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Report On

Application for Grant of Equipment Authorization of the
Lantronix, Inc.
Wireless Print Solutions Adapter; xPrintServer Wi-Fi Professional and xPrintServer Wi-Fi Essential Ethernet to Wireless Print Server

FCC Part 15 Subpart C §15.247 (DTS)
IC RSS-210 Issue 8 December 2010

Report No. SD72105305-0414C May 2015

REPORT ON	Radio Testing of the Lantronix, Inc. Ethernet to Wireless Print Server
TEST REPORT NUMBER	SD72105305-0414C
PREPARED FOR	Lantronix, Inc. 7535 Irvine Center Drive, Suite 100 Irvine, CA
CONTACT PERSON	Michael Simonsen Engineering Supervisor (949) 453-7109 Michael.Simonsen@Lantronix.com
PREPARED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: EMC/Senior Wireless Test Engineer
APPROVED BY	Chip R. Fleury Name Authorized Signatory Title: West Coast EMC Manager
DATED	May 28, 2015

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

Revision History

SD72105305-0414C Lantronix, Inc. Wireless Print Solutions Adapter; xPrintServer Wi-Fi Professional and xPrintServer Wi-Fi Essential Ethernet to Wireless Print Server					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
05/28/2015	Initial Release				Chip R. Fleury

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Lantronix, Inc.
Ethernet to Wireless Print Server

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Lantronix, Inc. Wireless Print Solutions Adapter; xPrintServer Wi-Fi Professional and xPrintServer Wi-Fi Essential Ethernet to Wireless Print Server to the requirements of FCC Part 15 Subpart C §15.247 and IC 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	Lantronix, Inc.
Model Number(s)	WPSA-100 (Xerox); XPS2140201S (Lantronix) and XPS2140101S (Lantronix)
FCC ID Number	R68XPSWF
IC Number	3867A-XPSWF
Serial Number(s)	N/A
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.247 (October 1, 2014). • RSS-210 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment (Issue 8, December 2010). • RSS-Gen - General Requirements for Compliance of Radio Apparatus (Issue 4, November 2014). • 558074 D01 DTS Meas Guidance v03r02,(June 05, 2014) Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.
Start of Test	May 11, 2015
Finish of Test	May 28, 2015
Name of Engineer(s)	Ferdinand Custodio
Related Document(s)	• Continuous TX test instructions.rtf • 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 8.8	Conducted Emissions	Compliant	
2.3		RSS-Gen 6.6	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 7.1	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	

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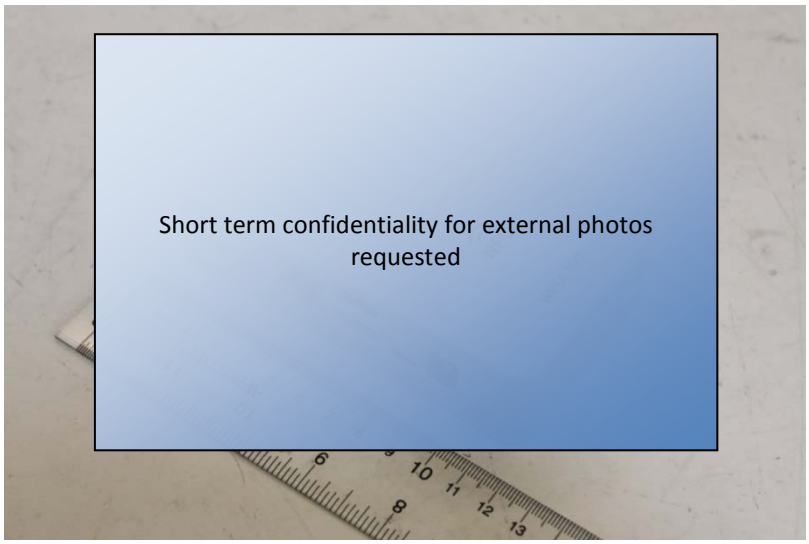
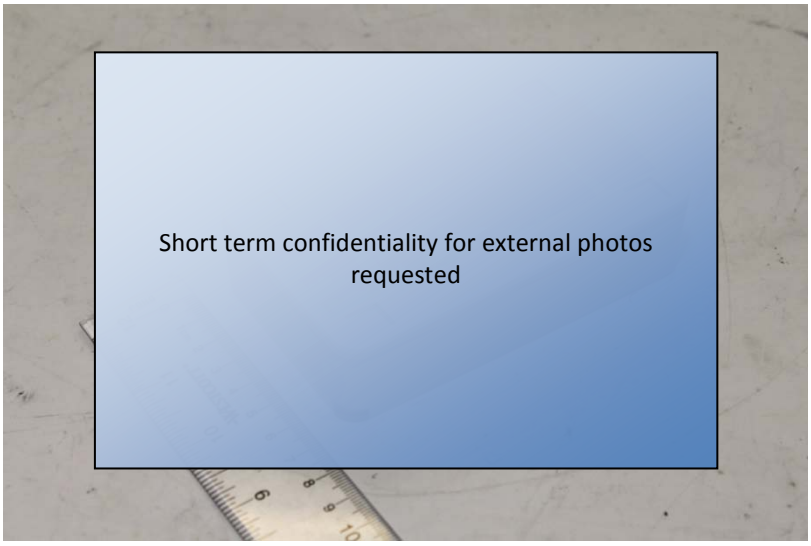
1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Lantronix, Inc. Wireless Print Solutions Adapter; xPrintServer Wi-Fi Professional and xPrintServer Wi-Fi Essential Ethernet to Wireless Print Server as shown in the photograph below. The EUT is a device intended to support Ethernet to Wi-Fi bridging in mobile printing applications. The device is intended to be connected to a printer over the Ethernet and/or Wireless networks. The device includes an NFC interface to allow tap to print transactions between a tablet or cell phone device. The NFC would provide the network configuration to the phone and the Ethernet and Wi-Fi would provide the high band width channel for print jobs. The Wireless Print Solutions Adaptor version will be marketed by Xerox. The XPrintServer2 product with dual Type A USB host connector will be directly sold and marketed by Lantronix. The only difference between the "Professional" and "Essential" is the software app. Lantronix controls the manufacturing for both versions. Lantronix controls the manufacturing for both versions. The 802.11 b/g/n and BT LE functions of the EUT at 2.4GHz (20MHz BW) were verified in this test report.





Equipment Under Test

1.3.2 EUT General Description

EUT Description	Ethernet to Wireless Print Server
Model Name	Wireless Print Solutions Adapter; xPrintServer Wi-Fi Professional and xPrintServer Wi-Fi Essential
Model Number(s)	WPSA-100 (Xerox); XPS2140201S (Lantronix) and XPS2140101S (Lantronix)
Rated Voltage	5VDC via AC Adapter (TOP Switching Power Supply P/N W050010GPX1 L1 Input: 100-240VAV 50/60Hz @0.2A Output: 5VDC @ 1.0A).
Mode Verified	802.11 b/g/n and BT LE
Capability	802.11 b/g/n/AC WLAN (DTS), NFC and Bluetooth 4.0+EDR
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering
Antenna Type	Savvi™ Embedded Ceramic WLAN 802.11 a/b/g Antenna 2.4 to 2.5 and 4.9 to 5.8 GHz (P/N M830510)
Antenna Gain	1.1 dBi (2.4GHz) 3.2 dBi (5GHz)

1.3.3 Maximum Conducted Output Power (Peak)

Mode	Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
802.11b	2412-2462	19.48	88.72
802.11g	2412-2462	23.04	201.37
802.11 n (ht20)	2412-2462	22.84	192.31
Bluetooth LE	2402-2480	1.353	1.366

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Antenna conducted port test configuration. A modified sample was provided for this setup. The integral antenna was removed and an on-board U.FL SMT surface mount connector was installed on the main PCB. RF configurations of the EUT were modified using Tera Term via Ethernet connection. Manufacturer provided instructions (Continuous TX test instructions.rtf) to configure WLAN mode, channel, modulation and power. For Bluetooth, the mode and channels were configurable.
B	Radiated emissions test configuration. Identical programming procedure as Test Configuration A. EUT transmitting through the integral antenna.

1.4.2 EUT Exercise Software

EUT is configured via TCP/IP (Ethernet). IP assigned address is first determined on the support laptop via tftpd32. This IP address will be used to connect to the EUT via Tera Term. Once connected, corresponding instructions were issued using vi (visual editor) as referenced in the instructions provided.

1.4.3 Support Equipment and I/O cables

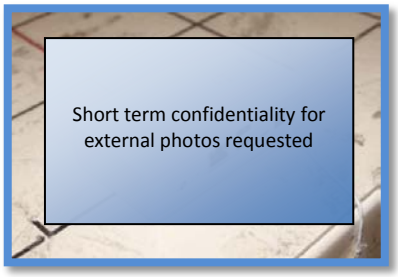
Manufacturer	Equipment/Cable	Description
Topmicro.com	EUT AC Adapter (Switching Power Supply)	P/N W050010GPX1 L1 (5VDC @ 1A)
HP	Support Laptop (NC6220)	P/N PZ064UA#ABA S/N CNU62315QR
HP	Support Laptop AC Adapter	P/N 380467-003 S/N 592C60AYMSO26N
Pan International	Patch Cord (Ethernet EUT to Laptop)	1.5 meters, unshielded CAT5 patch cord

1.4.4 Worst Case Configuration

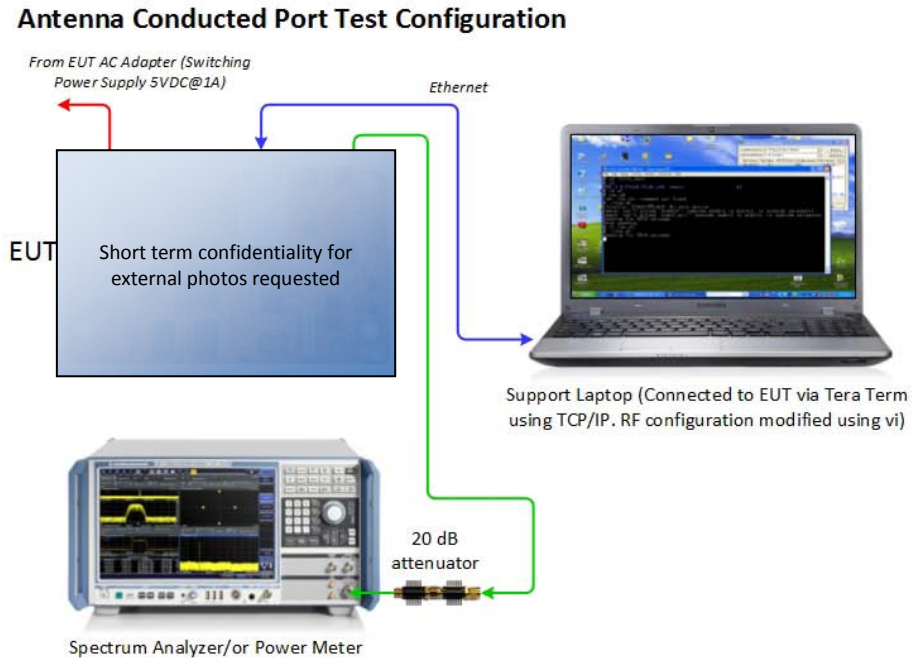
Worst-case configuration used in this test report as per maximum conducted output power measurements:

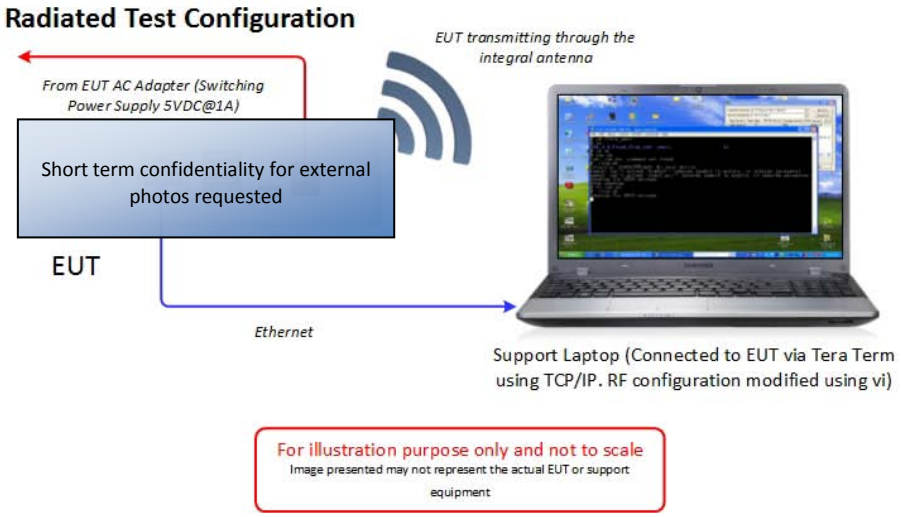
Mode	Channel	Data Rate
802.11b	11 (High Channel)	11Mbps
802.11g	1 (Low Channel)	48 Mbps
802.11 n (ht20)	1 (Low Channel)	65.0 Mbps (mcs 7)
Bluetooth LE	37 (Low Channel)	1Mbps

EUT is a mobile device. For radiated measurements, the EUT was verified representing typical usage (horizontal placement).



1.4.5 Simplified Test Configuration Diagram





For illustration purpose only and not to scale
Image presented may not represent the actual EUT or support equipment

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 N/A		
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 LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858-546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

Sony Electronics Inc., Building #8 16530 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 942 5542 FAX: 858-546 0364

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration No.: US1146

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 §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.

1.9.2 **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
Lantronix, Inc.
Ethernet to Wireless Print Server

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: N/A / Test Configuration A

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

May 11 and 28, 2015/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

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 – 24.8°C
Relative Humidity	49.7 - 50.5%
ATM Pressure	98.9 – 99.9 kPa

2.1.7 Additional Observations

- This is a conducted test (Maximum conducted [average] output power) using direct connection to a power meter.
- An offset of 20.4dB was added to compensate for the external attenuator and cable used from the antenna port to the power sensor.
- Test methodology is per Clause 9.2.3.1 of KDB 558074 D01 (DTS Meas Guidance v03r02, June 05, 2014). All conditions under this Clause were satisfied.
- Test Program Power Settings as recommended by the manufacturer were: 17dBm for 802.11b, 15dBm for 802.11g and 14dBm for 802.11n
- 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 (17 dBm default setting)	1 (2412 MHz)	1	15.14	18.45
		2	15.55	18.97
		5.5	15.52	18.87
		11	15.45	19.16
	6 (2437 MHz)	1	15.27	18.89
		2	15.45	18.89
		5.5	15.39	18.76
		11	15.27	19.02
	11 (2462 MHz)	1	15.57	18.88
		2	15.75	19.00
		5.5	15.86	19.18
		11	**15.84**	**19.48**
802.11g (15 dBm default setting)	1 (2412 MHz)	6	13.37	22.55
		9	13.28	22.67
		12	13.43	22.89
		18	13.21	22.89
		24	13.43	22.72
		36	12.65	22.75
		48	**12.64**	**23.04**
		54	12.57	22.41
	6 (2437 MHz)	6	13.57	22.69
		9	13.46	22.74
		12	13.43	22.73
		18	13.10	22.90
		24	12.90	22.69
		36	12.34	22.68
		48	12.48	22.66

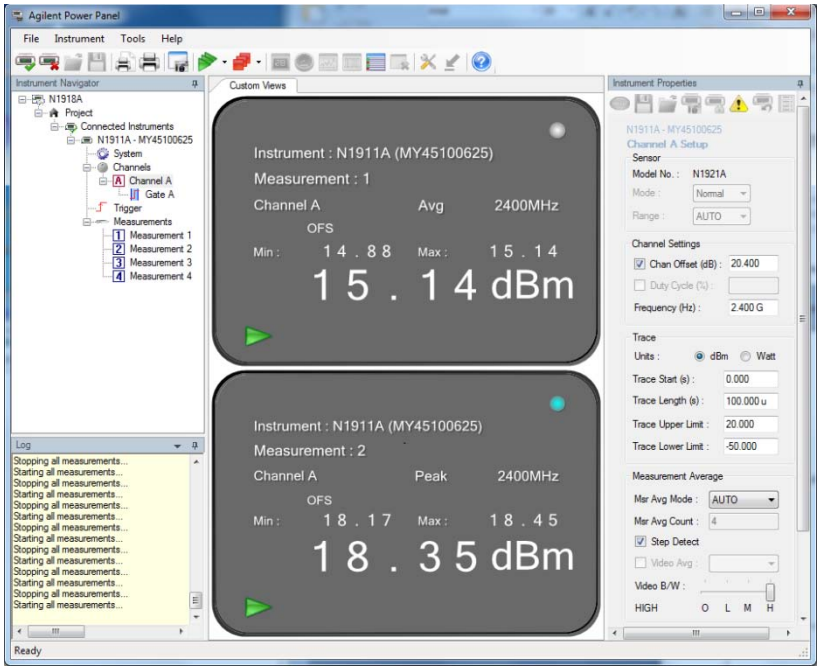
WLAN Mode	Channel	Data Rates (Mbps)	Measured Average Power (dBm)	Measured Peak Power (dBm)
802.11g (15 dBm default setting)	6 (2437 MHz)	54	12.82	22.44
	11 (2462 MHz)	6	13.91	22.71
		9	13.71	22.75
		12	13.73	22.93
		18	13.69	23.00
		24	13.37	22.65
		36	12.91	22.68
		48	12.76	22.80
		54	12.15	22.34
802.11n (20 MHz BW / 14dBm default setting)	1 (2412 MHz)	mcs 0 (6.50 Mbps)	12.28	22.51
		mcs 1(13.0 Mbps)	12.25	22.41
		mcs 2(19.5 Mbps)	12.24	22.65
		mcs 3 (26.0 Mbps)	12.14	22.54
		mcs 4 (39.0 Mbps)	12.14	22.67
		mcs 5 (52.0 Mbps)	11.85	22.62
		mcs 6 (58.5 Mbps)	11.27	22.67
		mcs 7 (65.0 Mbps)	**11.27**	**22.84**
	6 (2437 MHz)	mcs 0 (6.50 Mbps)	12.54	22.70
		mcs 1(13.0 Mbps)	12.52	22.65
		mcs 2(19.5 Mbps)	12.16	22.56
		mcs 3 (26.0 Mbps)	11.89	22.79
		mcs 4 (39.0 Mbps)	11.61	22.53
		mcs 5 (52.0 Mbps)	11.40	22.43
		mcs 6 (58.5 Mbps)	11.44	22.82
		mcs 7 (65.0 Mbps)	11.07	22.64

WLAN Mode	Channel	Data Rates (Mbps)	Measured Average Power (dBm)	Measured Peak Power (dBm)
802.11n (20 MHz BW / 14dBm default setting)	11 (2462 MHz)	mcs 0 (6.50 Mbps)	12.41	22.69
		mcs 1(13.0 Mbps)	12.19	22.34
		mcs 2(19.5 Mbps)	12.62	22.67
		mcs 3 (26.0 Mbps)	12.21	22.51
		mcs 4 (39.0 Mbps)	11.98	22.45
		mcs 5 (52.0 Mbps)	11.51	22.59
		mcs 6 (58.5 Mbps)	11.59	22.67
		mcs 7 (65.0 Mbps)	11.09	22.45

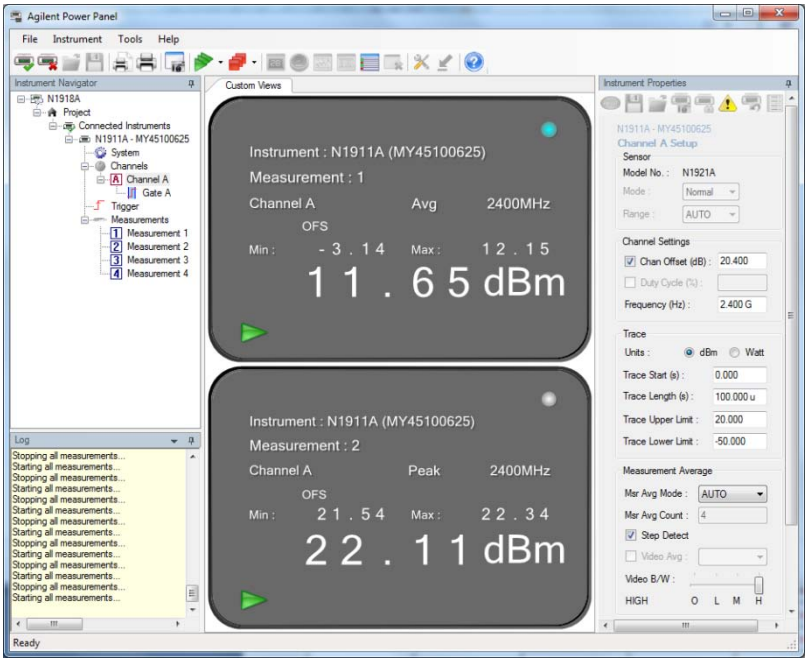
Bluetooth Low Energy (LE)	Channel	Modulation	Measured Average Power (dBm)	Calculated Average Power using 8.713 dB correction factor (dBm)	Measured Peak Power (dBm)
	37 (2402 MHz)	GFSK @ 1Mbps and using PRBS9	-7.360	1.353	5.24
	17 (2440 MHz)		-11.88	-3.167	6.76
	39 (2480 MHz)		-14.62	-5.907	4.78

Test Notes: 8.713dB measurement correction factor is from Section 2.1.10 of this test report. This correction factor is applied to the Average power meter measurement for EUT that can't transmit continuously (>98%) using it's duty cycle information.

