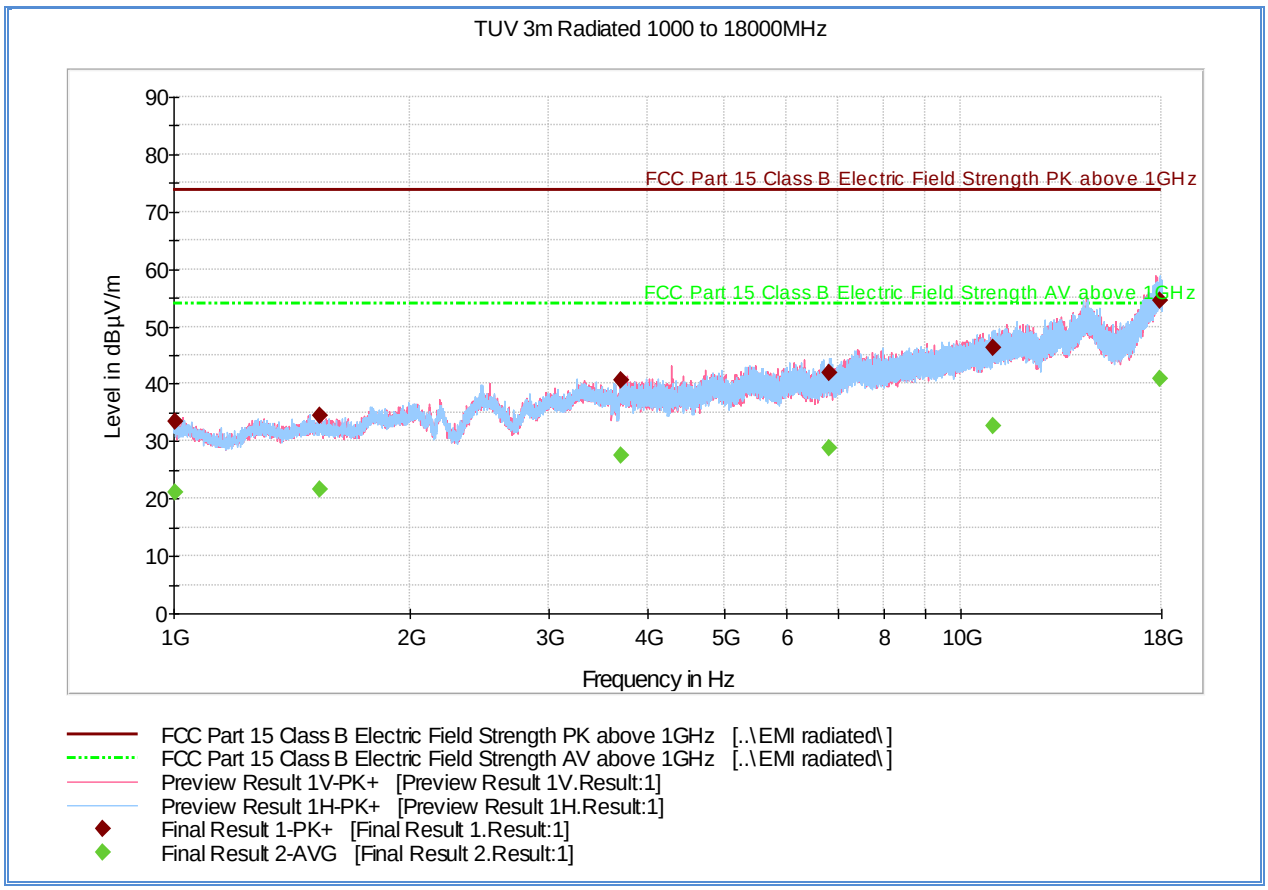
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1285.140000	34.1	1000.0	1000.000	396.0	V	225.0	-9.3	39.8	73.9
1986.460000	36.3	1000.0	1000.000	100.0	V	188.0	-6.3	37.6	73.9
3746.580000	40.6	1000.0	1000.000	175.0	V	130.0	0.5	33.3	73.9
6747.793333	42.2	1000.0	1000.000	314.0	H	265.0	5.0	31.7	73.9
10181.753333	45.9	1000.0	1000.000	333.0	V	93.0	10.2	28.0	73.9
17825.600000	53.2	1000.0	1000.000	112.0	V	27.0	21.2	20.7	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)
1285.140000	21.3	1000.0	1000.000	396.0	V	225.0	-9.3	32.6	53.9
1986.460000	23.3	1000.0	1000.000	100.0	V	188.0	-6.3	30.6	53.9
3746.580000	27.5	1000.0	1000.000	175.0	V	130.0	0.5	26.4	53.9
6747.793333	28.8	1000.0	1000.000	314.0	H	265.0	5.0	25.1	53.9
10181.753333	32.5	1000.0	1000.000	333.0	V	93.0	10.2	21.4	53.9
17825.600000	40.3	1000.0	1000.000	112.0	V	27.0	21.2	13.6	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 1GHz. Measurements above 1GHz are noise floor figures.

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



Peak Data

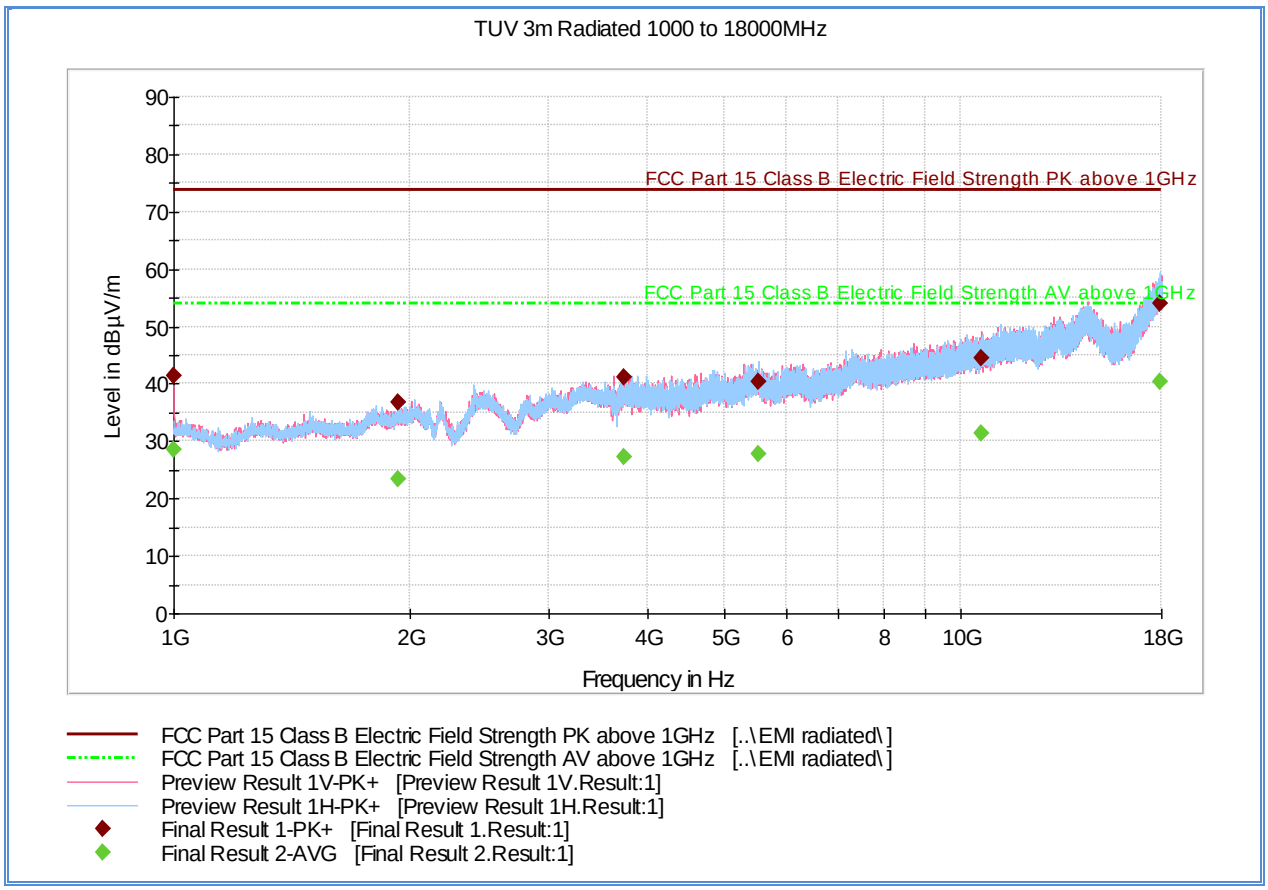
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1006.173333	33.5	1000.0	1000.000	341.0	V	78.0	-11.3	40.4	73.9
1536.366667	34.6	1000.0	1000.000	141.0	V	168.0	-9.0	39.3	73.9
3702.900000	40.5	1000.0	1000.000	348.0	V	229.0	0.3	33.4	73.9
6808.880000	42.0	1000.0	1000.000	299.0	H	309.0	5.3	31.9	73.9
11006.226667	46.3	1000.0	1000.000	400.0	V	309.0	11.5	27.6	73.9
17946.386667	54.4	1000.0	1000.000	358.0	H	300.0	21.6	19.5	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)
1006.173333	21.0	1000.0	1000.000	341.0	V	78.0	-11.3	32.9	53.9
1536.366667	21.5	1000.0	1000.000	141.0	V	168.0	-9.0	32.4	53.9
3702.900000	27.5	1000.0	1000.000	348.0	V	229.0	0.3	26.4	53.9
6808.880000	28.9	1000.0	1000.000	299.0	H	309.0	5.3	25.0	53.9
11006.226667	32.6	1000.0	1000.000	400.0	V	309.0	11.5	21.3	53.9
17946.386667	41.0	1000.0	1000.000	358.0	H	300.0	21.6	12.9	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 1GHz. Measurements above 1GHz are noise floor figures.