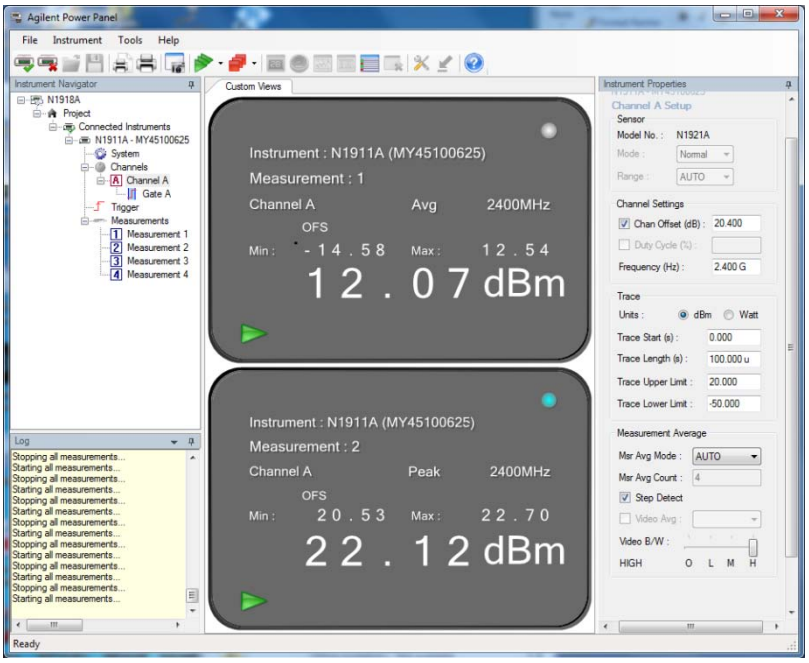
2.1.9 **Sample Test Display**



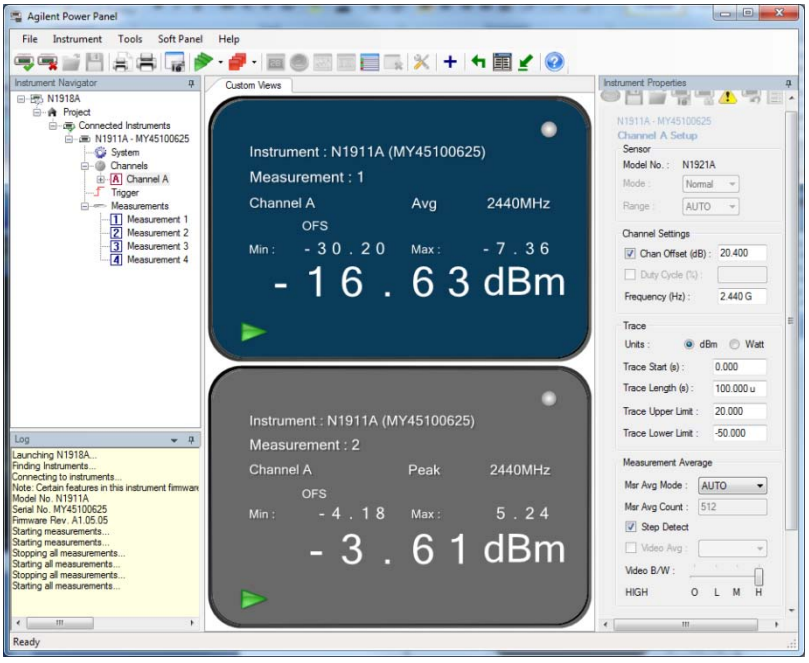
802.11 “b” mode. Low Channel 1Mbps



802.11 “g” mode. High Channel 54Mbps

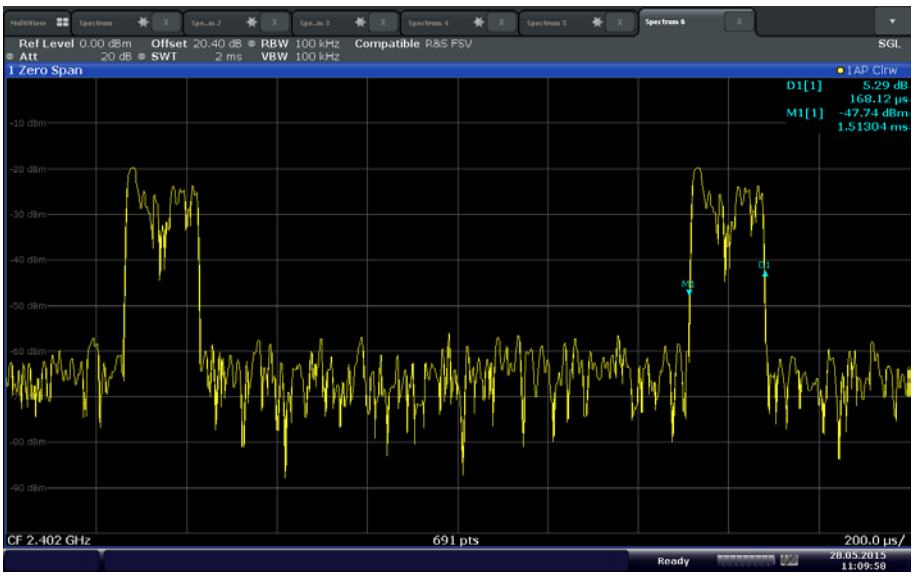


802.11 “n” mode ht20. Mid Channel MCS0 6.5Mbps



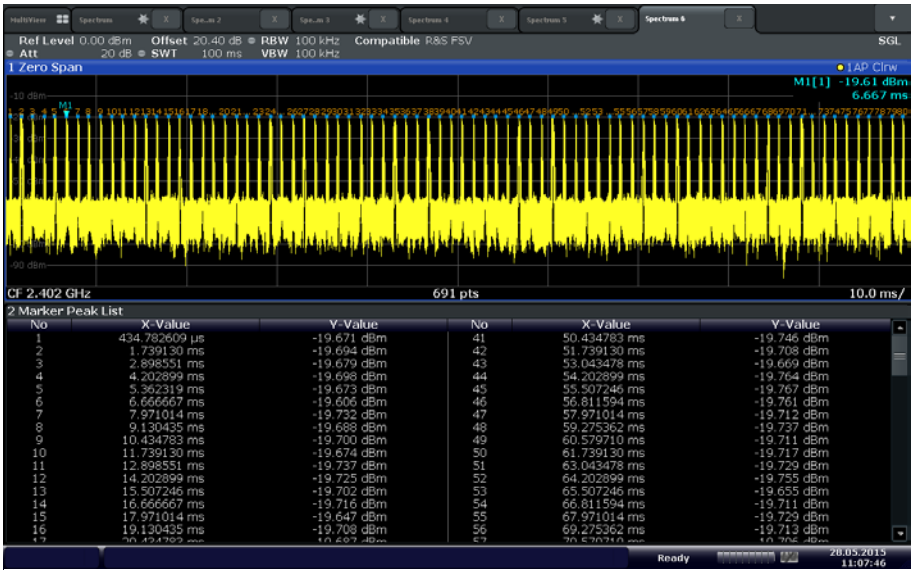
Bluetooth LE. Low Channel 1Mbps

2.1.10 Duty Cycle Measurement Correction Factor for Bluetooth LE



Date: 28.MAY.2015 11:09:58

2ms sweep plot showing 2 packets (168.12 µs wide)



Date: 28.MAY.2015 11:07:46

100ms sweep plot showing 80 packets

Duty Cycle Measurement Factor = 10 log (1/((80x0.16812)/100))
= 10 log (1/(13.449/100))
= 10 log (1/0.134496)
= **8.713** (as per Clause 9.2.3.1 (d) of KDB 558074 D01 (DTS Meas Guidance v03r02, June 05, 2014)

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: N/A /Test Configuration B

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

May 11 and 28, 2015/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

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 – 24.8°C
Relative Humidity	49.7 - 50.5%
ATM Pressure	98.9 – 99.9 kPa

2.2.7 Additional Observations

- The EUT was verified using the supplied AC Adapter.
- Verification performed while the EUT is on WLAN operating mode. No significant difference observed on the emissions when the EUT is on BTLE TX mode. Only WLAN test results presented.

- 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.

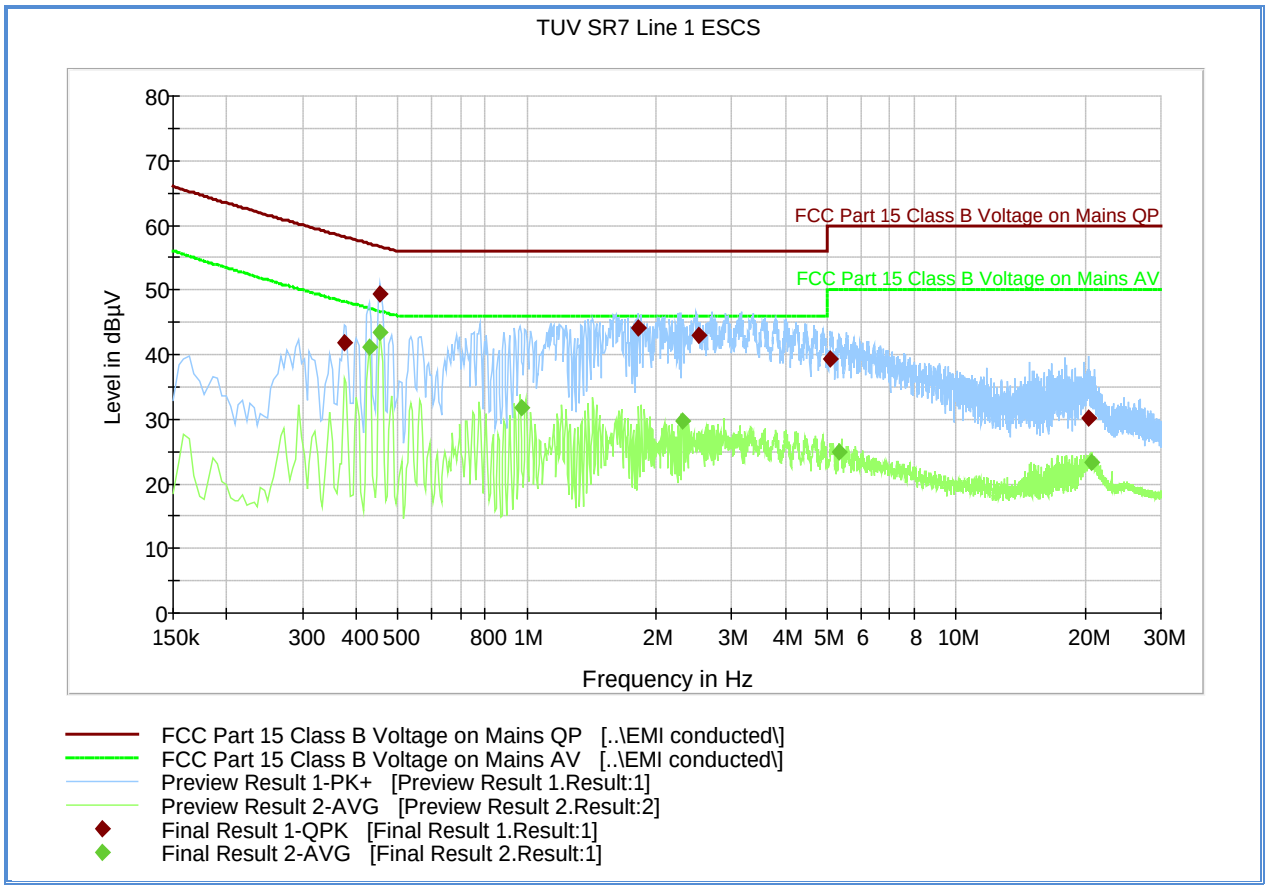
2.2.8 Sample Computation (Conducted Emission – Quasi Peak)

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.

2.2.10 FCC Conducted Emissions Line 1 - Hot



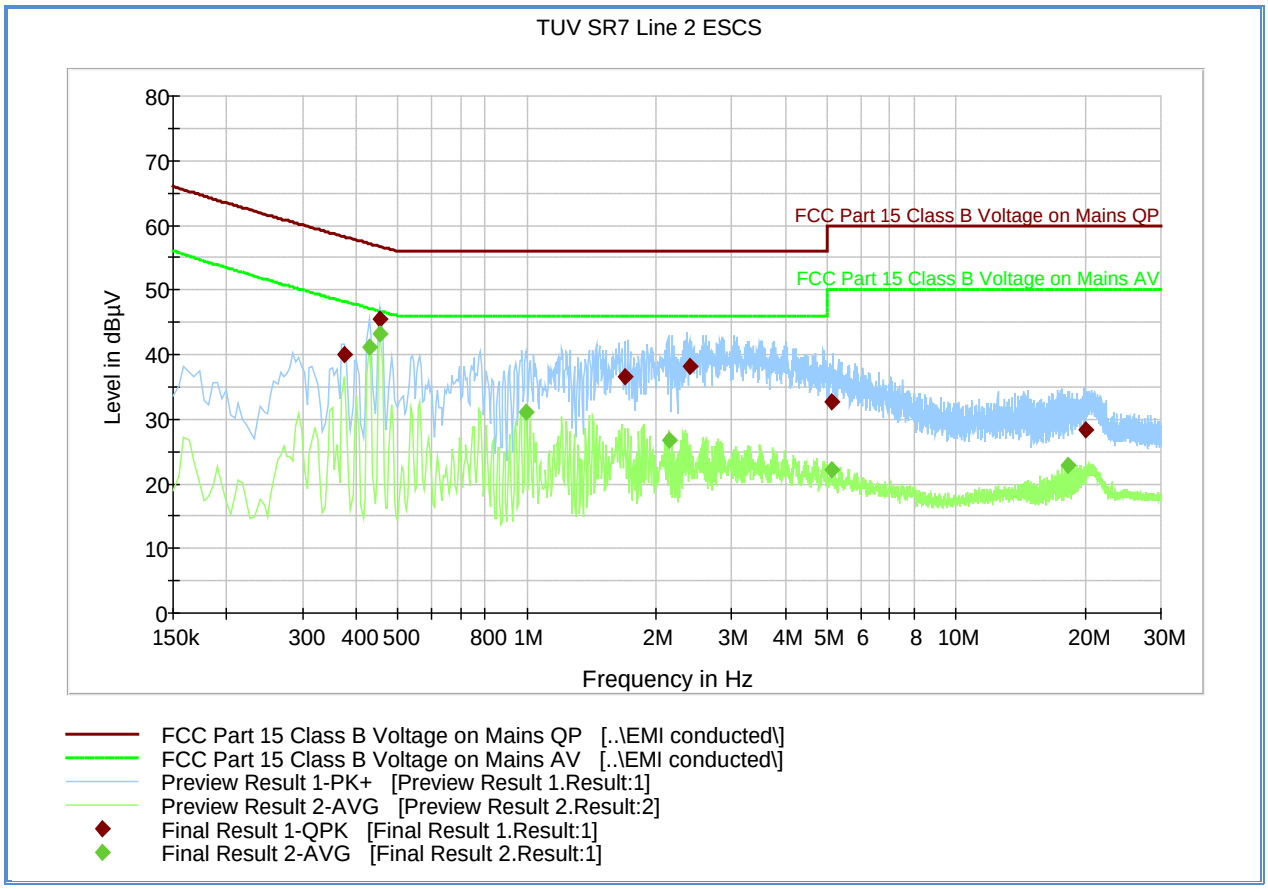
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.375000	41.8	1000.0	9.000	Off	L1	20.2	16.5	58.2
0.456000	49.4	1000.0	9.000	Off	L1	20.2	7.3	56.7
1.819500	44.0	1000.0	9.000	Off	L1	20.2	12.0	56.0
2.508000	43.0	1000.0	9.000	Off	L1	20.5	13.0	56.0
5.100000	39.4	1000.0	9.000	Off	L1	20.6	20.6	60.0
20.377500	30.3	1000.0	9.000	Off	L1	21.0	29.7	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.429000	41.2	1000.0	9.000	Off	L1	20.2	6.0	47.2
0.456000	43.5	1000.0	9.000	Off	L1	20.2	3.2	46.7
0.969000	31.8	1000.0	9.000	Off	L1	20.1	14.2	46.0
2.305500	29.8	1000.0	9.000	Off	L1	20.5	16.2	46.0
5.325000	25.0	1000.0	9.000	Off	L1	20.6	25.0	50.0
20.724000	23.3	1000.0	9.000	Off	L1	21.0	26.7	50.0

2.2.1 FCC Conducted Emissions Line 2 – Neutral



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.375000	40.0	1000.0	9.000	Off	N	20.2	18.3	58.2
0.456000	45.5	1000.0	9.000	Off	N	20.1	11.2	56.7
1.689000	36.5	1000.0	9.000	Off	N	20.2	19.5	56.0
2.400000	38.2	1000.0	9.000	Off	N	20.4	17.8	56.0
5.136000	32.7	1000.0	9.000	Off	N	20.6	27.3	60.0
19.959000	28.3	1000.0	9.000	Off	N	20.9	31.7	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.429000	41.1	1000.0	9.000	Off	N	20.1	6.0	47.2
0.456000	43.3	1000.0	9.000	Off	N	20.1	3.4	46.7
0.996000	31.0	1000.0	9.000	Off	N	20.2	15.0	46.0
2.152500	26.7	1000.0	9.000	Off	N	20.4	19.3	46.0
5.145000	22.2	1000.0	9.000	Off	N	20.6	27.8	50.0
18.163500	22.8	1000.0	9.000	Off	N	20.9	27.2	50.0

2.3 99% EMISSION BANDWIDTH

2.3.1 Specification Reference

RSS-Gen Clause 6.6

2.3.2 Standard Applicable

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.
When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 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 (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

Note: Video averaging is not permitted.
A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.
The trace data points are recovered and are directly summed in linear power level 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 (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.
The difference between the two recorded frequencies is the 99% occupied bandwidth.

2.3.3 Equipment Under Test and Modification State

Serial No: N/A / Test Configuration A

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

May 11 and 28, 2015/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

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 – 24.8°C
Relative Humidity	49.7 - 50.5%
ATM Pressure	98.9 – 99.9 kPa

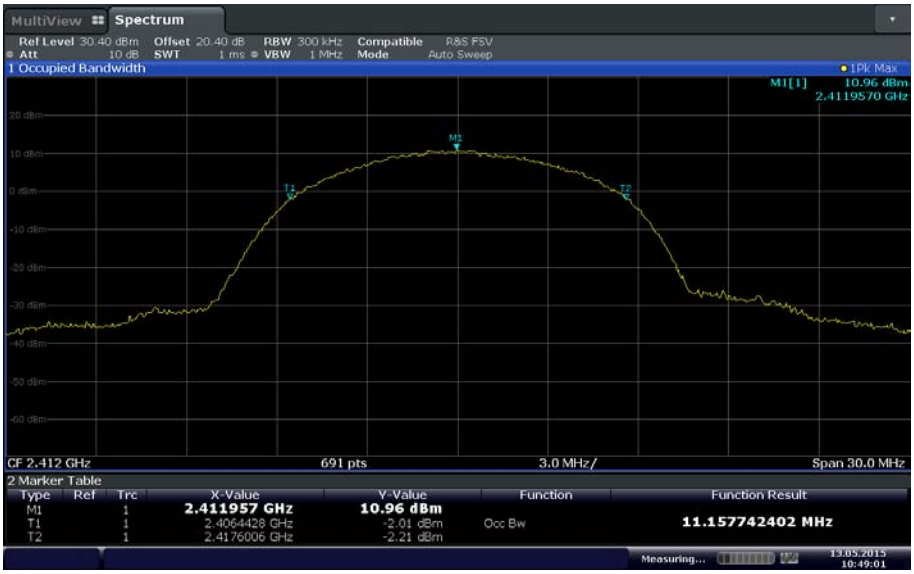
2.3.7 Additional Observations

- This is a conducted test.
- A correction factor of 20.4 dB was used 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)	11.158
	6 (2437 MHz)	11.201
	11 (2462 MHz)	11.201
802.11g	1 (2412 MHz)	17.583
	6 (2437 MHz)	17.583
	11 (2462 MHz)	17.583
802.11n HT20	1 (2412 MHz)	18.523
	6 (2437 MHz)	18.596
	11 (2462 MHz)	18.524
Bluetooth LE	37 (2402 MHz)	1.0854
	17 (2440 MHz)	1.0854
	39 (2480 MHz)	1.0709

2.3.9 **Test Results Plots**

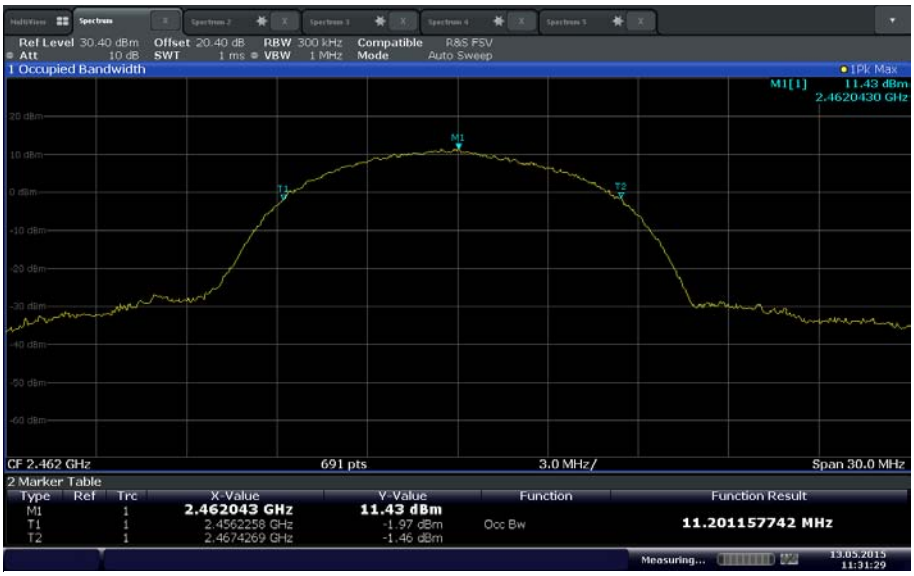


Date: 13.MAY.2015 10:49:01

802.11b Low Channel

Date: 13.MAY.2015 11:24:01

802.11b Mid Channel



Date: 13.MAY.2015 11:31:28

802.11b High Channel

Date: 13.MAY.2015 13:15:38

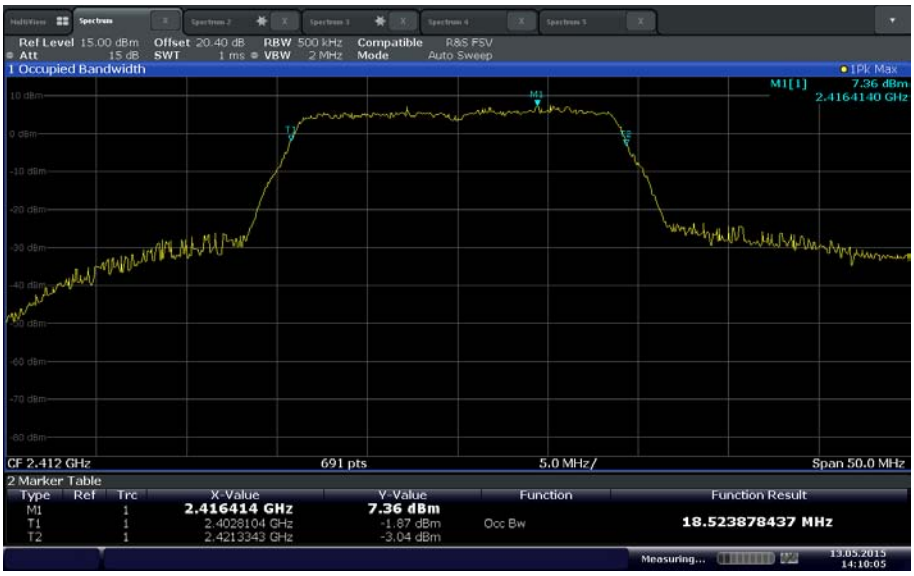
802.11g Low Channel

Date: 13.MAY.2015 13:27:56

802.11g Mid Channel

Date: 13.MAY.2015 13:37:41

802.11g High Channel



Date: 13.MAY.2015 14:10:05

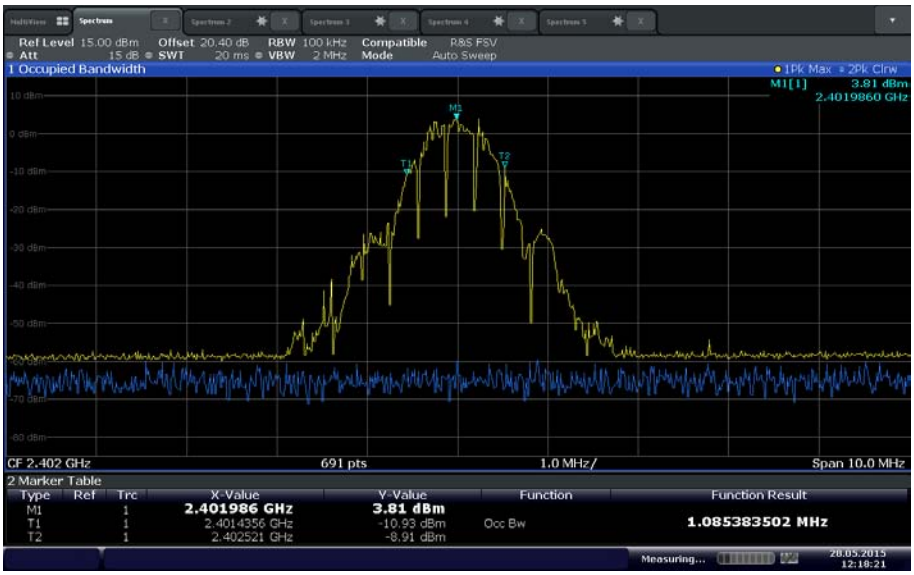
802.11n HT20 Low Channel

Date: 13.MAY.2015 14:26:00

802.11n HT20 Mid Channel

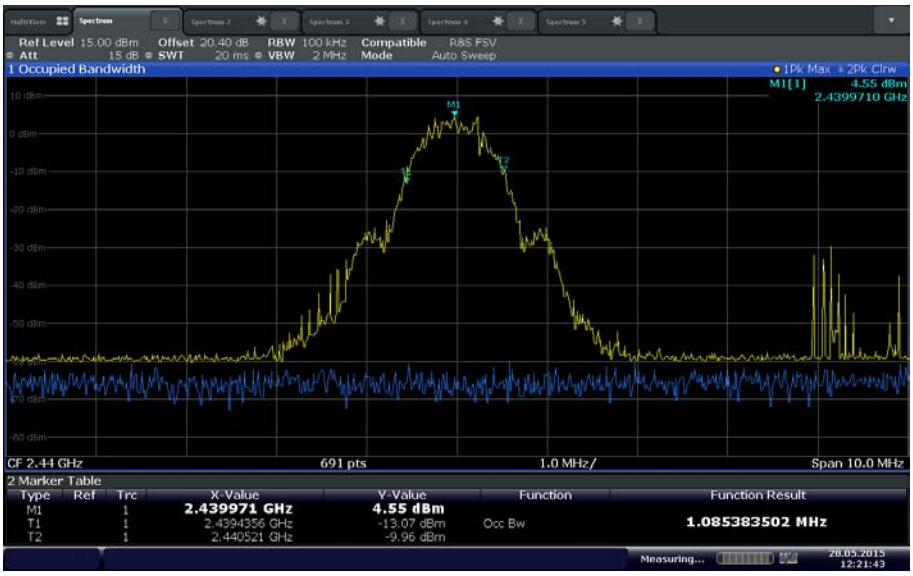
Date: 13.MAY.2015 14:37:06

802.11n HT20 High Channel



Date: 28.MAY.2015 12:18:21

Bluetooth LE Low Channel



Date: 28.MAY.2015 12:21:43

Bluetooth LE Mid Channel

Date: 28.MAY.2015 12:24:31

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: N/A / Test Configuration A

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

May 11 and 28, 2015/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

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 – 24.8°C
Relative Humidity	49.7 - 50.5%
ATM Pressure	98.9 – 99.9 kPa

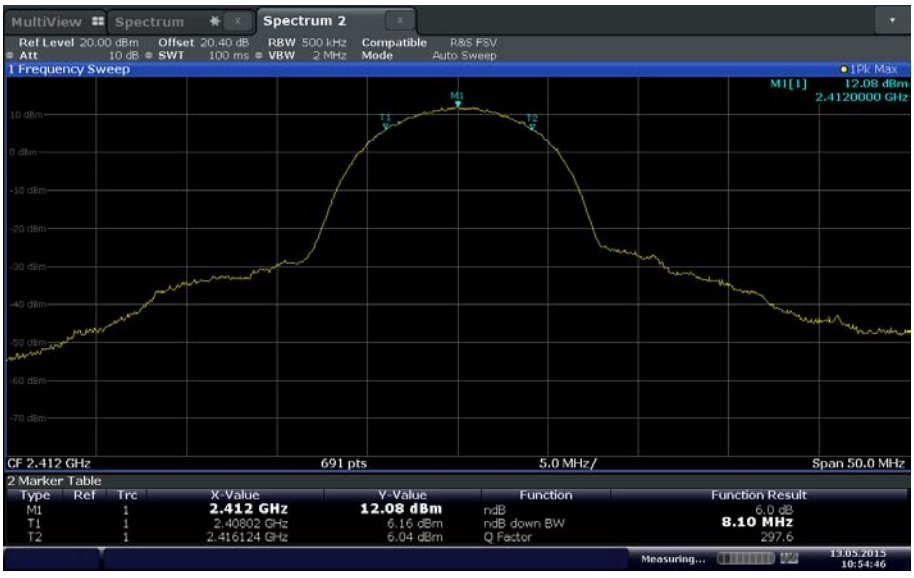
2.4.7 Additional Observations

- This is a conducted test.
- A correction factor of 20.4 dB was used to compensate for the external attenuator and cable used.
- Span is wide enough to capture the channel transmission.
- RBW is set to either 100 kHz (BT LE) or 1% of the span (802.11 b, g and n).
- VBW is ≥3X RBW.
- Sweep is auto.
- Detector is peak.
- The “n” dB down marker function of the spectrum analyzer was used for this test.

2.4.8 Test Results

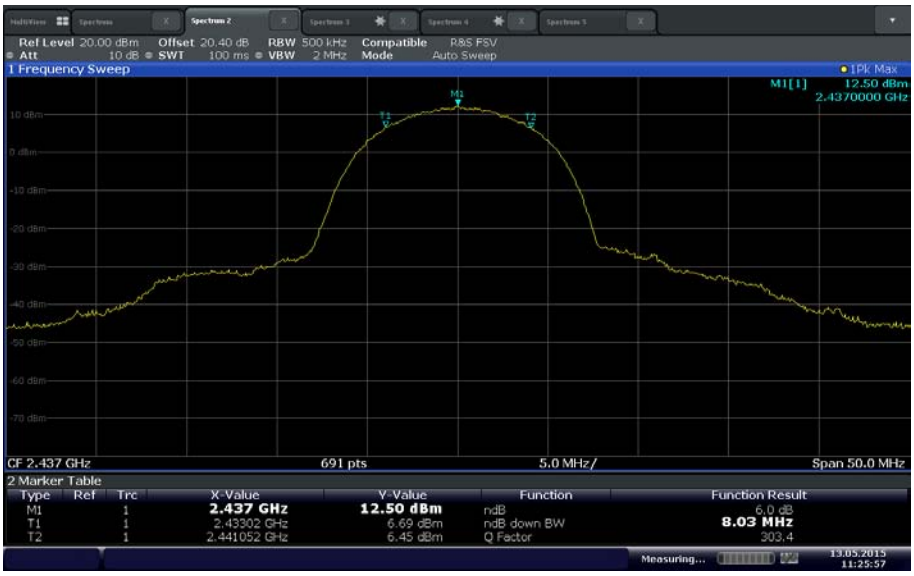
Mode	Channel	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Compliance
802.11b	1 (2412 MHz)	8.10	0.500	Complies
	6 (2437 MHz)	8.03	0.500	Complies
	11 (2462 MHz)	8.03	0.500	Complies
802.11g	1 (2412 MHz)	17.00	0.500	Complies
	6 (2437 MHz)	16.93	0.500	Complies
	11 (2462 MHz)	16.71	0.500	Complies
802.11n HT20	1 (2412 MHz)	18.02	0.500	Complies
	6 (2437 MHz)	18.02	0.500	Complies
	11 (2462 MHz)	17.87	0.500	Complies
Bluetooth LE	37 (2402 MHz)	0.724	0.500	Complies
	17 (2440 MHz)	0.709	0.500	Complies
	39 (2480 MHz)	0.724	0.500	Complies