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



Peak Data

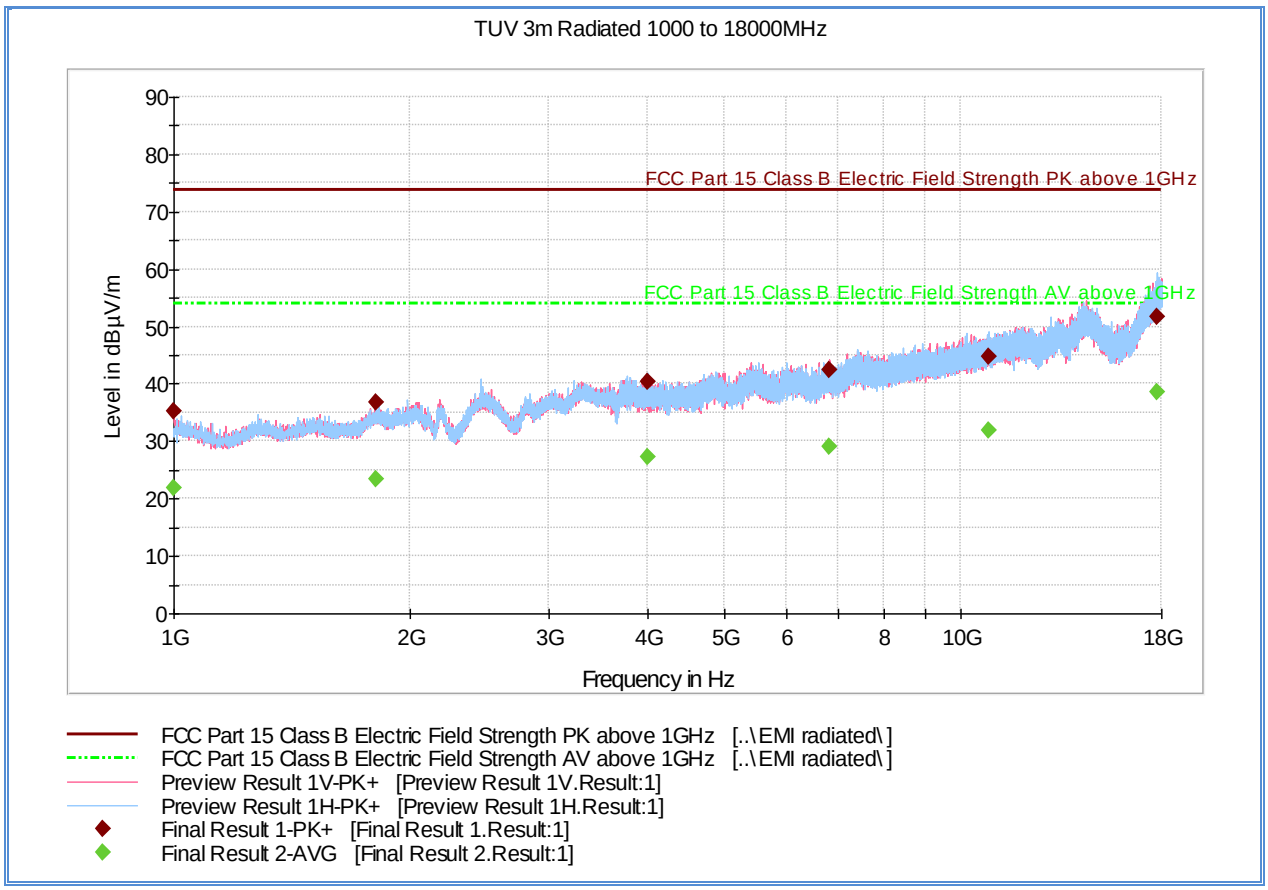
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	41.3	1000.0	1000.000	128.0	V	308.0	-11.4	32.6	73.9
1925.186667	36.9	1000.0	1000.000	266.0	V	154.0	-6.5	37.0	73.9
3740.746667	41.2	1000.0	1000.000	254.0	V	46.0	0.5	32.7	73.9
5543.506667	40.3	1000.0	1000.000	214.0	H	351.0	4.1	33.6	73.9
10611.773333	44.5	1000.0	1000.000	338.0	V	138.0	11.0	29.4	73.9
17938.013333	53.9	1000.0	1000.000	347.0	H	310.0	21.5	20.0	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)
1000.000000	28.5	1000.0	1000.000	128.0	V	308.0	-11.4	25.4	53.9
1925.186667	23.4	1000.0	1000.000	266.0	V	154.0	-6.5	30.5	53.9
3740.746667	27.2	1000.0	1000.000	254.0	V	46.0	0.5	26.7	53.9
5543.506667	27.7	1000.0	1000.000	214.0	H	351.0	4.1	26.2	53.9
10611.773333	31.4	1000.0	1000.000	338.0	V	138.0	11.0	22.5	53.9
17938.013333	40.4	1000.0	1000.000	347.0	H	310.0	21.5	13.5	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 2GHz. Measurements above 2GHz are noise floor figures.

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



Peak Data

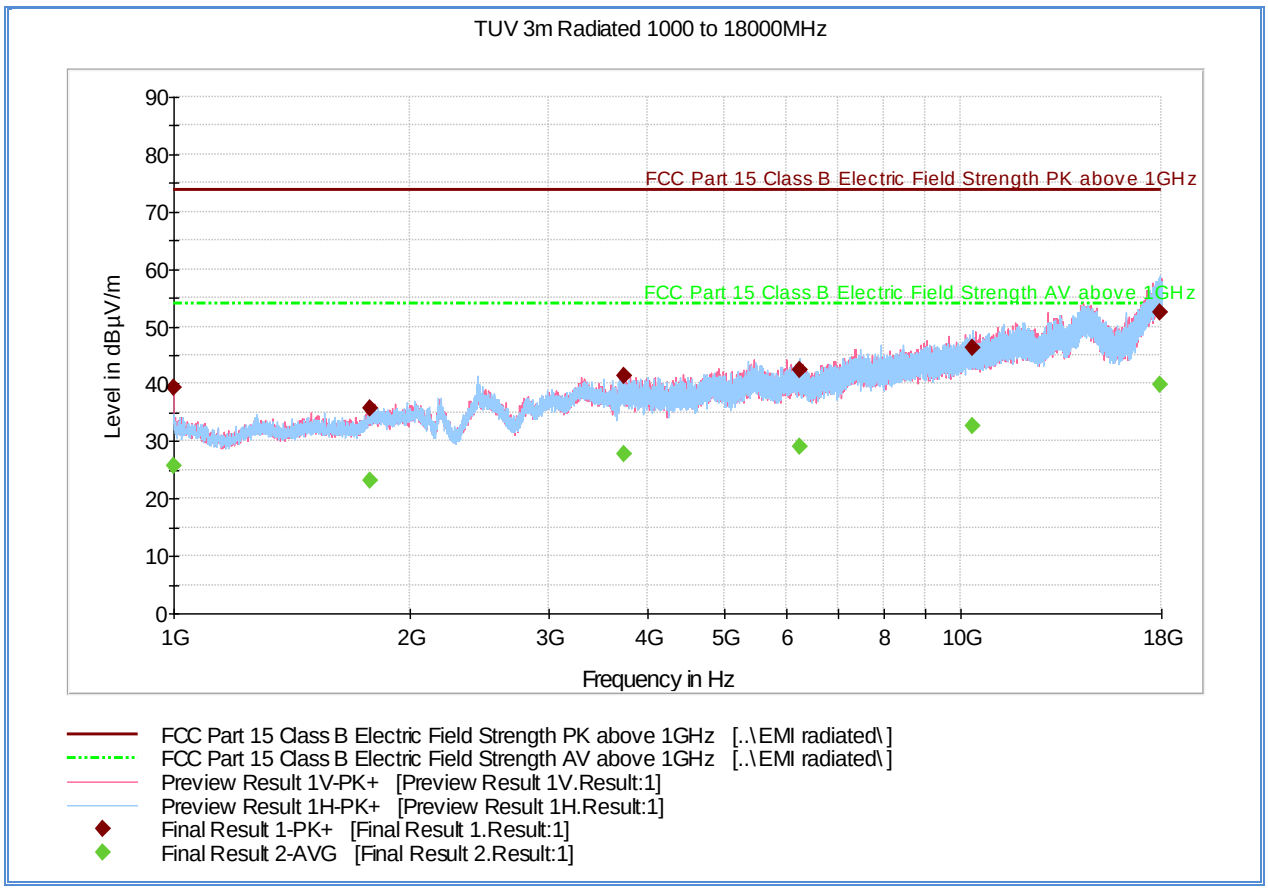
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.200000	35.2	1000.0	1000.000	128.0	V	283.0	-11.4	38.7	73.9
1805.220000	36.8	1000.0	1000.000	357.0	H	108.0	-7.0	37.1	73.9
3996.586667	40.4	1000.0	1000.000	373.0	H	330.0	1.3	33.5	73.9
6822.400000	42.4	1000.0	1000.000	176.0	V	236.0	5.3	31.5	73.9
10841.846667	44.7	1000.0	1000.000	376.0	H	315.0	11.2	29.2	73.9
17741.820000	51.6	1000.0	1000.000	262.0	H	208.0	20.8	22.3	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)
1000.200000	21.9	1000.0	1000.000	128.0	V	283.0	-11.4	32.0	53.9
1805.220000	23.5	1000.0	1000.000	357.0	H	108.0	-7.0	30.4	53.9
3996.586667	27.2	1000.0	1000.000	373.0	H	330.0	1.3	26.7	53.9
6822.400000	29.1	1000.0	1000.000	176.0	V	236.0	5.3	24.8	53.9
10841.846667	31.8	1000.0	1000.000	376.0	H	315.0	11.2	22.1	53.9
17741.820000	38.5	1000.0	1000.000	262.0	H	208.0	20.8	15.4	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 1GHz. Measurements above 1GHz are noise floor figures.