2.4.9 Test Results Plots



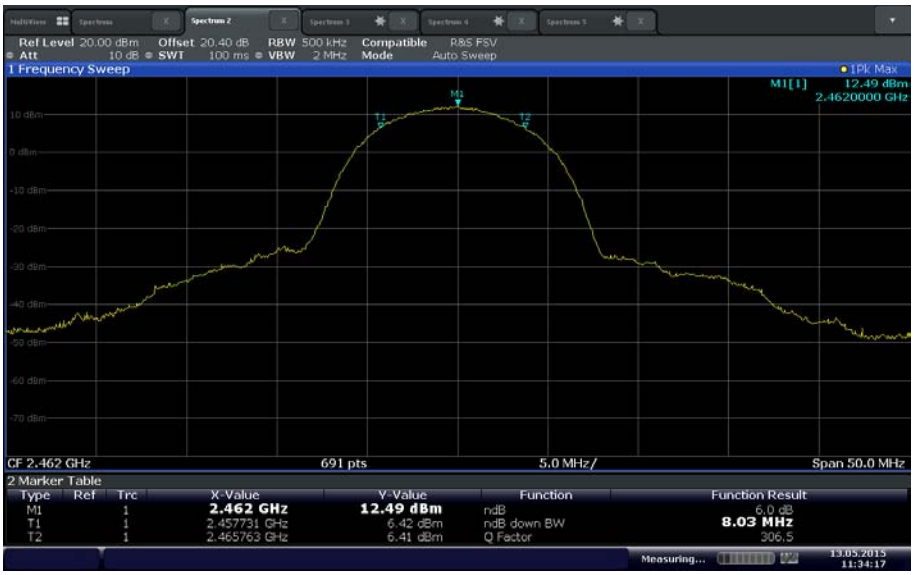
Date: 13.MAY.2015 10:54:47

802.11b Low Channel



Date: 13.MAY.2015 11:25:58

802.11b Mid Channel



Date: 13.MAY.2015 11:34:17

802.11b High Channel

Date: 13.MAY.2015 13:13:59

802.11g Low Channel

Date: 13.MAY.2015 13:29:47

802.11g Mid Channel

Date: 13.MAY.2015 13:39:21

802.11g High Channel

Date: 13.MAY.2015 14:16:58

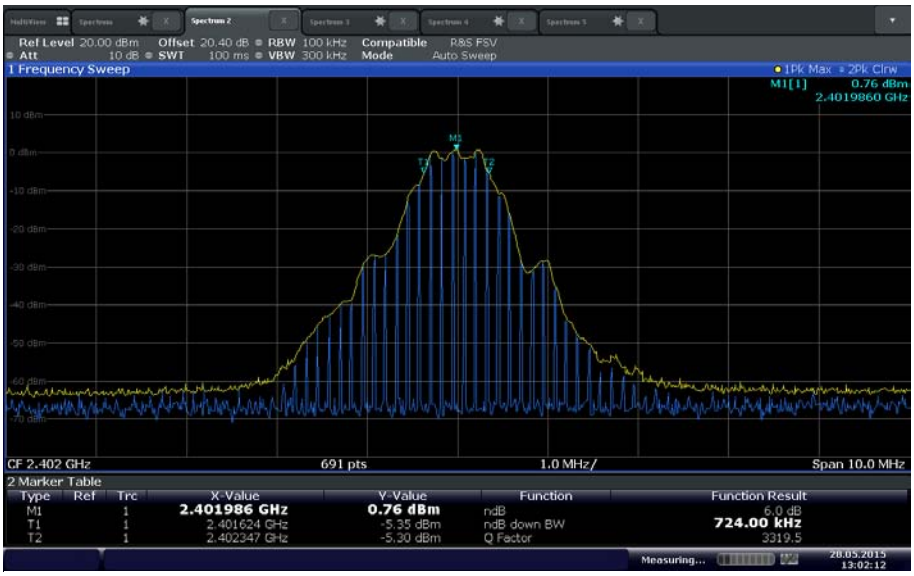
802.11n HT20 Low Channel

Date: 13.MAY.2015 14:27:47

802.11n HT20 Mid Channel

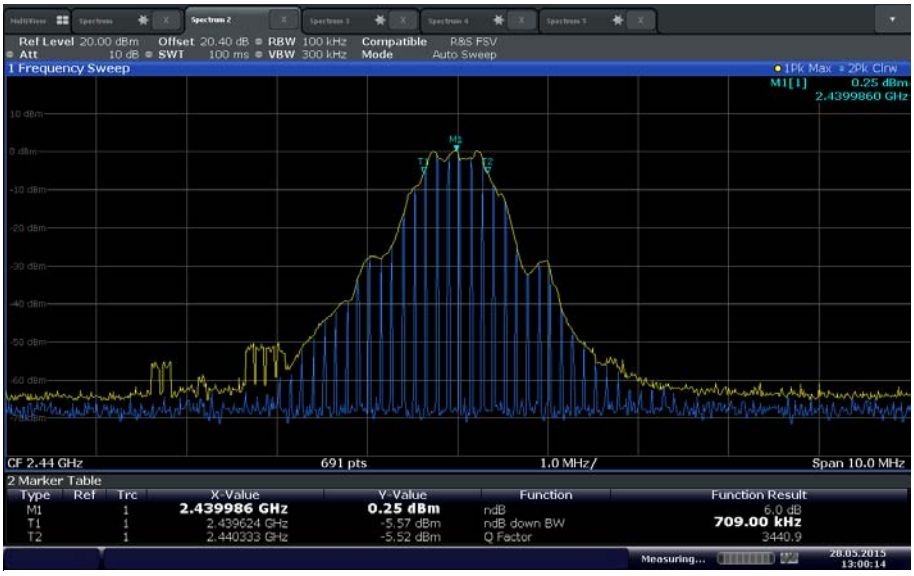
Date: 13.MAY.2015 14:40:34

802.11n HT20 High Channel



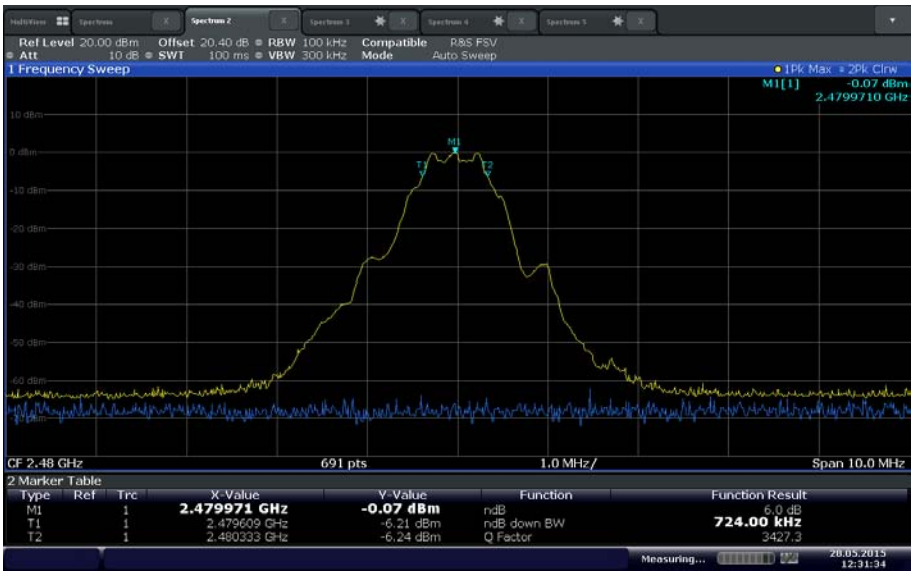
Date: 28.MAY.2015 13:02:12

Bluetooth LE Low Channel



Date: 28.MAY.2015 13:00:14

Bluetooth LE Mid Channel



Date: 28.MAY.2015 12:31:34

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: N/A / Test Configuration A

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

May 11 and 28, 2015/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

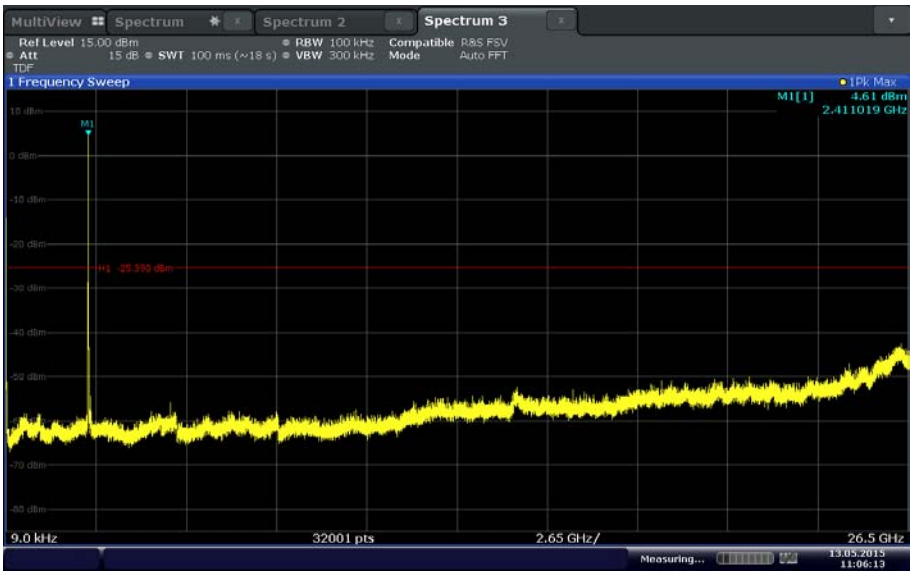
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 – 24.8°C
Relative Humidity	49.7 - 50.5%
ATM Pressure	98.9 – 99.9 kPa

2.5.7 Additional Observations

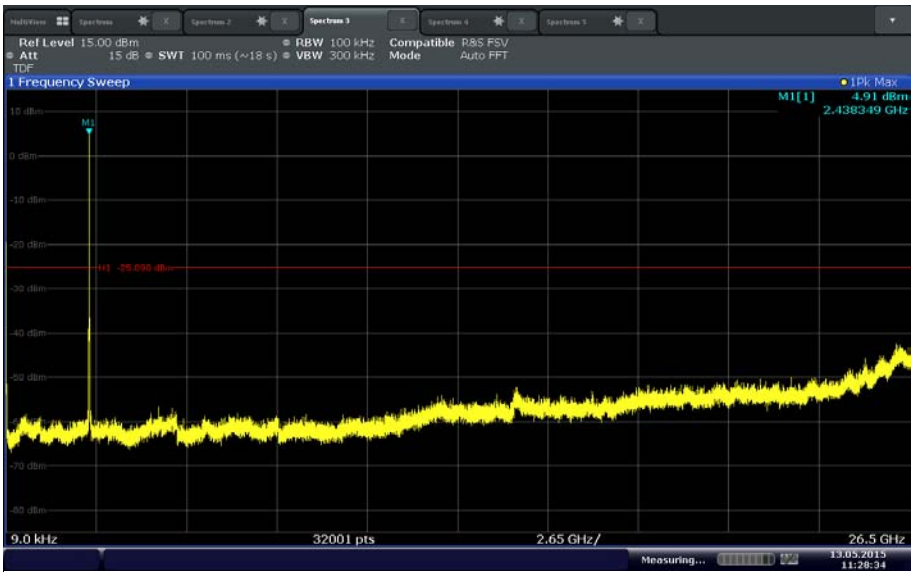
- This is a conducted test.
- TDF (Transducer Factor) was used to compensate for the external attenuator and cable used.
- RBW is 100kHz.VBW is 3X RBW.
- Sweep is auto. Detector is peak. Trace is max hold.
- Sweep points set to maximum.
- Initial scan was performed to determine the highest level of the desired power within the band. Limit (display line) was drawn 30dB below this level.
- Spectrum was searched from 9 kHz up to 26.5GHz.

2.5.8 **Test Results Plots**



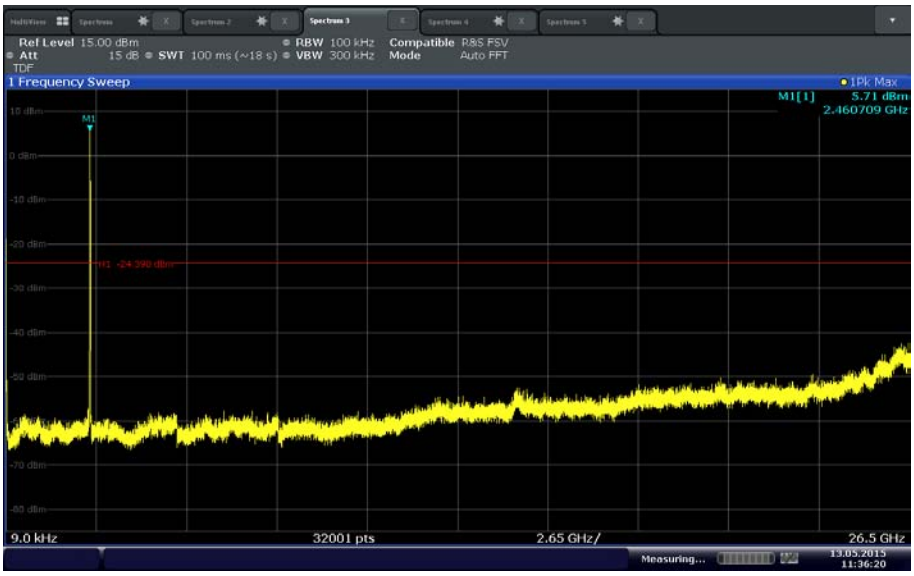
Date: 13.MAY.2015 11:06:14

802.11b Low Channel



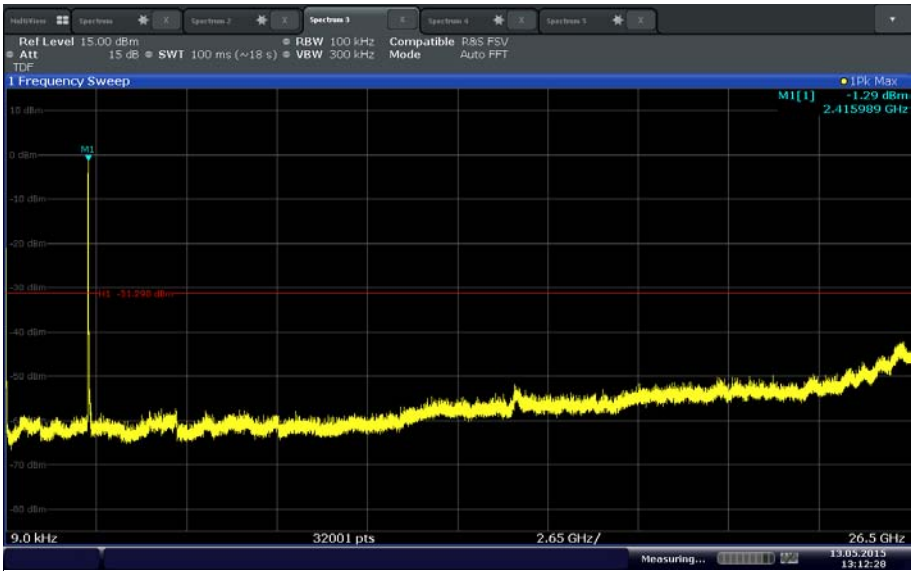
Date: 13.MAY.2015 11:28:34

802.11b Mid Channel



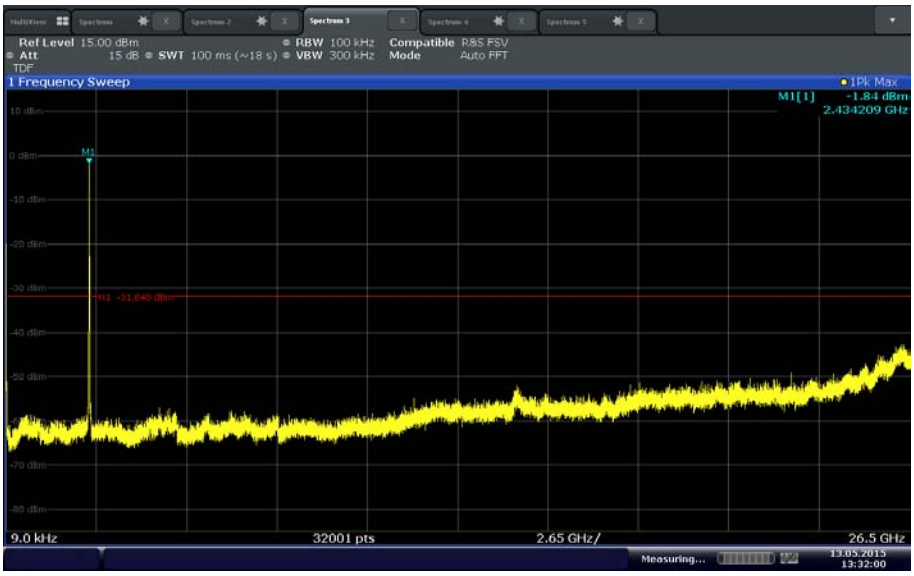
Date: 13.MAY.2015 11:36:20

802.11b High Channel



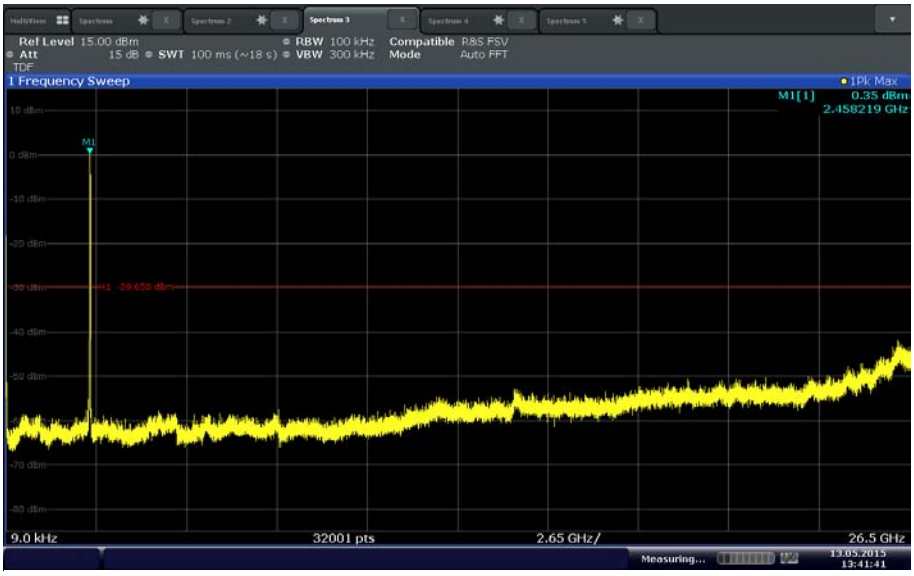
Date: 13.MAY.2015 13:12:29

802.11g Low Channel



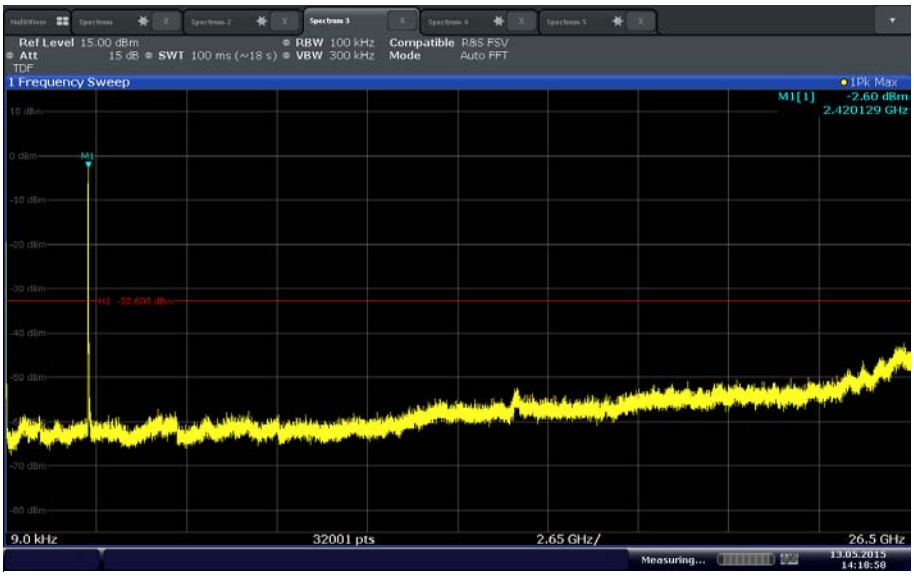
Date: 13.MAY.2015 13:32:00

802.11g Mid Channel



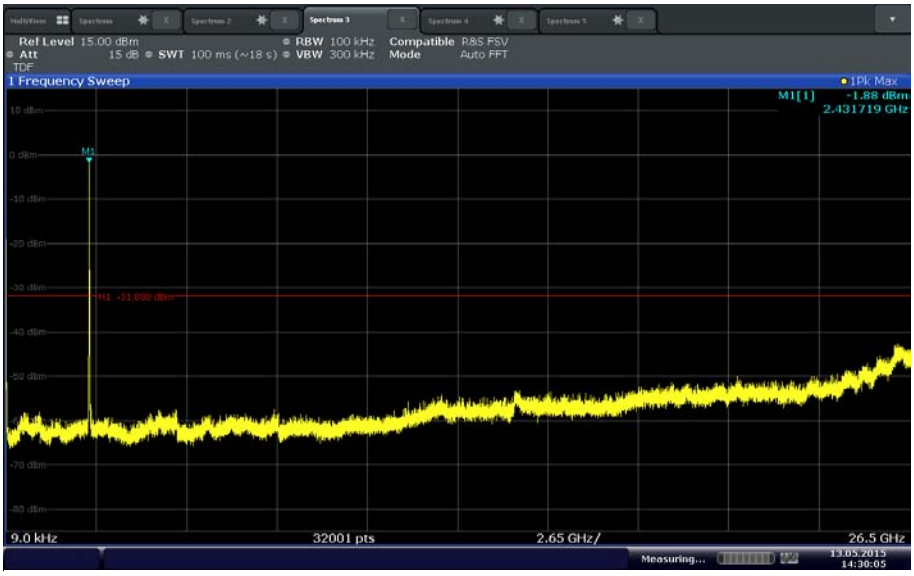
Date: 13.MAY.2015 13:41:41

802.11g High Channel



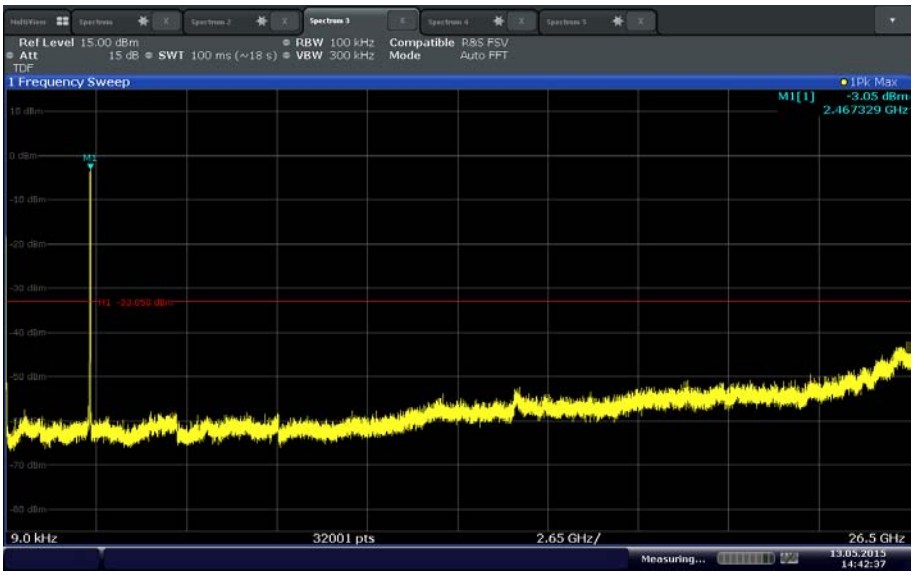
Date: 13.MAY.2015 14:18:58

802.11n HT20 Low Channel



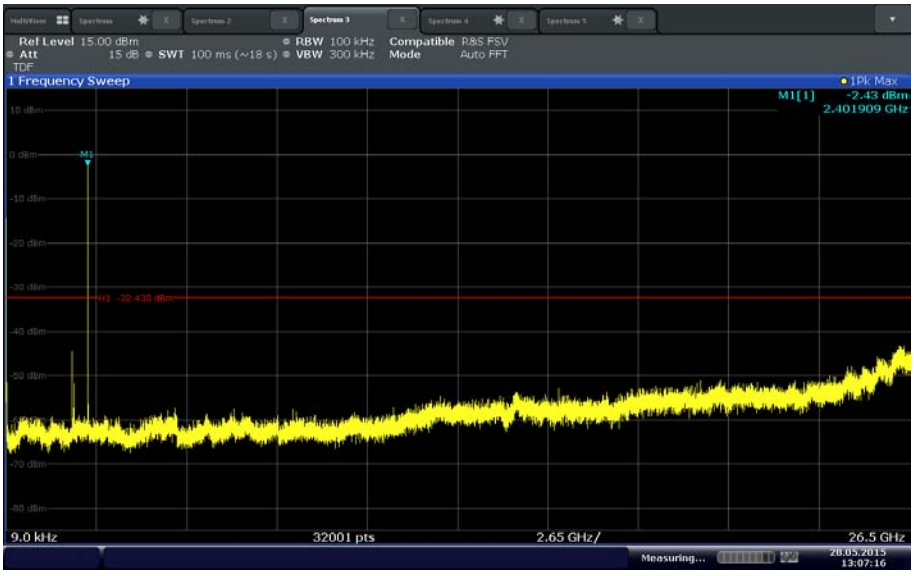
Date: 13.MAY.2015 14:30:05

802.11n HT20 Mid Channel



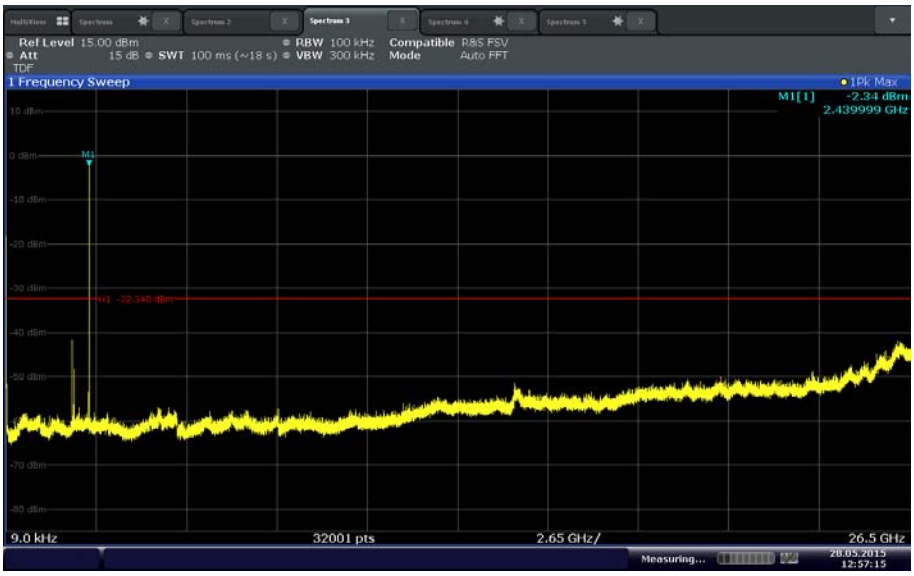
Date: 13.MAY.2015 14:42:37

802.11n HT20 High Channel



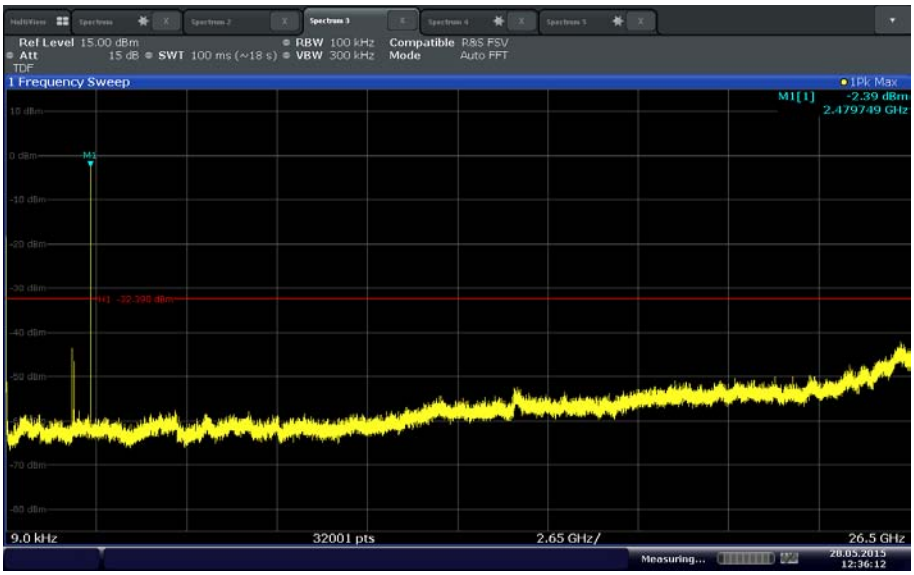
Date: 28.MAY.2015 13:07:16

Bluetooth LE Low Channel



Date: 28.MAY.2015 12:57:16

Bluetooth LE Mid Channel



Date: 28.MAY.2015 12:36:12

Bluetooth LE High Channel

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: N/A / Test Configuration A

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

May 11 and 28, 2015/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

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

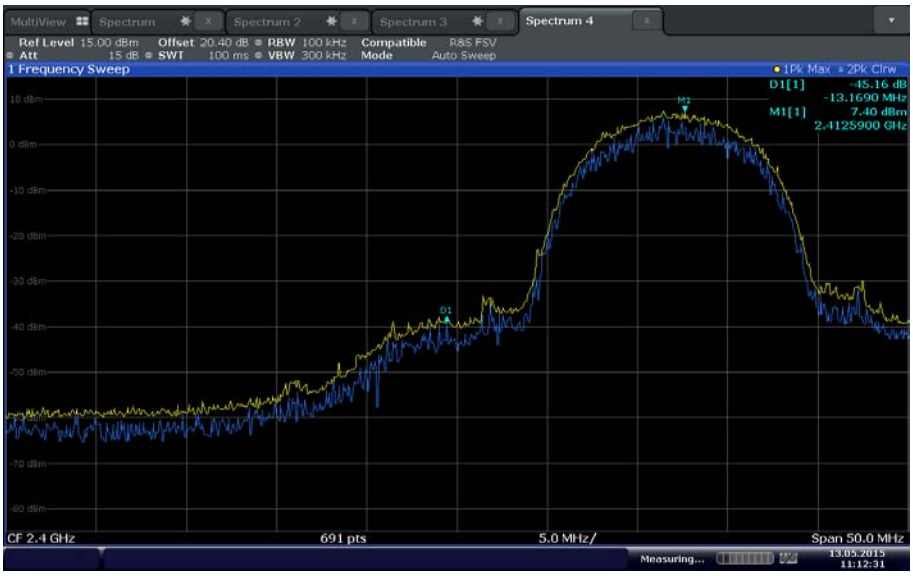
Ambient Temperature	24.3 – 24.8°C
Relative Humidity	49.7 - 50.5%
ATM Pressure	98.9 – 99.9 kPa

2.6.7 Additional Observations

- This is a conducted test.
- A correction factor of 20.4 dB was used 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.
- Trace was centred on the band-edge frequency.
- Span was set to encompass the band-edge frequency and the peak of the emission.
- Using Marker function, peak of the emission was determined and the delta to the band-edge frequency measured.
- Band-edges were verified ≤ 30 dBc (worst-case).

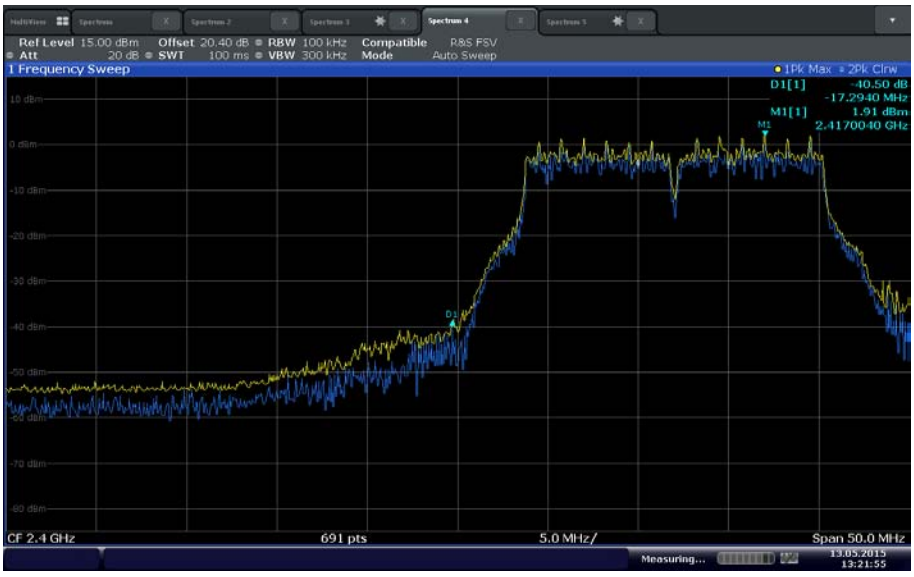
2.6.8 Test Results

Complies. See attached plots.



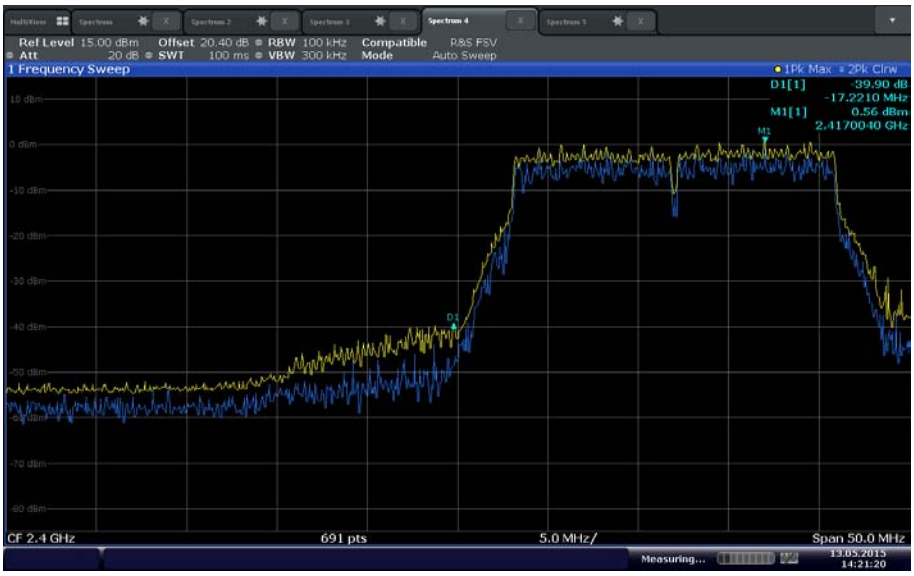
Date: 13.MAY.2015 11:12:31

802.11b Low Channel (2412 MHz)



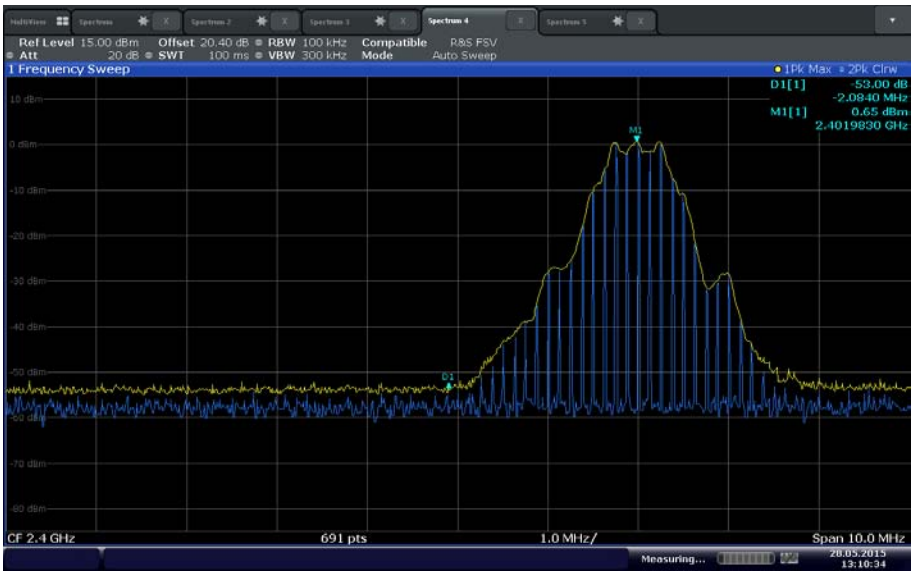
Date: 13.MAY.2015 13:21:56

802.11g Low Channel (2412 MHz)



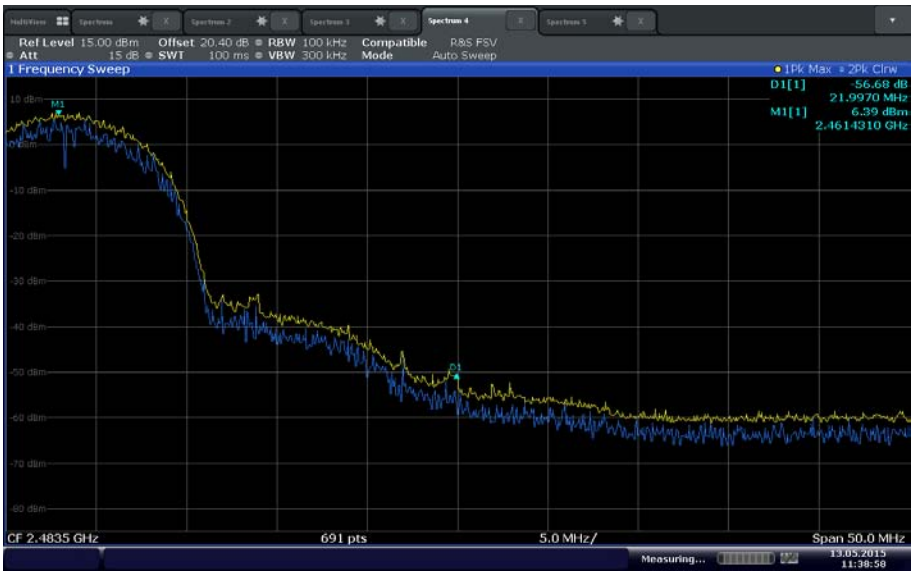
Date: 13.MAY.2015 14:21:20

802.11n HT20 Low Channel (2412 MHz)



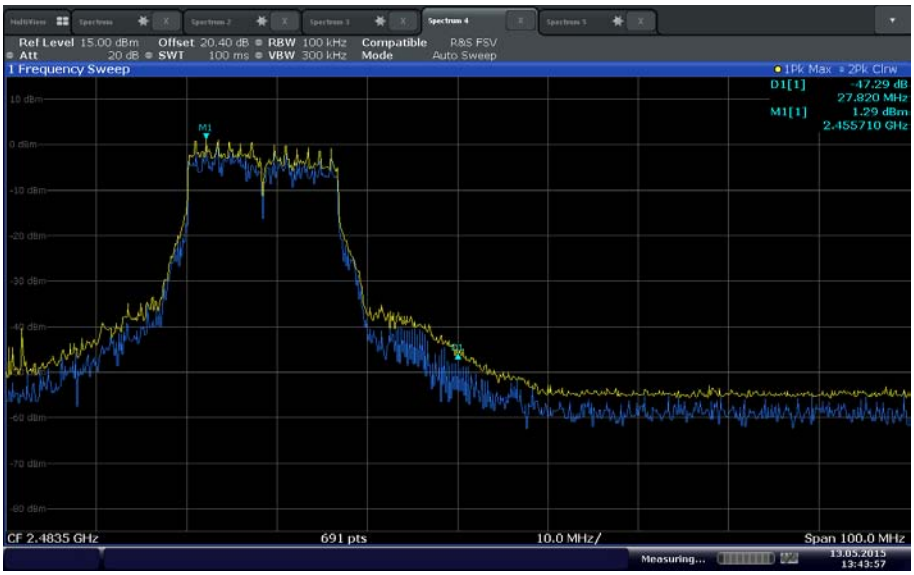
Date: 28.MAY.2015 13:10:33

Bluetooth LE Low Channel (2402 MHz)



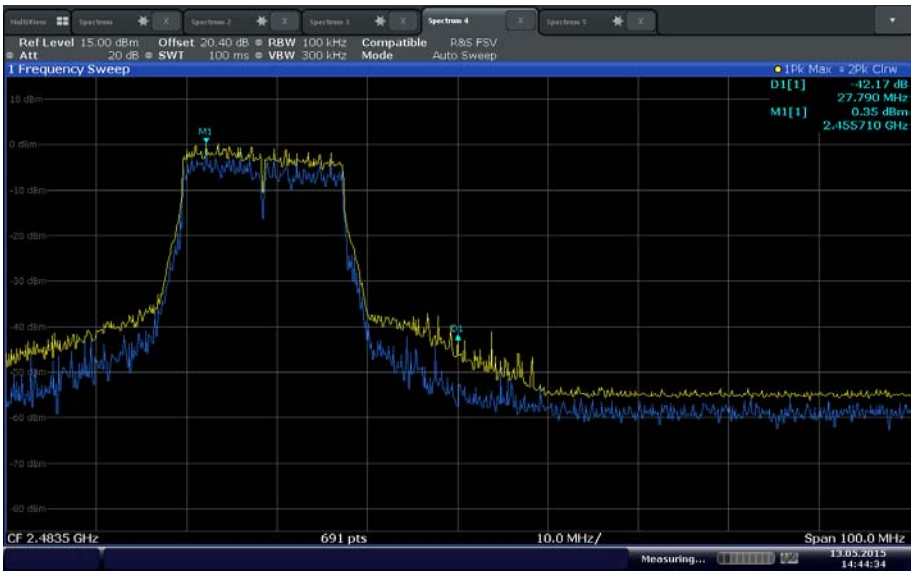
Date: 13.MAY.2015 11:38:58

802.11b High Channel (2462 MHz)



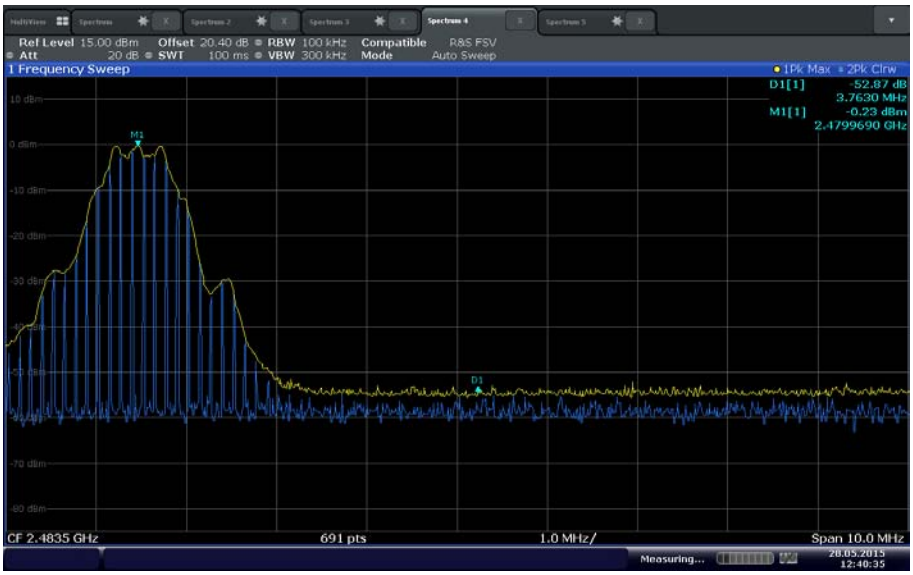
Date: 13.MAY.2015 13:43:57

802.11g High Channel (2462 MHz)



Date: 13.MAY.2015 14:44:34

802.11n HT20 High Channel (2462 MHz)



Date: 28.MAY.2015 12:40:35

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: N/A / Test Configuration B

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

May 11 and 28, 2015/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

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 – 24.8°C
Relative Humidity	49.7 - 50.5%
ATM Pressure	98.9 – 99.9 kPa

2.7.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic.
- 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 (802.11b, High Channel, 11Mbps) presented for radiated emissions below 1GHz. There are no significant differences in emissions between all modes below 1GHz.