2.7.21 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)
1000.000000	39.4	1000.0	1000.000	100.0	V	89.0	-11.4	34.5	73.9
1773.273333	35.7	1000.0	1000.000	360.0	V	346.0	-7.3	38.2	73.9
3735.233333	41.4	1000.0	1000.000	180.0	H	357.0	0.5	32.5	73.9
6252.166667	42.3	1000.0	1000.000	105.0	H	2.0	4.7	31.6	73.9
10338.000000	46.2	1000.0	1000.000	105.0	H	128.0	10.5	27.7	73.9
17951.773333	52.5	1000.0	1000.000	311.0	H	36.0	21.6	21.4	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)
1000.000000	25.6	1000.0	1000.000	100.0	V	89.0	-11.4	28.3	53.9
1773.273333	23.1	1000.0	1000.000	360.0	V	346.0	-7.3	30.8	53.9
3735.233333	27.7	1000.0	1000.000	180.0	H	357.0	0.5	26.2	53.9
6252.166667	29.0	1000.0	1000.000	105.0	H	2.0	4.7	24.9	53.9
10338.000000	32.6	1000.0	1000.000	105.0	H	128.0	10.5	21.3	53.9
17951.773333	39.8	1000.0	1000.000	311.0	H	36.0	21.6	14.1	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 2GHz. Measurements above 2GHz are noise floor figures.

2.8 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

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: UB310812700012 / Test Configuration A,B and C

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

October 13 and 14, 2012/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	22.4-23.5°C
Relative Humidity	48.7-49.56%
ATM Pressure	99.4 kPa

2.8.7 Additional Observations

- This is a radiated test. The spectrum was searched from 2310MHz to 2390MHz for lower band edge and 2483.5MHz to 2500MHz for the upper band edge.
- There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.
- Before each test, a new set of battery (freshly charged) is installed.

- 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)

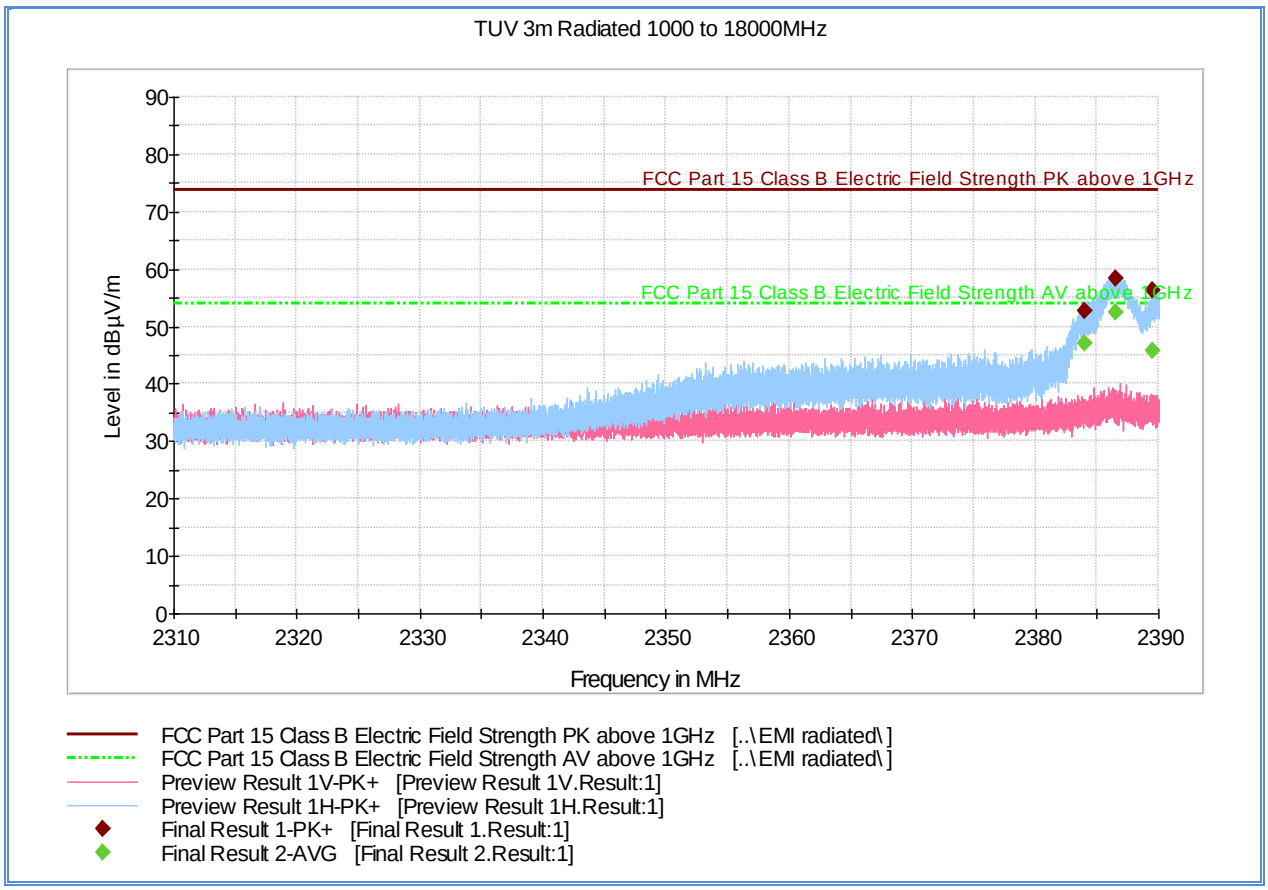
Measuring equipment raw measurement (dbµV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbµV/m) @ 30MHz			**11.8**

2.8.9 Test Results

See attached plots.

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

2.8.10 Test Results Above 802.11b Low Channel



Peak Data

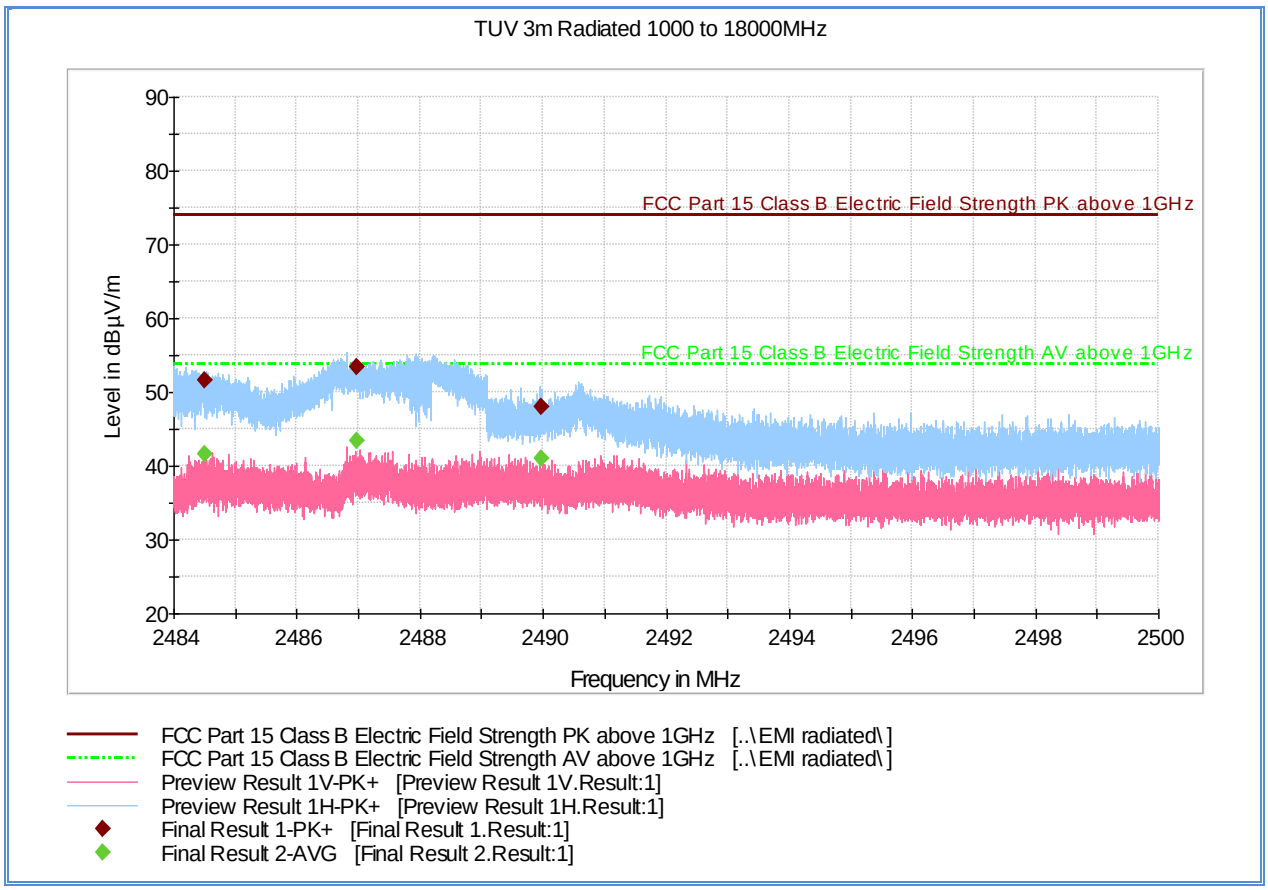
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2383.998667	52.7	1000.0	1000.000	100.0	H	276.0	-4.9	21.2	73.9
2386.478667	58.4	1000.0	1000.000	100.0	H	276.0	-4.9	15.5	73.9
2389.524000	56.2	1000.0	1000.000	100.0	H	276.0	-4.9	17.7	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)
2383.998667	46.9	1000.0	1000.000	100.0	H	276.0	-4.9	7.0	53.9
2386.478667	52.5	1000.0	1000.000	100.0	H	276.0	-4.9	1.4	53.9
2389.524000	45.8	1000.0	1000.000	100.0	H	276.0	-4.9	8.1	53.9