- Only noise floor measurements observed above 18GHz.
- 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.

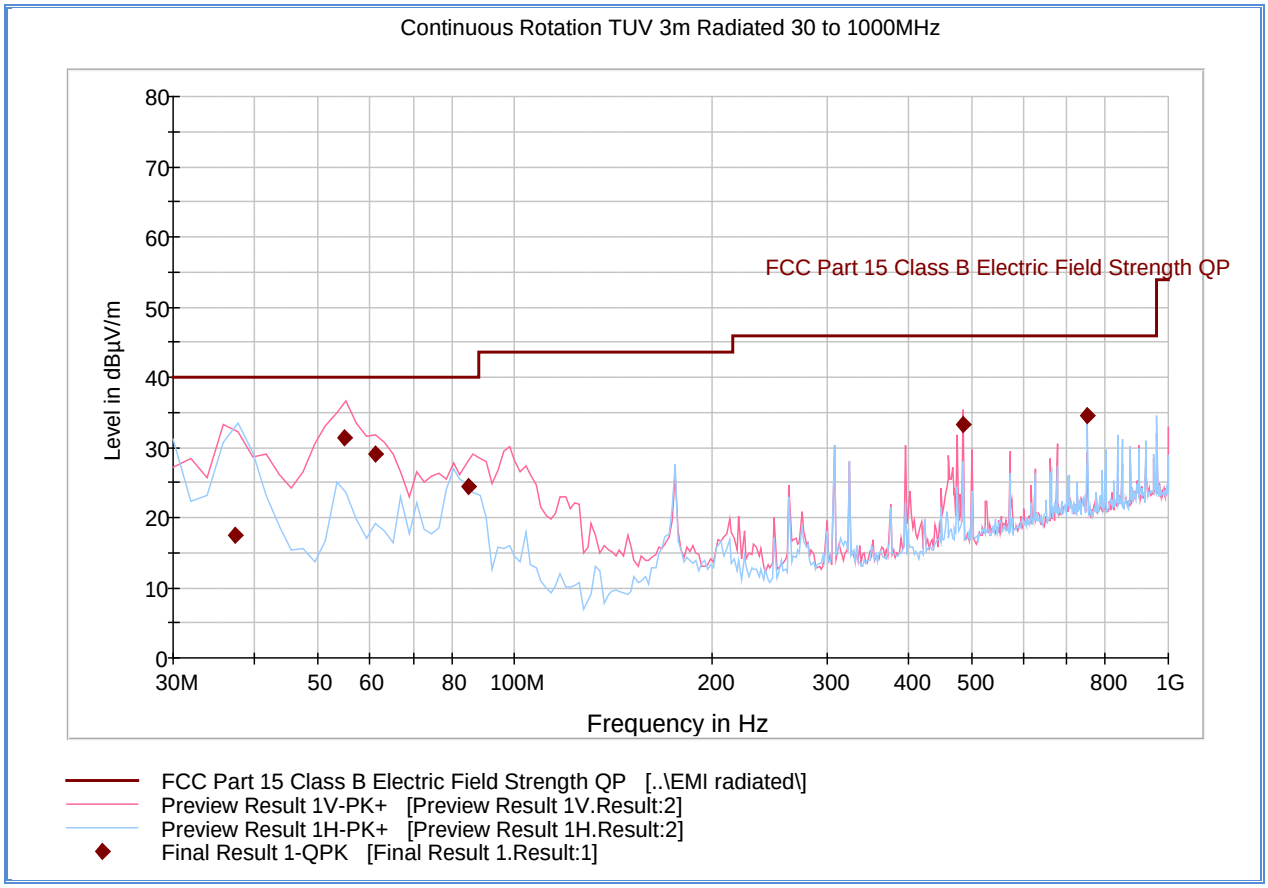
2.7.8 Sample Computation (Radiated Emission)

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.

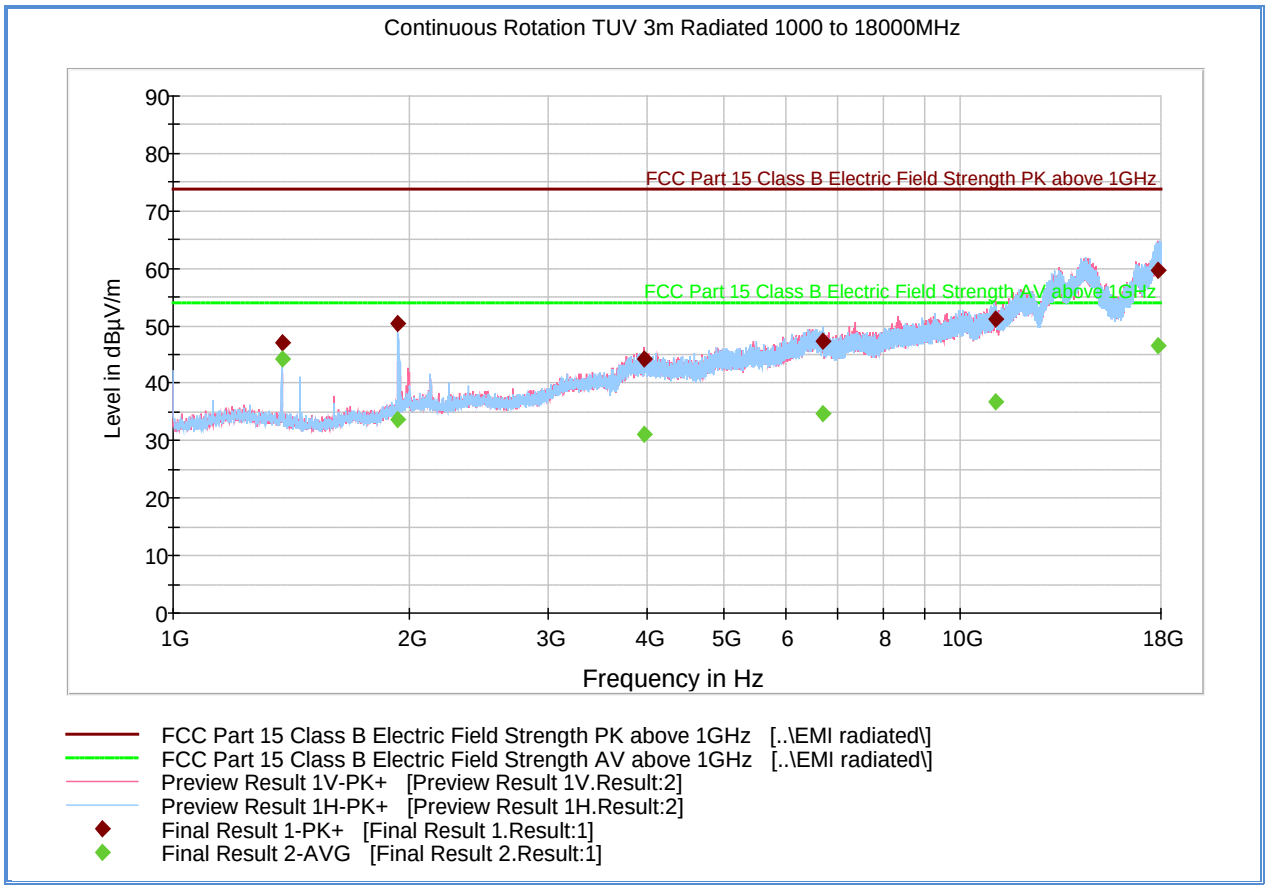
2.7.10 **Test Results Below 1GHz (Receive Mode)**



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)
37.375551	17.5	1000.0	120.000	400.0	H	11.0	-15.3	22.5	40.0
54.750541	31.3	1000.0	120.000	100.0	V	232.0	-21.0	8.7	40.0
61.262204	29.0	1000.0	120.000	100.0	V	165.0	-22.0	11.0	40.0
84.972745	24.3	1000.0	120.000	110.0	V	291.0	-21.6	15.7	40.0
483.989739	33.2	1000.0	120.000	139.0	V	318.0	-6.9	12.8	46.0
749.982365	34.6	1000.0	120.000	100.0	H	83.0	-2.0	11.4	46.0

2.7.11 Test Results Above 1GHz (Receive Mode)



Peak Data

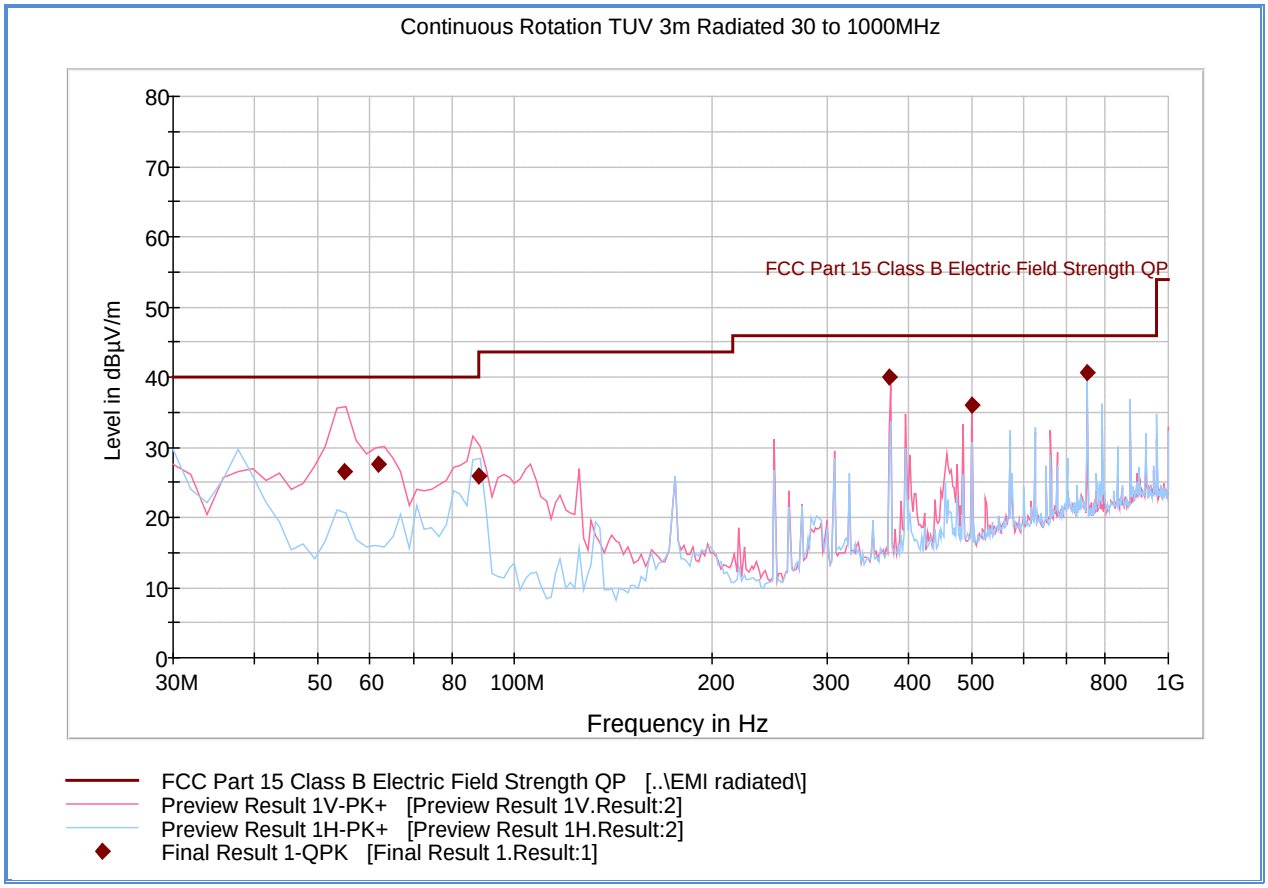
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1375.166667	47.2	1000.0	1000.000	117.7	H	217.0	-9.0	26.7	73.9
1932.566667	50.5	1000.0	1000.000	402.6	H	3.0	-5.9	23.4	73.9
3965.333333	44.3	1000.0	1000.000	148.7	V	114.0	3.8	29.6	73.9
6684.200000	47.4	1000.0	1000.000	350.6	H	197.0	9.9	26.5	73.9
11071.33333	51.2	1000.0	1000.000	390.1	V	326.0	14.9	22.7	73.9
17823.56666	59.6	1000.0	1000.000	332.2	V	0.0	26.2	14.3	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)
1375.166667	44.3	1000.0	1000.000	117.7	H	217.0	-9.0	9.6	53.9
1932.566667	33.7	1000.0	1000.000	402.6	H	3.0	-5.9	20.2	53.9
3965.333333	31.0	1000.0	1000.000	148.7	V	114.0	3.8	22.9	53.9
6684.200000	34.8	1000.0	1000.000	350.6	H	197.0	9.9	19.1	53.9
11071.33333	36.8	1000.0	1000.000	390.1	V	326.0	14.9	17.1	53.9
17823.56666	46.4	1000.0	1000.000	332.2	V	0.0	26.2	7.5	53.9

Test Notes: No significant emissions observed above 3GHz.

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

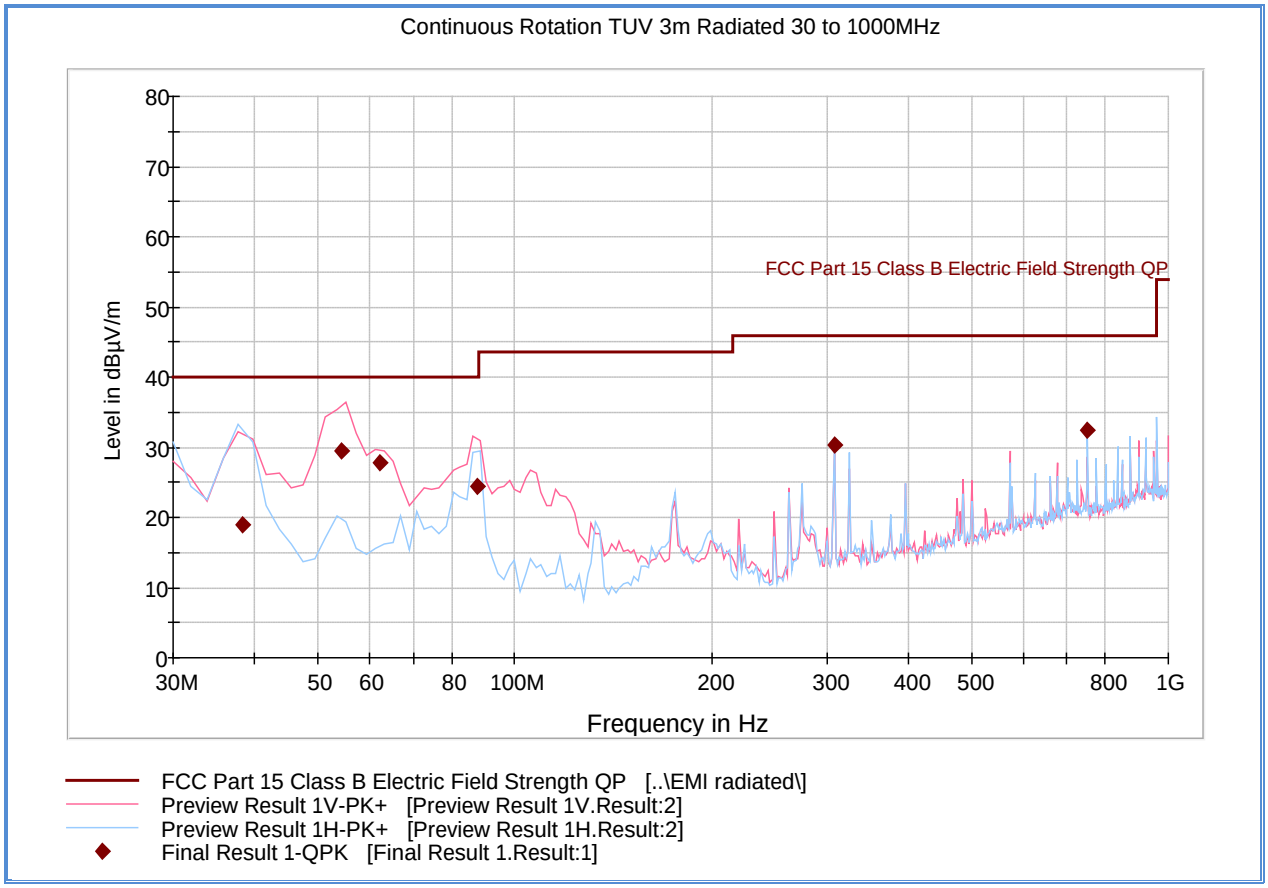


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
54.990541	26.5	1000.0	120.000	100.0	V	15.0	-21.0	13.5	40.0
61.806092	27.6	1000.0	120.000	108.0	V	127.0	-22.0	12.4	40.0
88.052745	26.0	1000.0	120.000	109.0	V	40.0	-21.2	17.5	43.5
375.012024	40.0	1000.0	120.000	138.0	V	84.0	-9.6	6.0	46.0
499.980842	36.0	1000.0	120.000	100.0	V	317.0	-7.1	10.0	46.0
749.982365	40.6	1000.0	120.000	100.0	H	322.0	-2.0	5.4	46.0

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

2.7.13 Test Results Below 1GHz (Bluetooth LE)

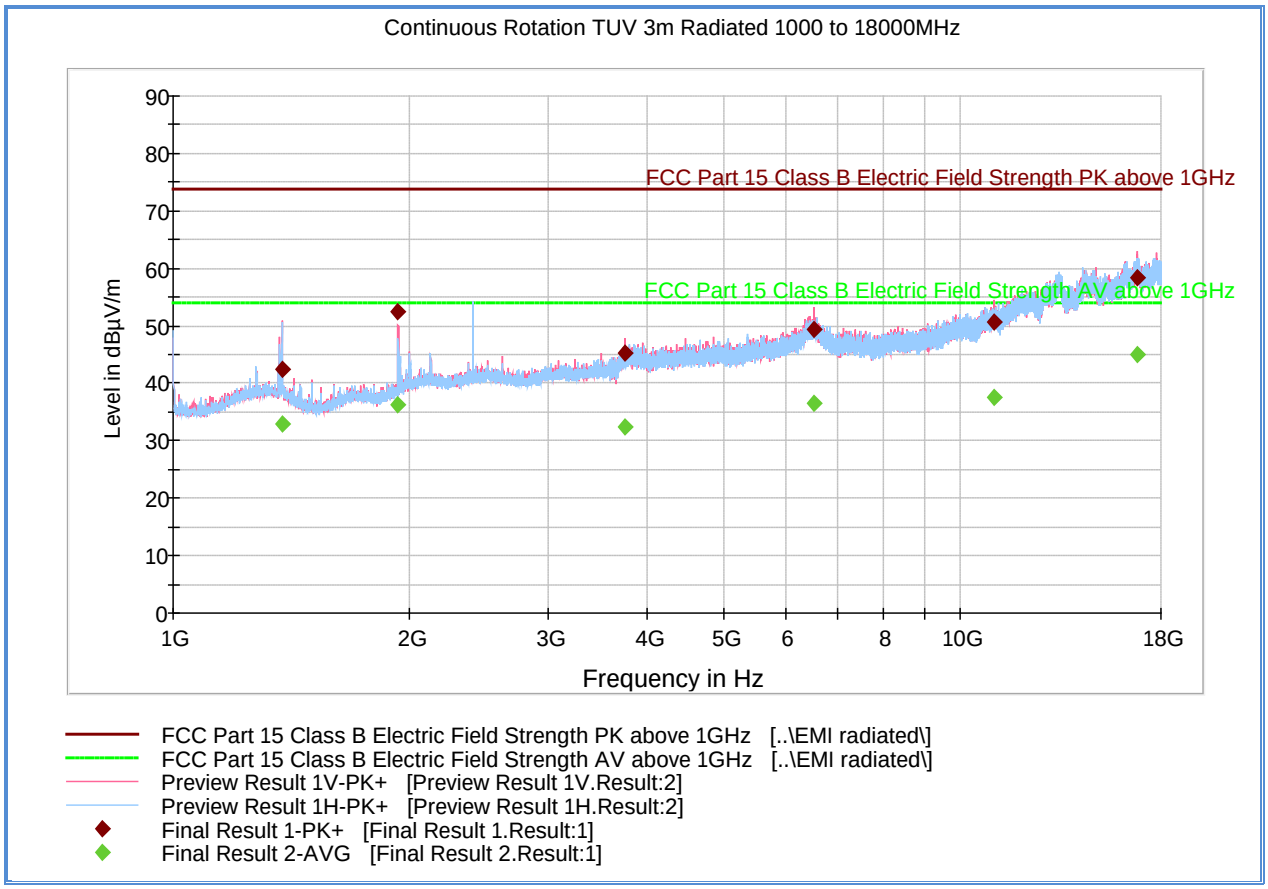


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
38.215551	19.0	1000.0	120.000	393.0	H	11.0	-15.8	21.0	40.0
54.150541	29.4	1000.0	120.000	100.0	V	219.0	-20.8	10.6	40.0
62.062204	27.8	1000.0	120.000	115.0	V	175.0	-22.0	12.2	40.0
87.692745	24.5	1000.0	120.000	100.0	V	6.0	-21.3	15.5	40.0
308.015952	30.2	1000.0	120.000	100.0	H	47.0	-12.2	15.8	46.0
749.982365	32.4	1000.0	120.000	100.0	H	348.0	-2.0	13.6	46.0

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

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



Peak Data

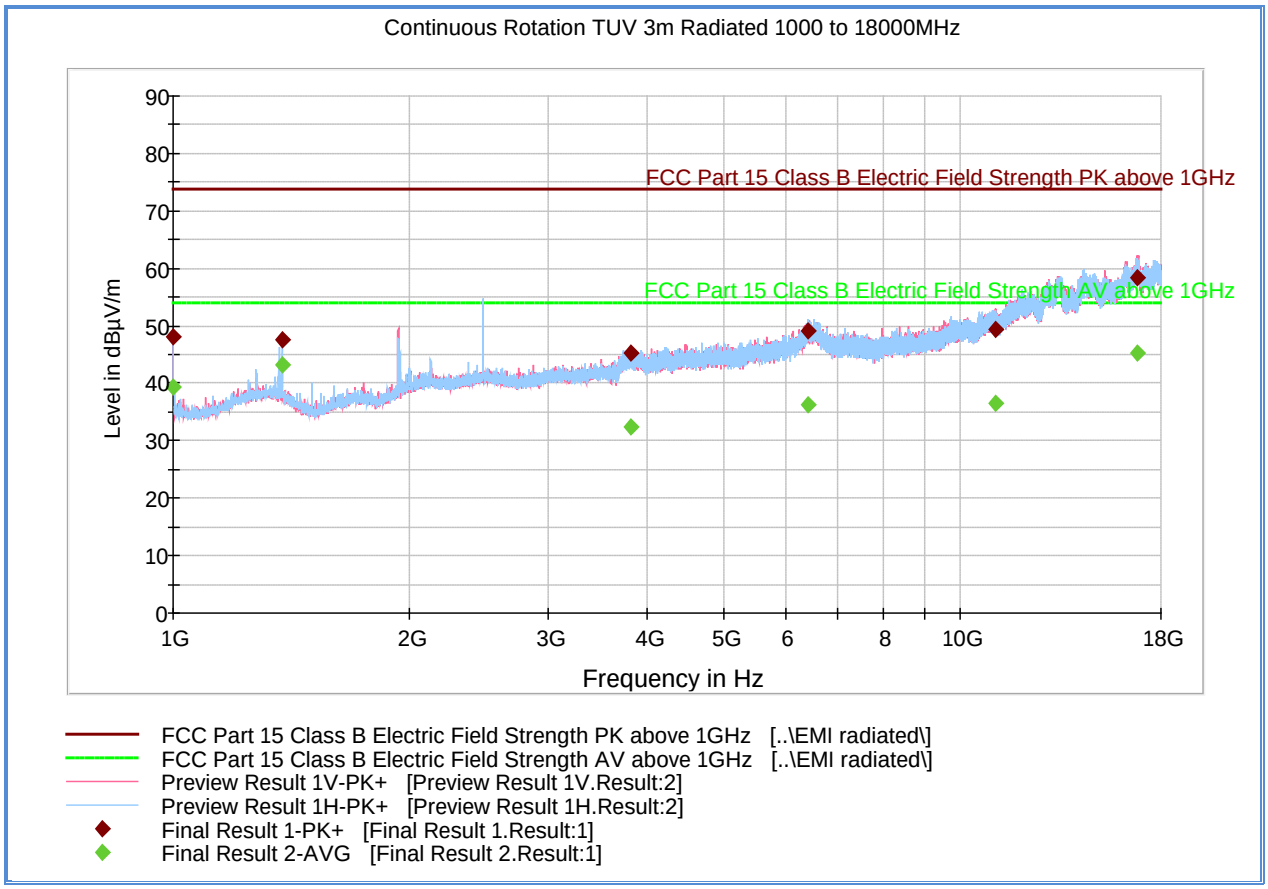
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1375.366667	42.4	1000.0	1000.000	116.7	V	148.0	-5.4	31.5	73.9
1932.566667	52.4	1000.0	1000.000	402.1	V	137.0	-2.3	21.5	73.9
3750.966667	45.4	1000.0	1000.000	402.1	V	203.0	4.5	28.5	73.9
6520.600000	49.5	1000.0	1000.000	189.5	V	161.0	11.2	24.4	73.9
11031.900000	50.7	1000.0	1000.000	155.7	V	160.0	14.8	23.2	73.9
16795.266667	58.4	1000.0	1000.000	117.7	V	342.0	23.8	15.5	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)
1375.366667	32.9	1000.0	1000.000	116.7	V	148.0	-5.4	21.0	53.9
1932.566667	36.3	1000.0	1000.000	402.1	V	137.0	-2.3	17.6	53.9
3750.966667	32.3	1000.0	1000.000	402.1	V	203.0	4.5	21.6	53.9
6520.600000	36.4	1000.0	1000.000	189.5	V	161.0	11.2	17.5	53.9
11031.900000	37.6	1000.0	1000.000	155.7	V	160.0	14.8	16.3	53.9
16795.266667	44.9	1000.0	1000.000	117.7	V	342.0	23.8	9.0	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

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



Peak Data

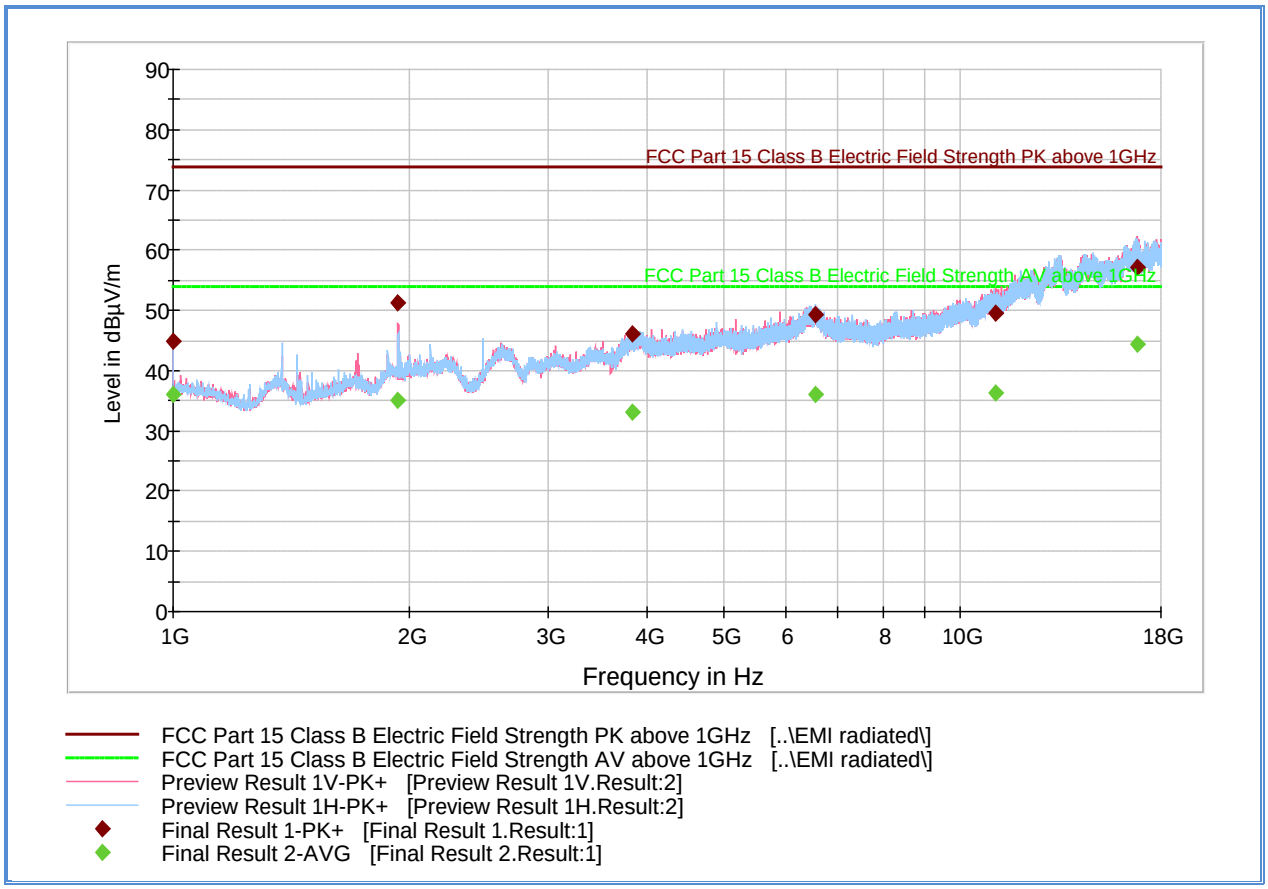
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	48.0	1000.0	1000.000	229.4	H	170.0	-7.2	25.9	73.9
1374.766667	47.7	1000.0	1000.000	116.7	H	168.0	-5.4	26.2	73.9
3817.900000	45.3	1000.0	1000.000	174.6	H	247.0	4.9	28.6	73.9
6411.133333	49.1	1000.0	1000.000	147.7	H	142.0	11.2	24.8	73.9
11109.900000	49.5	1000.0	1000.000	322.2	V	226.0	14.5	24.4	73.9
16793.933333	58.4	1000.0	1000.000	402.1	V	155.0	23.8	15.5	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)
1000.000000	39.2	1000.0	1000.000	229.4	H	170.0	-7.2	14.7	53.9
1374.766667	43.1	1000.0	1000.000	116.7	H	168.0	-5.4	10.8	53.9
3817.900000	32.5	1000.0	1000.000	174.6	H	247.0	4.9	21.4	53.9
6411.133333	36.3	1000.0	1000.000	147.7	H	142.0	11.2	17.6	53.9
11109.900000	36.6	1000.0	1000.000	322.2	V	226.0	14.5	17.3	53.9
16793.933333	45.2	1000.0	1000.000	402.1	V	155.0	23.8	8.7	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

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



Peak Data

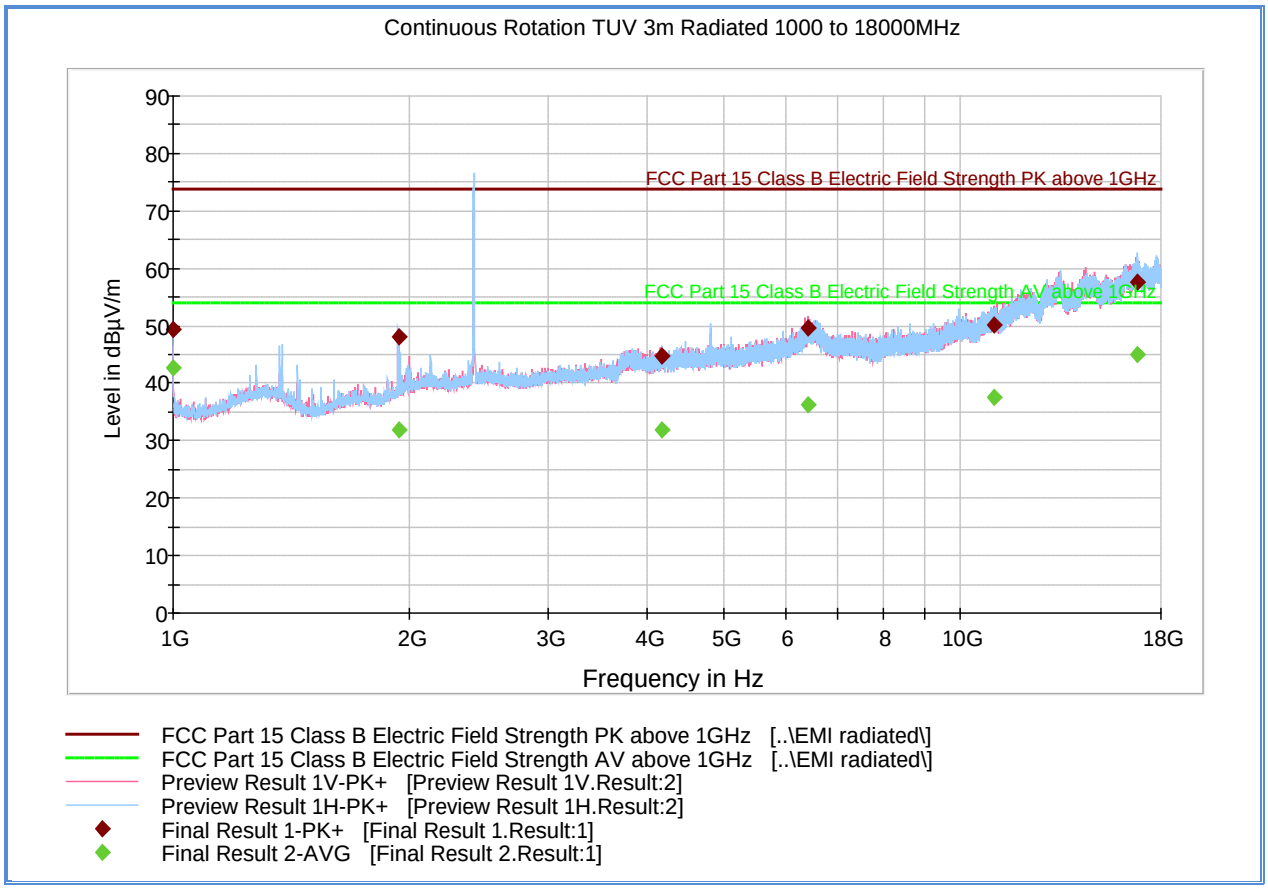
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	44.9	1000.0	1000.000	166.6	V	86.0	-7.2	29.0	73.9
1932.566667	51.2	1000.0	1000.000	302.2	V	207.0	-2.3	22.7	73.9
3828.766667	46.2	1000.0	1000.000	201.3	H	230.0	4.9	27.7	73.9
6550.700000	49.4	1000.0	1000.000	402.0	H	317.0	11.3	24.5	73.9
11091.166667	49.4	1000.0	1000.000	191.5	V	287.0	14.5	24.5	73.9
16824.933333	57.2	1000.0	1000.000	156.6	V	174.0	23.5	16.7	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)
1000.000000	36.0	1000.0	1000.000	166.6	V	86.0	-7.2	17.9	53.9
1932.566667	35.1	1000.0	1000.000	302.2	V	207.0	-2.3	18.8	53.9
3828.766667	33.0	1000.0	1000.000	201.3	H	230.0	4.9	20.9	53.9
6550.700000	36.1	1000.0	1000.000	402.0	H	317.0	11.3	17.8	53.9
11091.166667	36.4	1000.0	1000.000	191.5	V	287.0	14.5	17.5	53.9
16824.933333	44.5	1000.0	1000.000	156.6	V	174.0	23.5	9.4	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