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

2.8.11 Test Results Above 802.11b High Channel



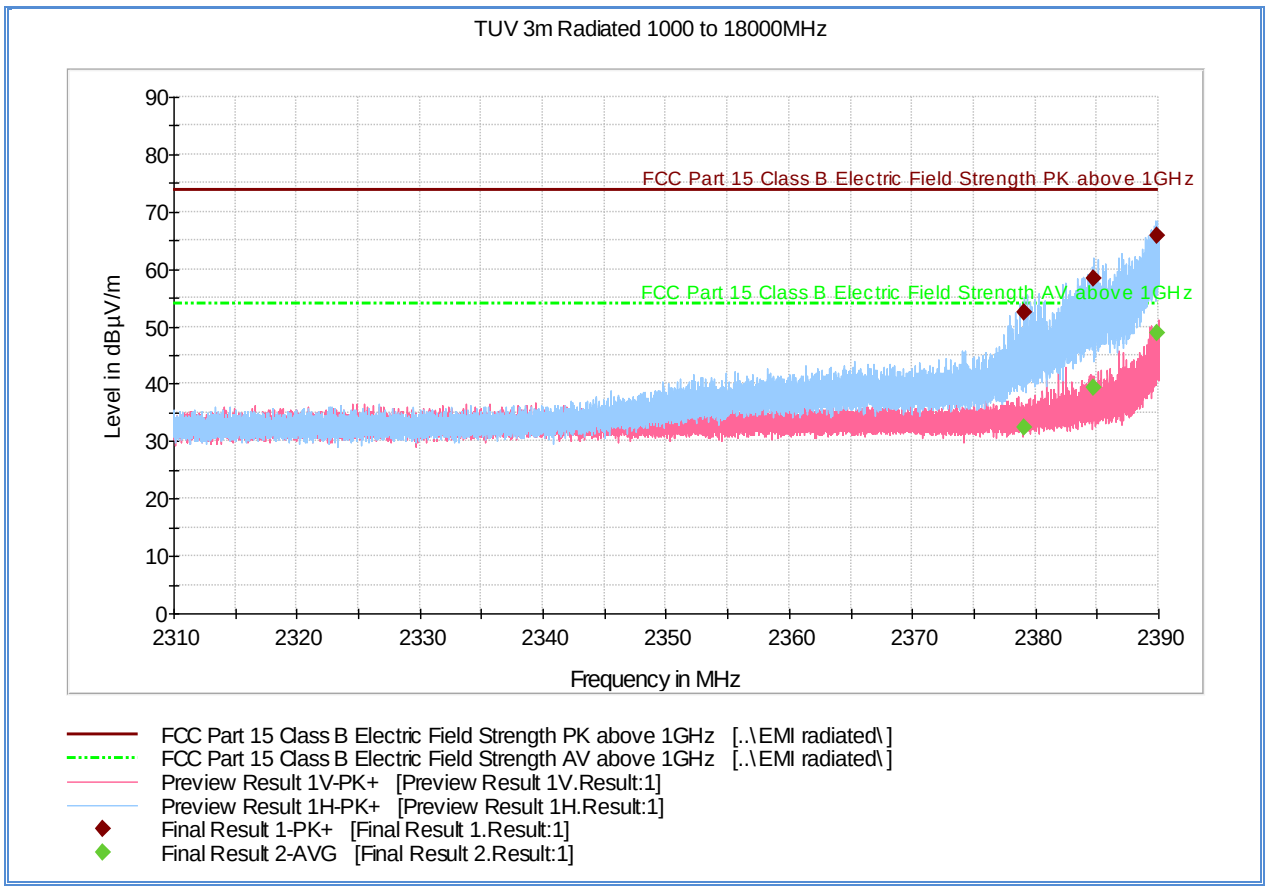
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2484.500000	51.7	1000.0	1000.000	100.0	H	274.0	-4.7	22.2	73.9
2486.983733	53.4	1000.0	1000.000	100.0	H	274.0	-4.7	20.5	73.9
2489.984267	47.9	1000.0	1000.000	100.0	H	279.0	-4.7	26.0	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)
2484.500000	41.7	1000.0	1000.000	100.0	H	274.0	-4.7	12.2	53.9
2486.983733	43.4	1000.0	1000.000	100.0	H	274.0	-4.7	10.5	53.9
2489.984267	40.9	1000.0	1000.000	100.0	H	279.0	-4.7	13.0	53.9

2.8.12 Test Results Above 802.11g Low Channel



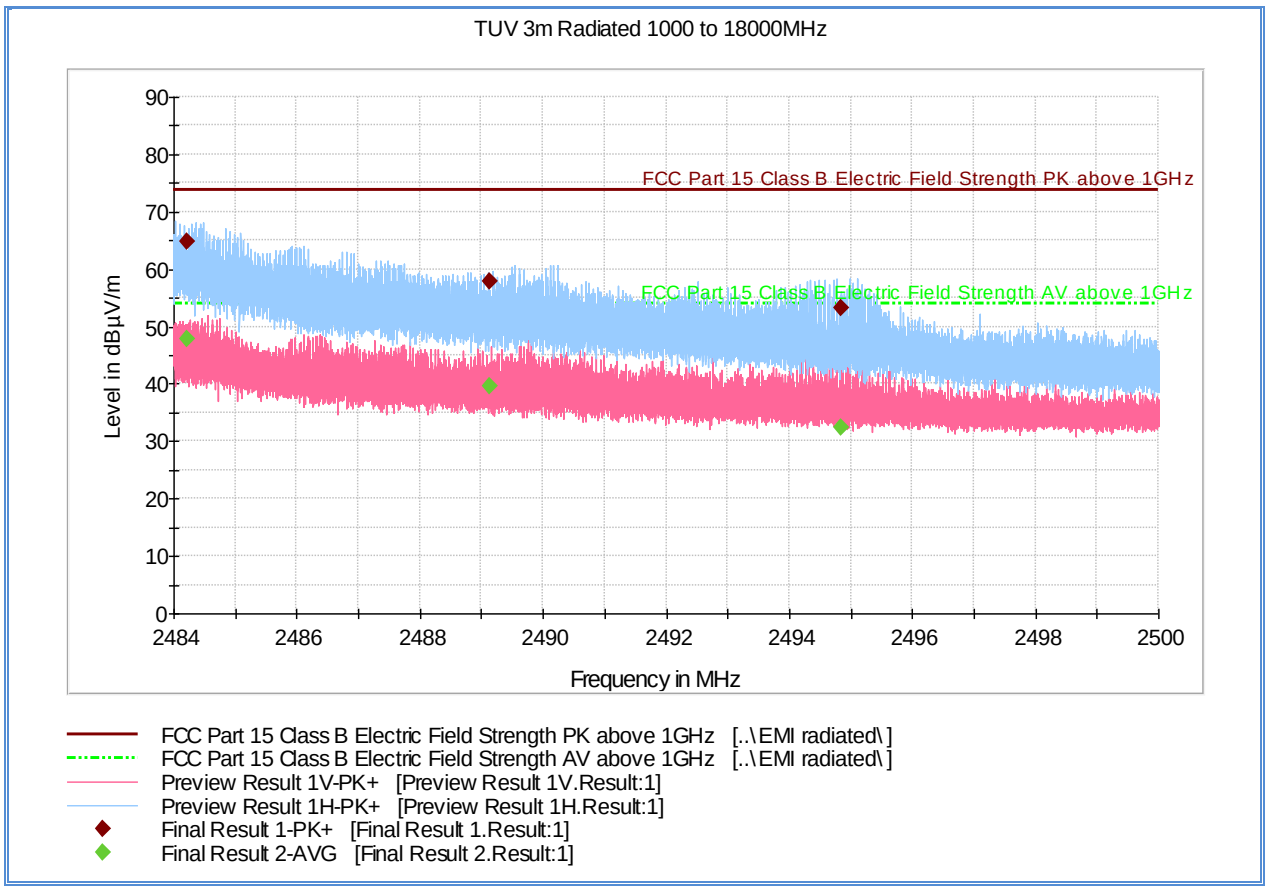
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2379.105333	52.4	1000.0	1000.000	100.0	H	273.0	-5.0	21.5	73.9
2384.724000	58.5	1000.0	1000.000	100.0	H	277.0	-4.9	15.4	73.9
2389.828000	65.8	1000.0	1000.000	100.0	H	275.0	-4.9	8.1	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)
2379.105333	32.3	1000.0	1000.000	100.0	H	273.0	-5.0	21.6	53.9
2384.724000	39.5	1000.0	1000.000	100.0	H	277.0	-4.9	14.4	53.9
2389.828000	48.9	1000.0	1000.000	100.0	H	275.0	-4.9	5.0	53.9

2.8.13 Test Results Above 802.11g High Channel



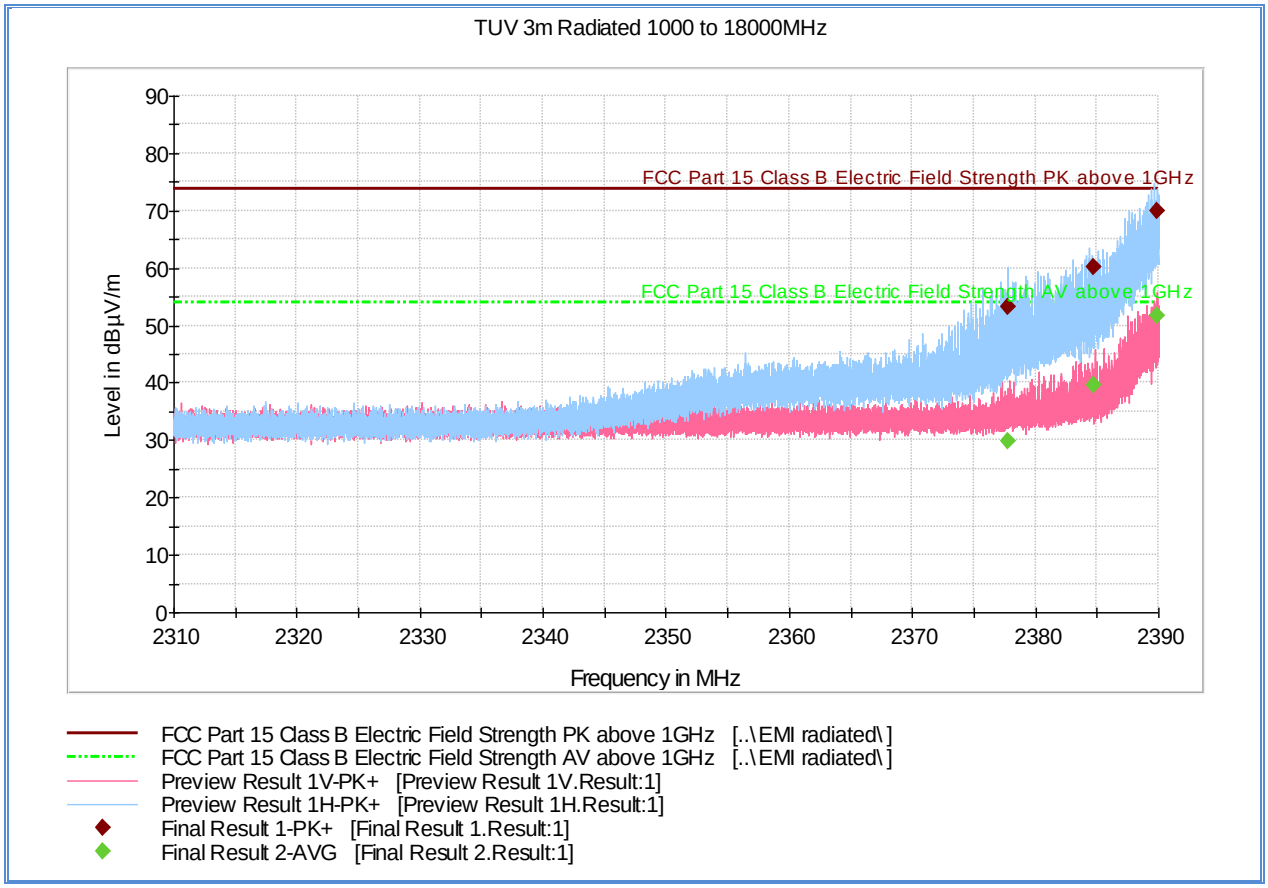
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2484.220000	64.7	1000.0	1000.000	100.0	H	274.0	-4.7	9.2	73.9
2489.126667	57.8	1000.0	1000.000	100.0	H	274.0	-4.7	16.1	73.9
2494.848267	53.3	1000.0	1000.000	100.0	H	275.0	-4.7	20.6	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)
2484.220000	47.7	1000.0	1000.000	100.0	H	274.0	-4.7	6.2	53.9
2489.126667	39.7	1000.0	1000.000	100.0	H	274.0	-4.7	14.2	53.9
2494.848267	32.3	1000.0	1000.000	100.0	H	275.0	-4.7	21.6	53.9

2.8.14 Test Results Above 802.11n Low Channel



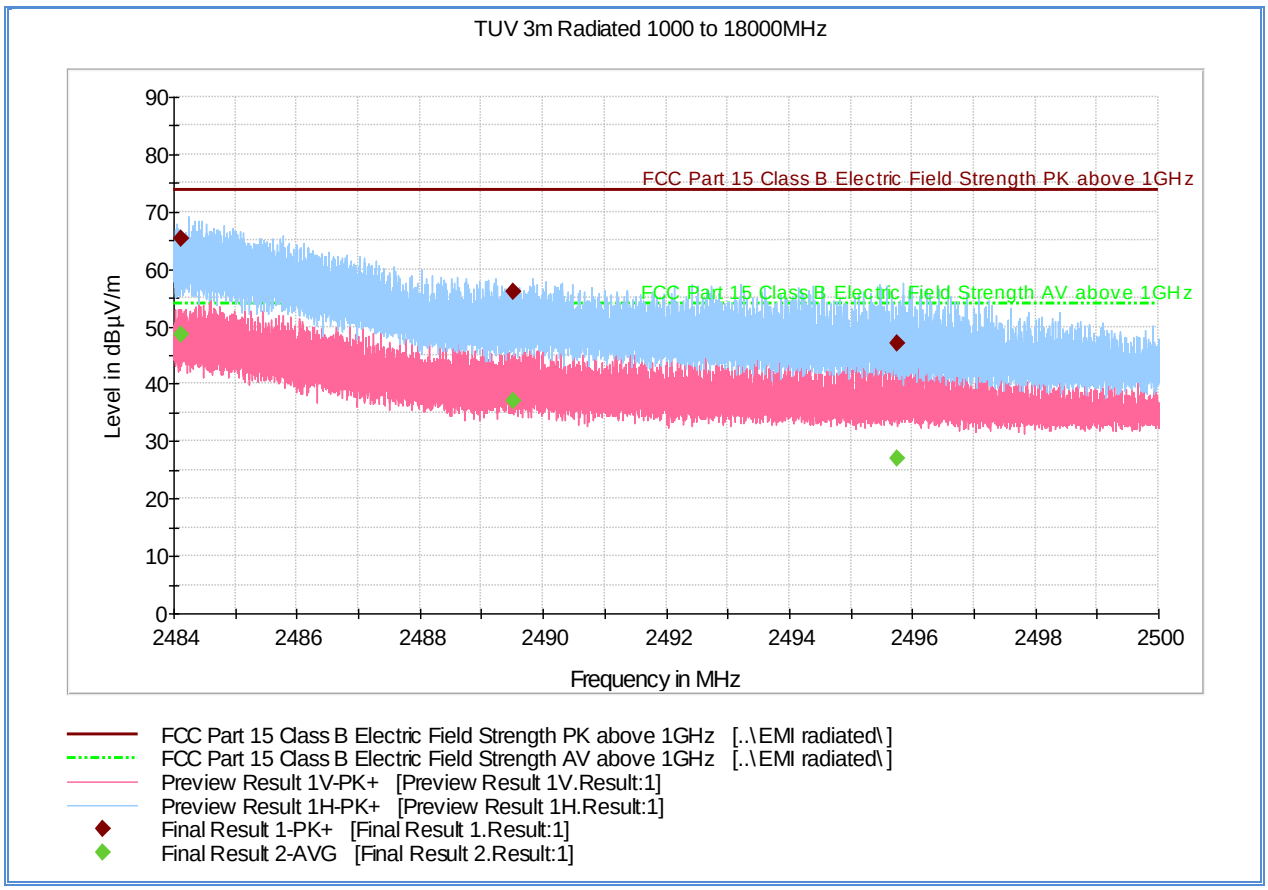
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2377.822667	53.2	1000.0	1000.000	100.0	H	282.0	-5.0	20.7	73.9
2384.729333	60.1	1000.0	1000.000	100.0	H	273.0	-4.9	13.8	73.9
2389.849333	69.9	1000.0	1000.000	100.0	H	275.0	-4.9	4.0	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)
2377.822667	29.9	1000.0	1000.000	100.0	H	282.0	-5.0	24.0	53.9
2384.729333	39.7	1000.0	1000.000	100.0	H	273.0	-4.9	14.2	53.9
2389.849333	51.7	1000.0	1000.000	100.0	H	275.0	-4.9	2.2	53.9

2.8.15 Test Results Above 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)
2484.120000	65.3	1000.0	1000.000	100.0	H	279.0	-4.7	8.6	73.9
2489.520800	56.1	1000.0	1000.000	100.0	H	278.0	-4.7	17.8	73.9
2495.759733	47.0	1000.0	1000.000	100.0	H	39.0	-4.7	26.9	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)
2484.120000	48.6	1000.0	1000.000	100.0	H	279.0	-4.7	5.3	53.9
2489.520800	37.1	1000.0	1000.000	100.0	H	278.0	-4.7	16.8	53.9
2495.759733	27.1	1000.0	1000.000	100.0	H	39.0	-4.7	26.8	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: UB310812700012 / Test Configuration D,E and F

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

October 11, 2012/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	22.2°C
Relative Humidity	53.0%
ATM Pressure	99.4 kPa

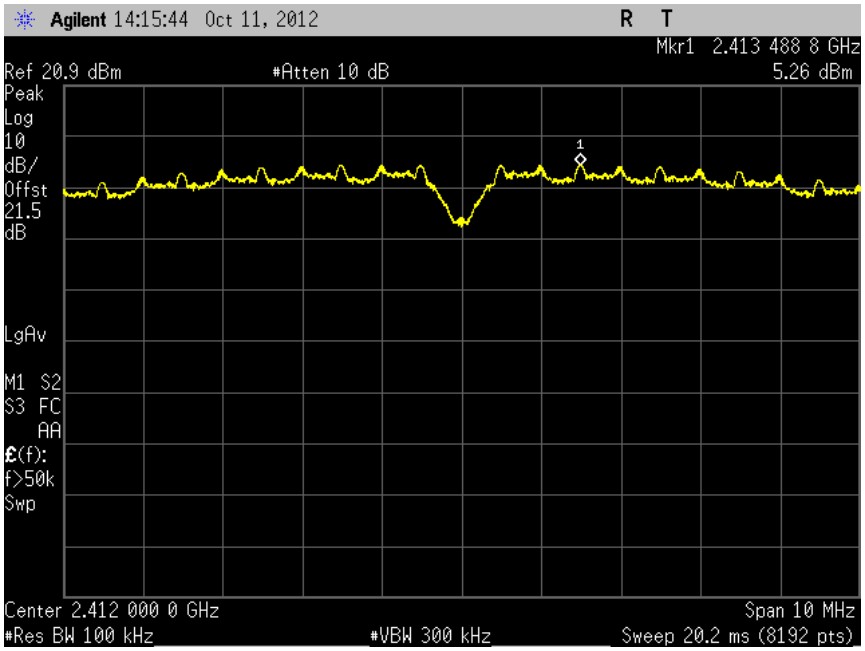
2.9.7 Additional Observations

- This is a conducted test.
- Test procedure is per Section 5.3.1 of KDB 558074 (January 18, 2012).
- An offset of 21.5dB 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 (3kHz/100kHz).

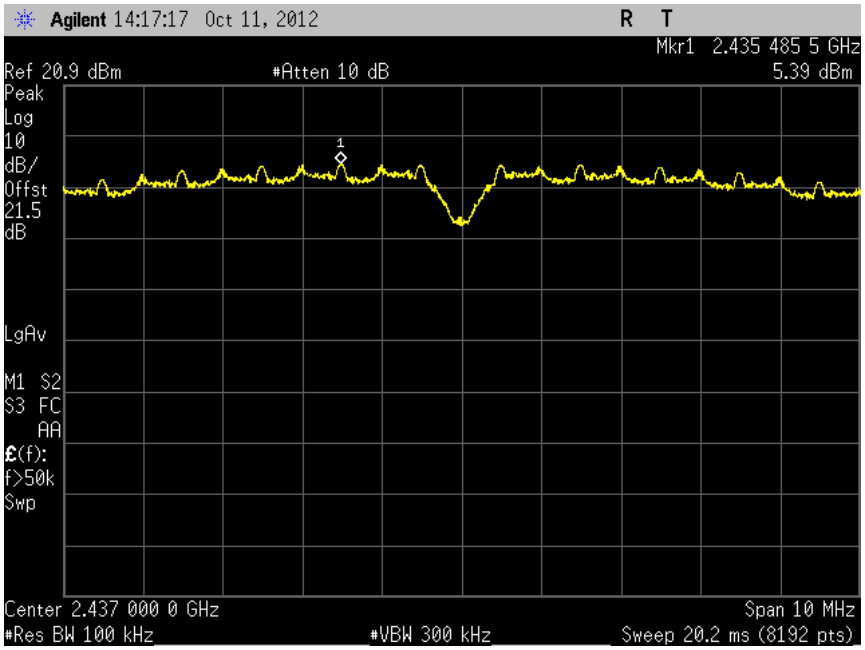
2.9.8 Test Results Summary

Mode	Channel	Marker Reading	Bandwidth Correction Factor (BWCF)	PSD Level (dBm)	Limit (dBm)	Compliance
802.11b	1 (2412 MHz)	5.26	15.228	-9.968	8	Complies
	6 (2437 MHz)	5.39	15.228	-9.838	8	Complies
	11 (2462 MHz)	5.77	15.228	-9.458	8	Complies
802.11g	1 (2412 MHz)	0.28	15.228	-14.948	8	Complies
	6 (2437 MHz)	4.06	15.228	-11.168	8	Complies
	11 (2462 MHz)	-0.13	15.228	-15.358	8	Complies
802.11n HT20	1 (2412 MHz)	-0.18	15.228	-15.408	8	Complies
	6 (2437 MHz)	4.43	15.228	-10.798	8	Complies
	11 (2462 MHz)	-0.63	15.228	-15.858	8	Complies

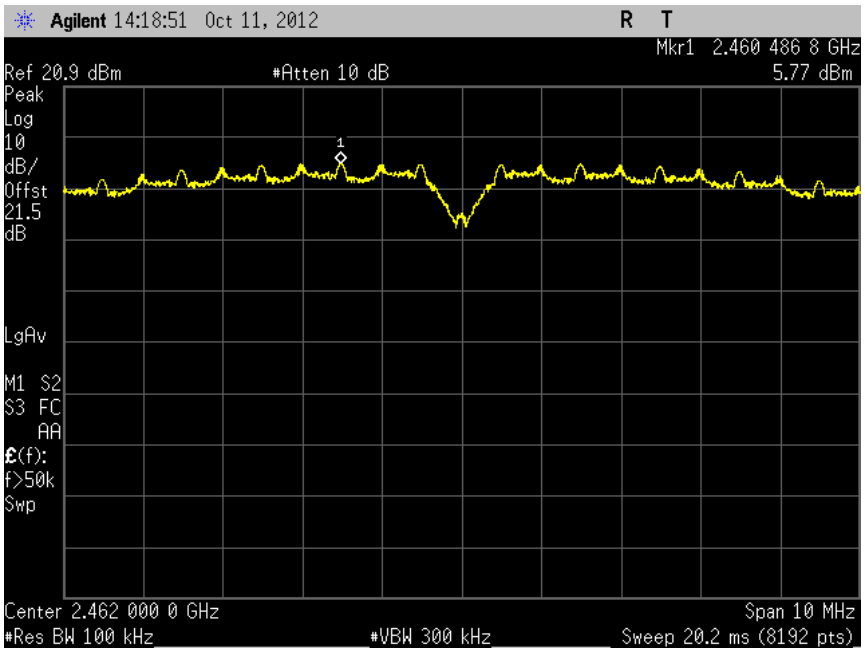
2.9.9 Test Results Plots



802.11 b Low Channel

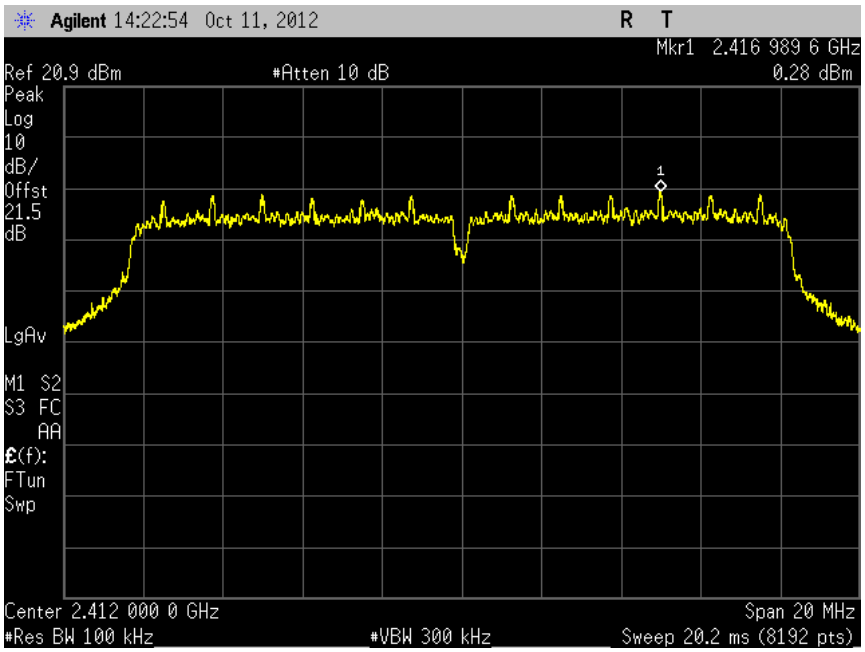


802.11 b Mid Channel

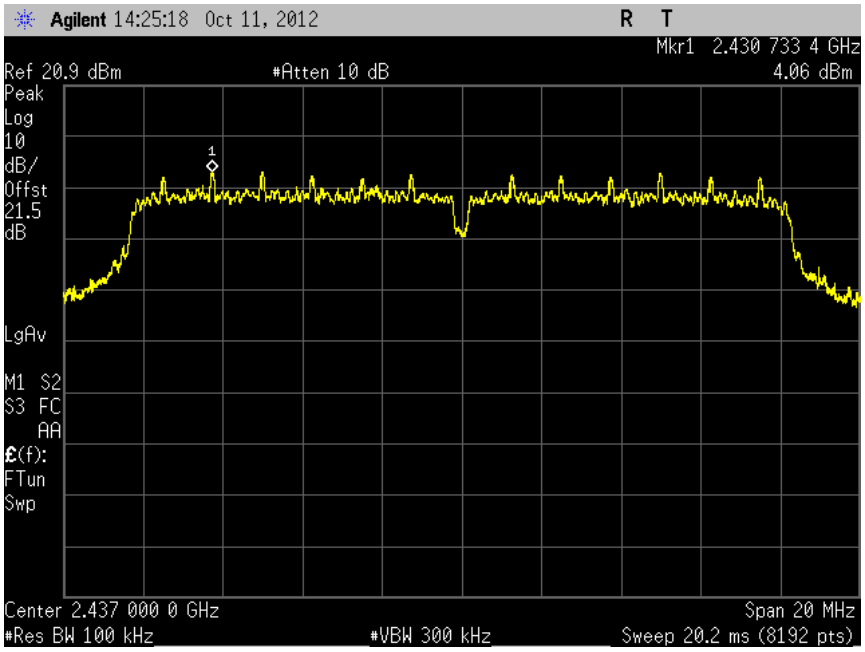


802.11 b High Channel

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

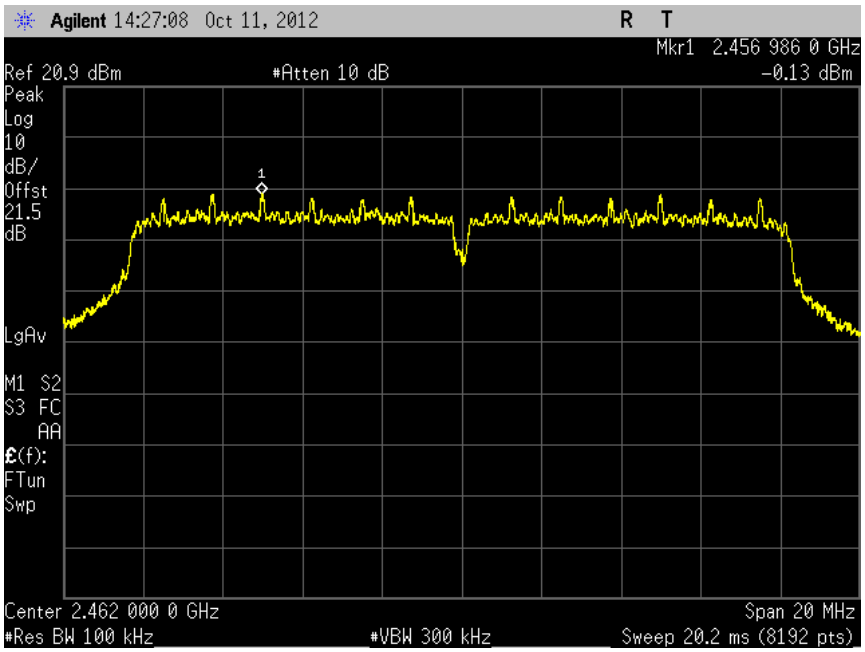


802.11 g Low Channel

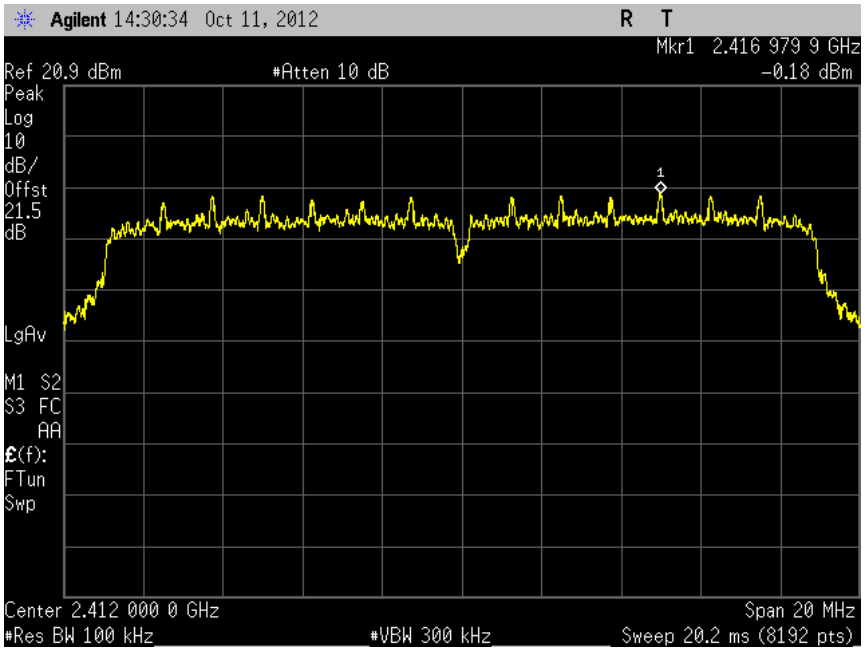


802.11 g Mid Channel

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

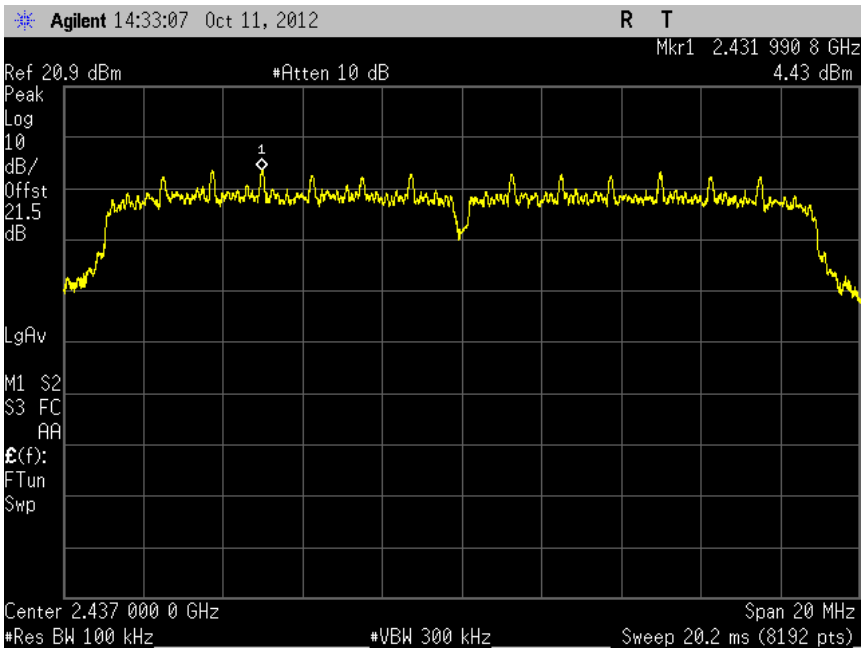


802.11 g High Channel

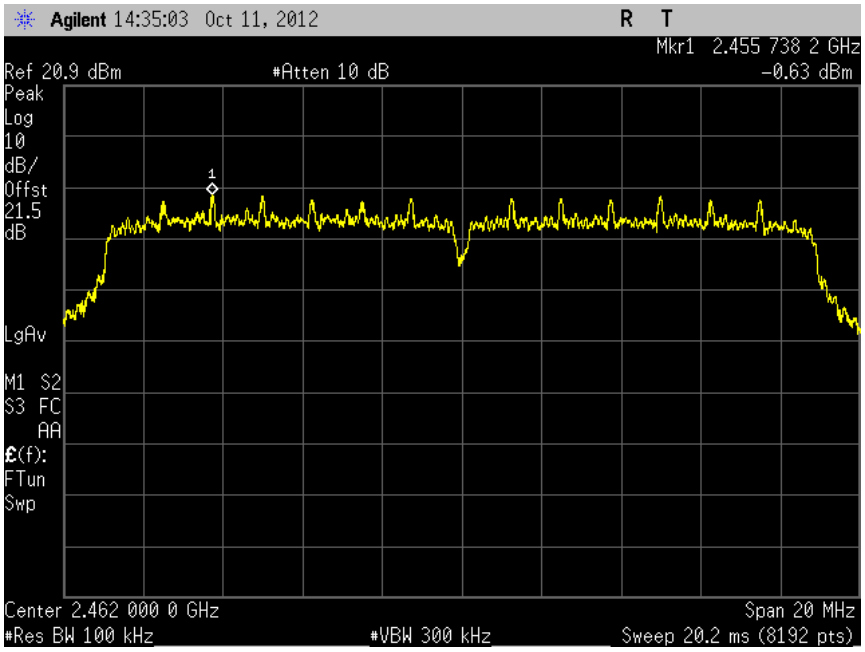


802.11 n Low Channel

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



802.11 n Mid Channel



802.11 n High Channel

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

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						
6814	Spectrum Analyzer	E4440A PSA Series	MY42510441	Agilent	11/03/11	11/03/12
7569	Series Power Meter	N1911A P-	MY45100625	Agilent	02/24/12	02/24/14
7570	50MHz-18GHz Wideband Power Sensor	N1921A	MY45240588	Agilent	02/14/12	02/24/13
Conducted Emissions Test Setup						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	02/29/12	02/28/13
7567	LISN	FCC-LISN-50-25-2-10	120304	Fischer Custom Comm.	05/24/12	05/24/13
7568	LISN	FCC-LISN-50-25-2-10	120305	Fischer Custom Comm.	05/24/12	05/24/13
8607	20dB Attenuator	CAT-20	N/A	MCL HAT-20	08/21/12	08/21/13
8609	20dB Attenuator	CAT-20	N/A	MCL HAT-20	08/21/12	08/21/13
Radiated Test Setup						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	12/06/11	12/06/12
6669	Double-ridged waveguide horn antenna	3115	94124364	EMCO	11/07/11	11/07/12
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	09/21/12	09/21/13
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	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
6815	2.4GHz Band Notch Filter	BRM50702	008	Micro-Tronics	Verified by 1040	
1150	Horn antenna	RA42-K-F-4B-C	012054-004	CMT	Verified by 1003 and 1049	
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	Verified by 1003 and 1049	
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	10/13/11	10/13/12*
Miscellaneous						
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	08/12/12	08/12/13
6452	Multimeter	3478A	2911A52177	Hewlett Packard	07/16/12	07/16/13
	Test Software	EMC32	V8.52	Rhode & Schwarz	N/A	

**This equipment was used to verify cable losses prior the calibration due date. Not used in collecting data for reporting purposes.*

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	3.55	2.05	4.20
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	2.23
				Coverage Factor (k):	2
				Expanded Uncertainty:	4.45

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	3.55	2.05	4.20
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	2.22
				Coverage Factor (k):	2
				Expanded Uncertainty:	4.44

3.2.3 Conducted Antenna Port Measurement

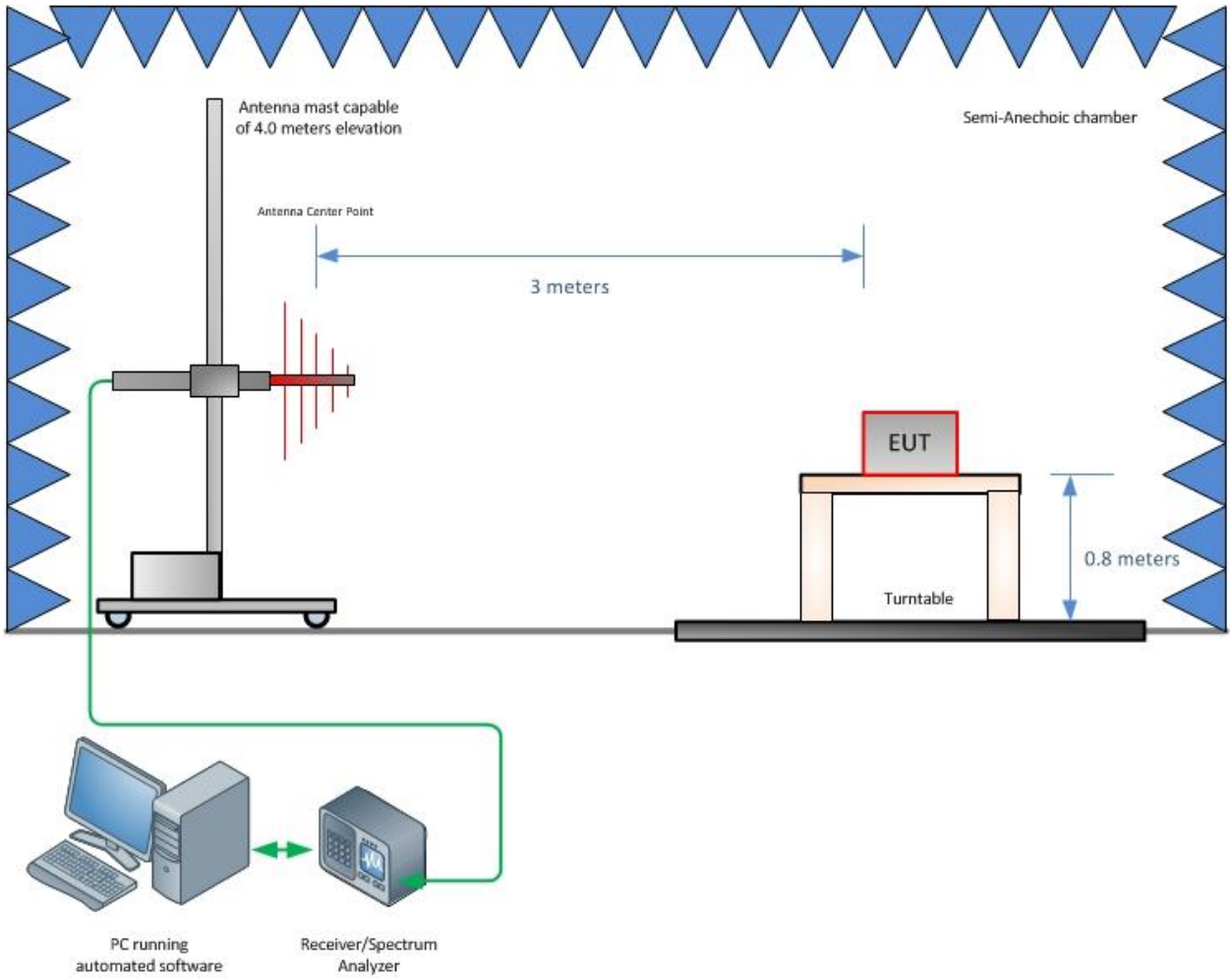
	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.50	0.29	0.08
3	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	0.72
				Coverage Factor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

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

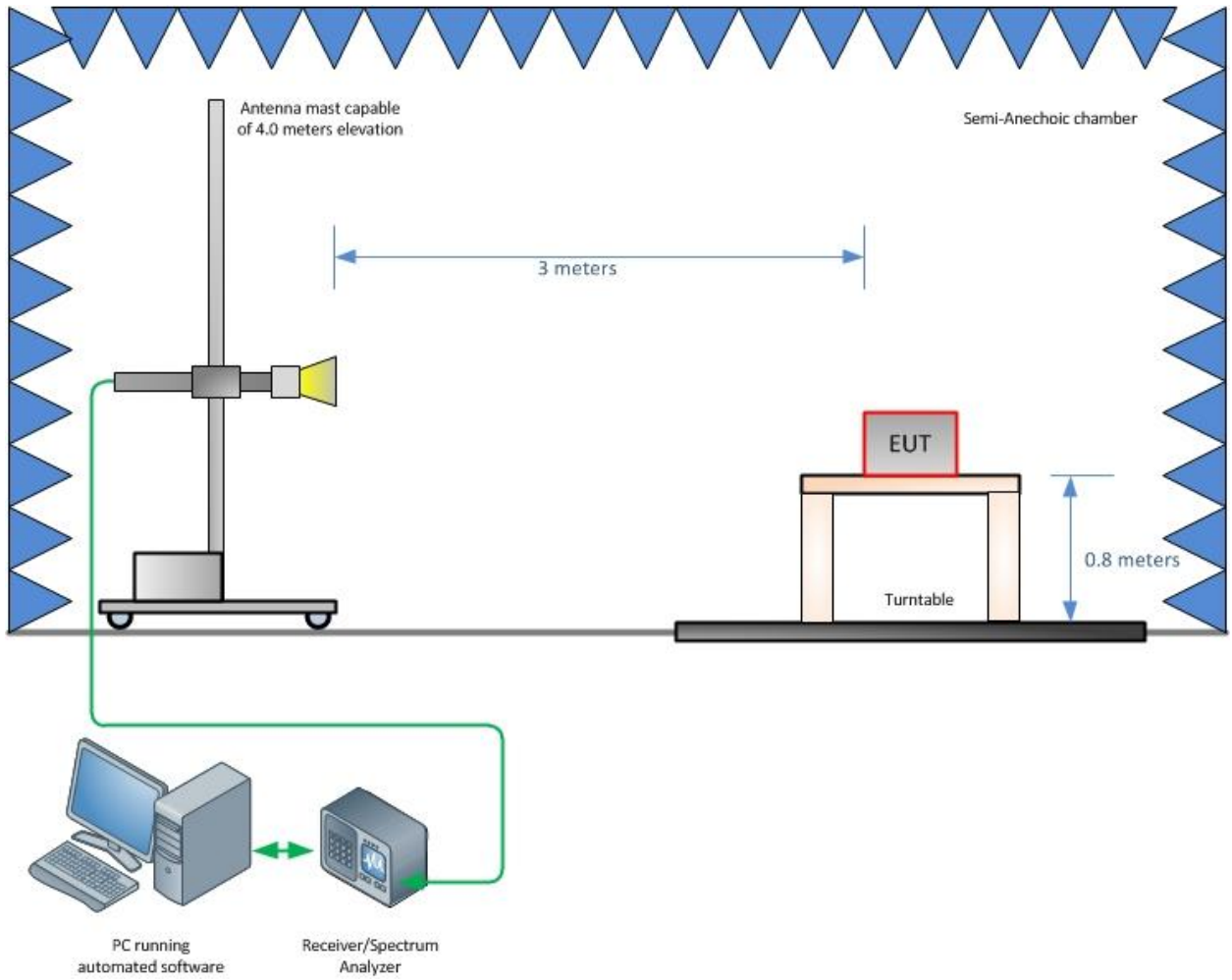
SECTION 4

DIAGRAM OF TEST SETUP

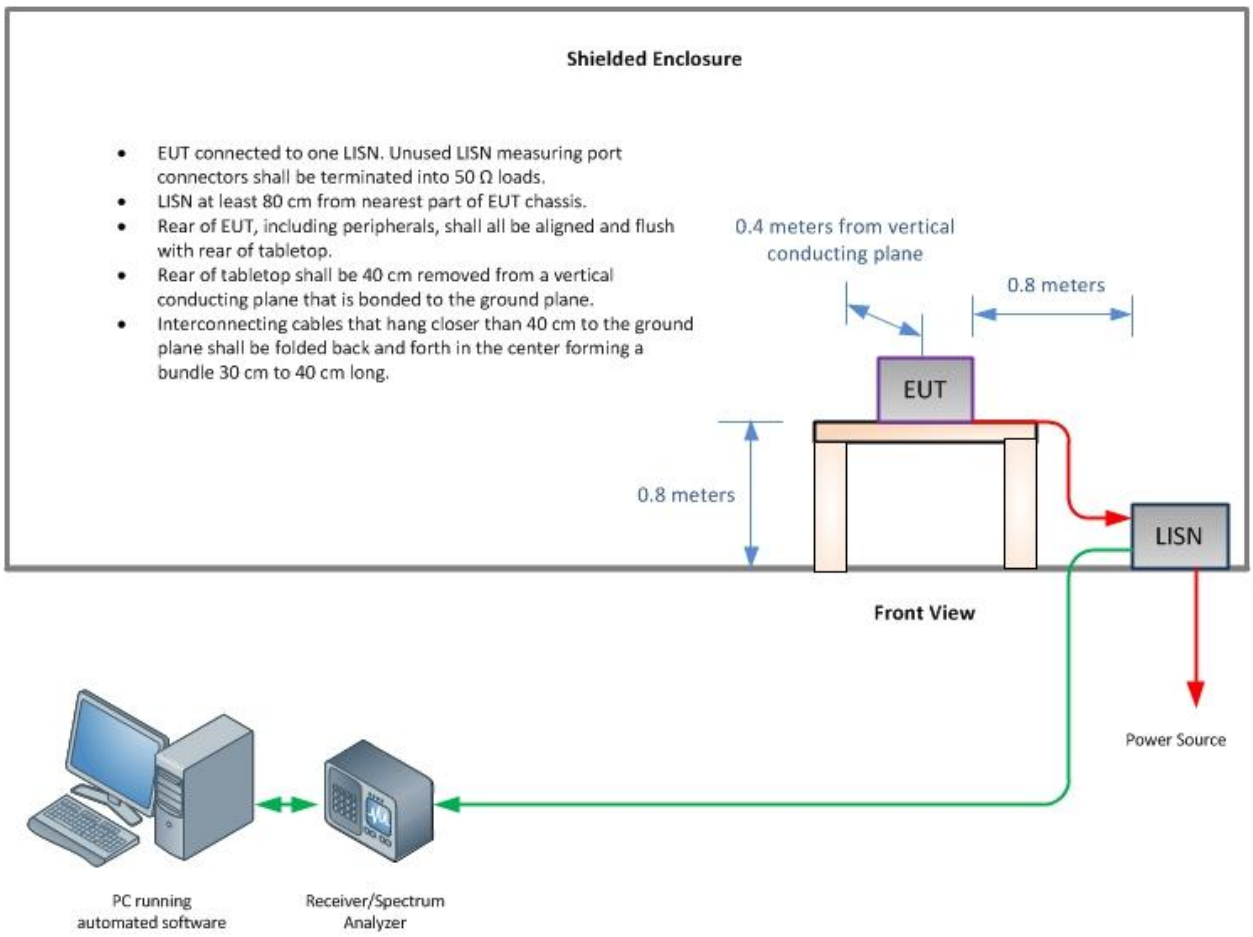
4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



Conducted Emissions Test Setup

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

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

TÜV SÜD America Inc.'s reports apply only to the specific sample tested under stated test conditions. It is the manufacturer's responsibility to assure the continued compliance of production units of this model. TÜV SÜD America, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America, Inc.'s issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and TÜV SÜD America, Inc., extracts from the test report shall not be reproduced, except in full without TÜV SÜD America, Inc.'s written approval.

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

TÜV SÜD America, Inc. and its professional staff hold government
and professional organization certifications for
AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, NIST and VCCI.

NVLAP Lab Code: 100268-0

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