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



Peak Data

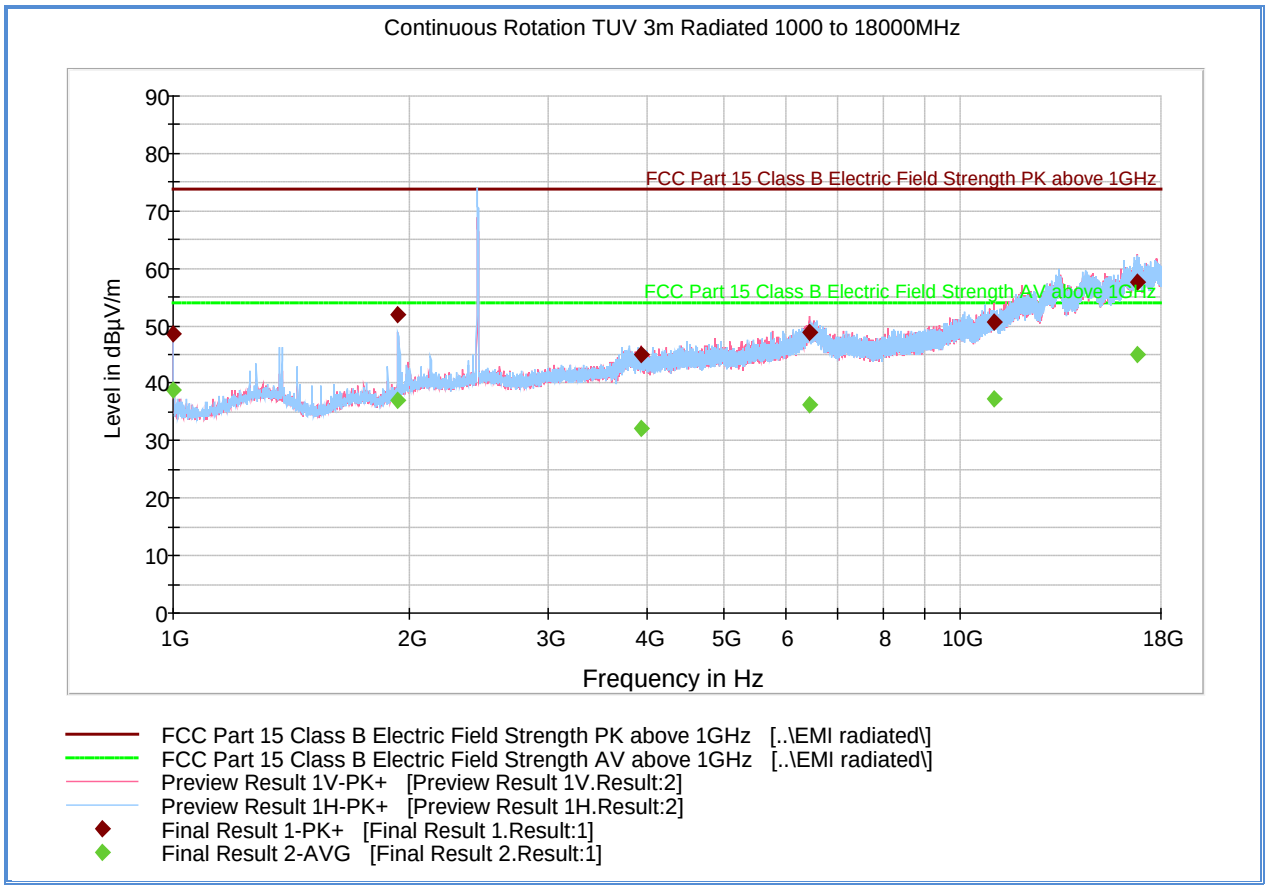
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	49.3	1000.0	1000.000	239.4	H	34.0	-7.2	24.6	73.9
1932.766667	48.1	1000.0	1000.000	355.1	H	213.0	-2.3	25.8	73.9
4182.366667	44.8	1000.0	1000.000	355.1	H	11.0	5.1	29.1	73.9
6408.800000	49.7	1000.0	1000.000	390.1	V	86.0	11.2	24.2	73.9
11045.833333	50.2	1000.0	1000.000	299.2	V	236.0	14.7	23.7	73.9
16781.866667	57.6	1000.0	1000.000	191.5	H	78.0	23.7	16.3	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)
1000.000000	42.7	1000.0	1000.000	239.4	H	34.0	-7.2	11.2	53.9
1932.766667	32.0	1000.0	1000.000	355.1	H	213.0	-2.3	21.9	53.9
4182.366667	32.0	1000.0	1000.000	355.1	H	11.0	5.1	21.9	53.9
6408.800000	36.3	1000.0	1000.000	390.1	V	86.0	11.2	17.6	53.9
11045.833333	37.4	1000.0	1000.000	299.2	V	236.0	14.7	16.5	53.9
16781.866667	45.0	1000.0	1000.000	191.5	H	78.0	23.7	8.9	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

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



Peak Data

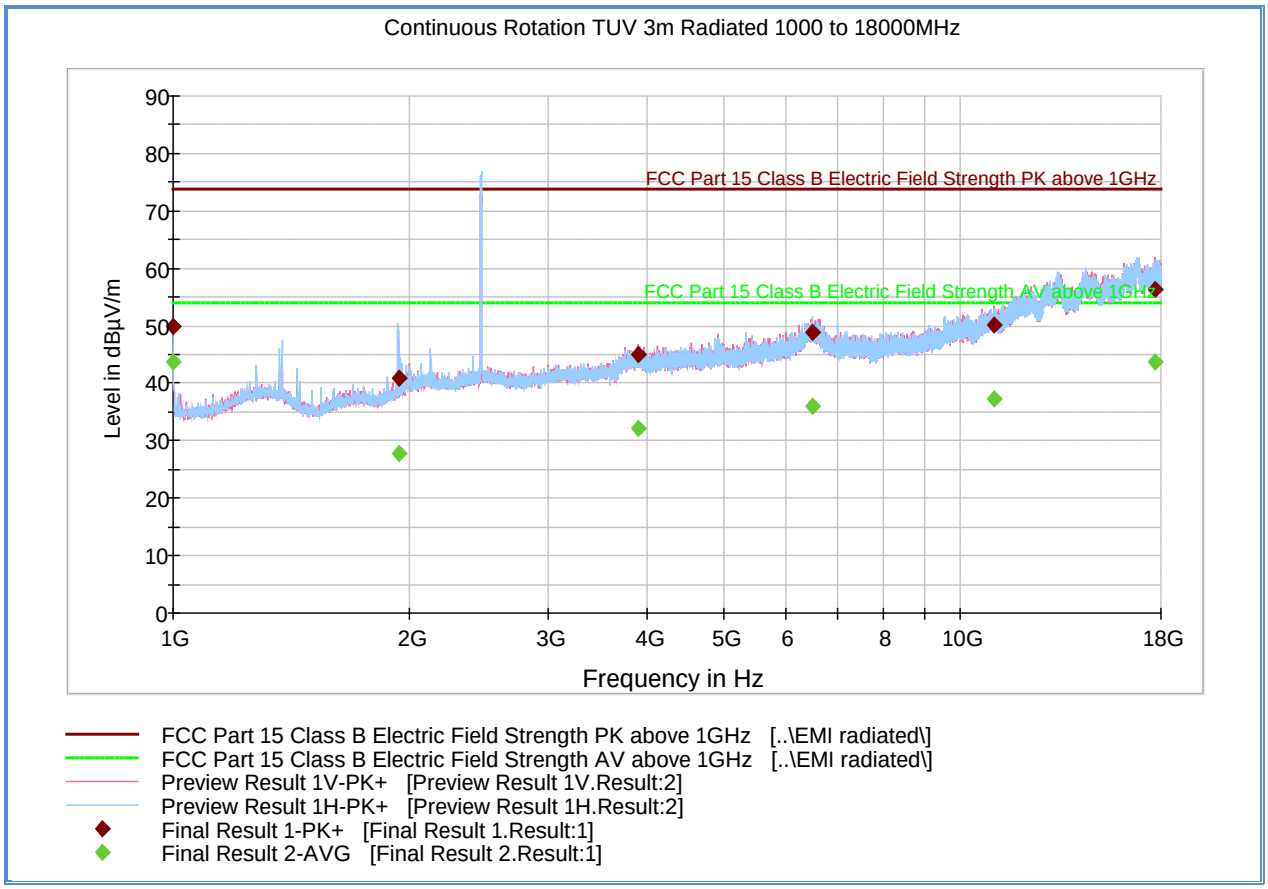
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.400000	48.7	1000.0	1000.000	270.3	H	235.0	-7.2	25.2	73.9
1932.566667	51.9	1000.0	1000.000	402.9	V	60.0	-2.3	22.0	73.9
3935.866667	44.9	1000.0	1000.000	157.6	V	168.0	5.0	29.0	73.9
6442.800000	48.8	1000.0	1000.000	124.7	V	50.0	11.1	25.1	73.9
11054.166667	50.7	1000.0	1000.000	402.9	V	197.0	14.7	23.2	73.9
16824.366667	57.7	1000.0	1000.000	350.6	V	44.0	23.6	16.2	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)
1000.400000	38.8	1000.0	1000.000	270.3	H	235.0	-7.2	15.1	53.9
1932.566667	37.1	1000.0	1000.000	402.9	V	60.0	-2.3	16.8	53.9
3935.866667	32.2	1000.0	1000.000	157.6	V	168.0	5.0	21.7	53.9
6442.800000	36.2	1000.0	1000.000	124.7	V	50.0	11.1	17.7	53.9
11054.166667	37.2	1000.0	1000.000	402.9	V	197.0	14.7	16.7	53.9
16824.366667	44.9	1000.0	1000.000	350.6	V	44.0	23.6	9.0	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

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



Peak Data

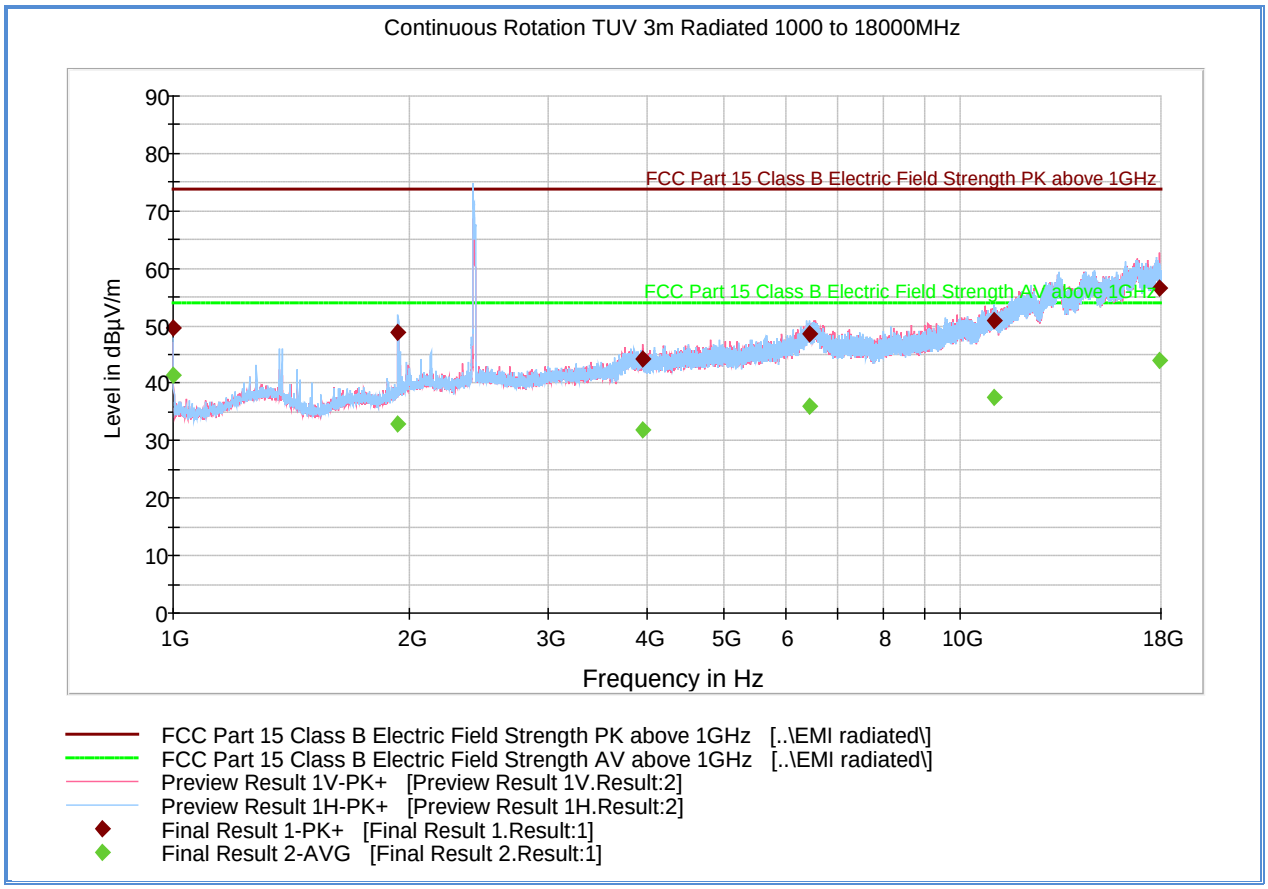
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	49.9	1000.0	1000.000	239.4	H	70.0	-7.2	24.0	73.9
1932.766667	40.8	1000.0	1000.000	333.1	H	206.0	-2.3	33.1	73.9
3897.733333	44.9	1000.0	1000.000	402.9	V	197.0	5.0	29.0	73.9
6492.333333	48.9	1000.0	1000.000	181.6	H	306.0	11.1	25.0	73.9
11044.600000	50.3	1000.0	1000.000	173.6	V	116.0	14.7	23.6	73.9
17714.933333	56.2	1000.0	1000.000	402.9	V	325.0	22.8	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)
1000.000000	43.8	1000.0	1000.000	239.4	H	70.0	-7.2	10.1	53.9
1932.766667	27.9	1000.0	1000.000	333.1	H	206.0	-2.3	26.0	53.9
3897.733333	32.1	1000.0	1000.000	402.9	V	197.0	5.0	21.8	53.9
6492.333333	36.1	1000.0	1000.000	181.6	H	306.0	11.1	17.8	53.9
11044.600000	37.2	1000.0	1000.000	173.6	V	116.0	14.7	16.7	53.9
17714.933333	43.8	1000.0	1000.000	402.9	V	325.0	22.8	10.1	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

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



Peak Data

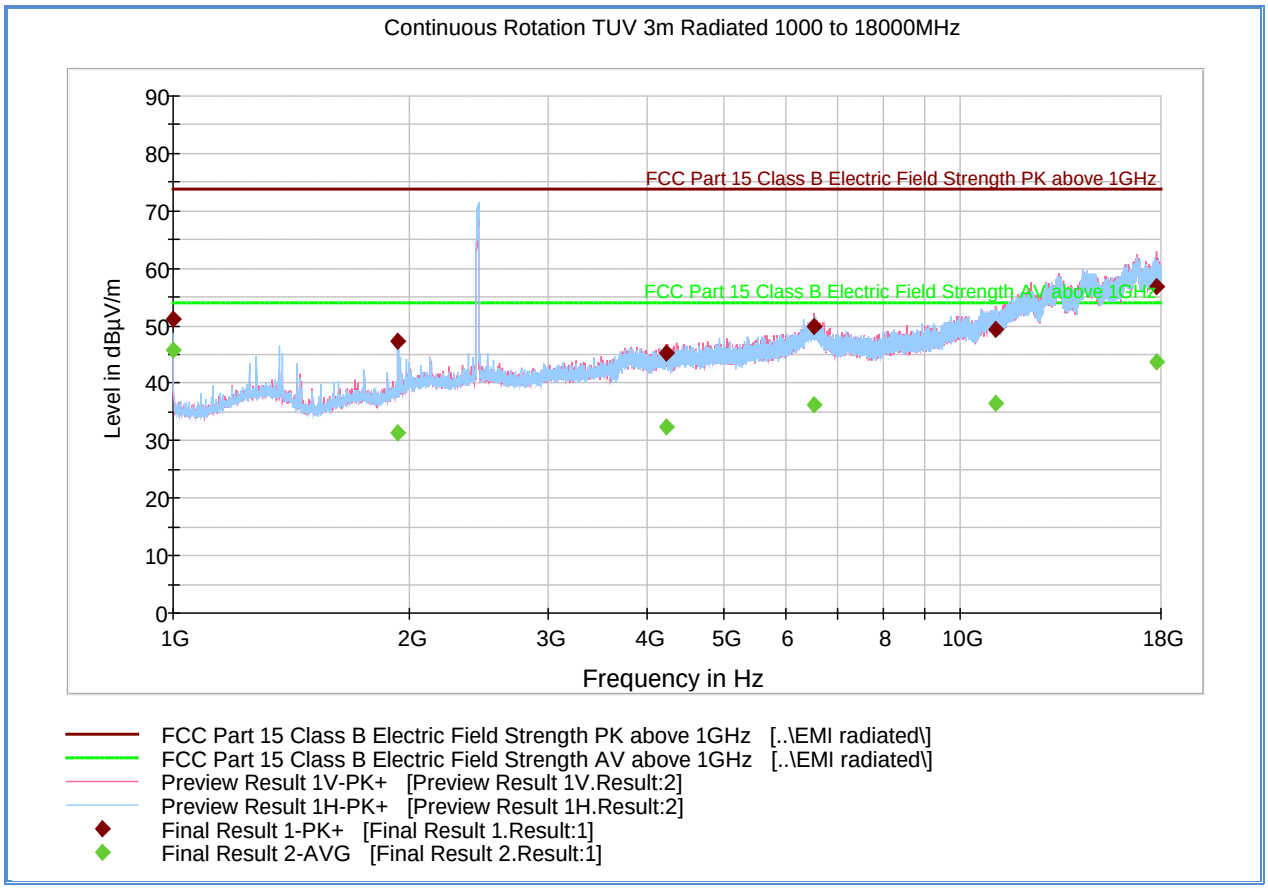
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	49.7	1000.0	1000.000	292.2	H	70.0	-7.2	24.2	73.9
1932.366667	48.9	1000.0	1000.000	103.7	H	226.0	-2.3	25.0	73.9
3958.766667	44.3	1000.0	1000.000	191.5	V	243.0	5.0	29.6	73.9
6427.766667	48.6	1000.0	1000.000	322.2	H	179.0	11.2	25.3	73.9
11043.466667	51.0	1000.0	1000.000	351.6	H	219.0	14.7	22.9	73.9
17938.433333	56.6	1000.0	1000.000	389.1	V	-1.0	22.9	17.3	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)
1000.000000	41.5	1000.0	1000.000	292.2	H	70.0	-7.2	12.4	53.9
1932.366667	32.9	1000.0	1000.000	103.7	H	226.0	-2.3	21.0	53.9
3958.766667	31.9	1000.0	1000.000	191.5	V	243.0	5.0	22.0	53.9
6427.766667	35.9	1000.0	1000.000	322.2	H	179.0	11.2	18.0	53.9
11043.466667	37.5	1000.0	1000.000	351.6	H	219.0	14.7	16.4	53.9
17938.433333	43.8	1000.0	1000.000	389.1	V	-1.0	22.9	10.1	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

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



Peak Data

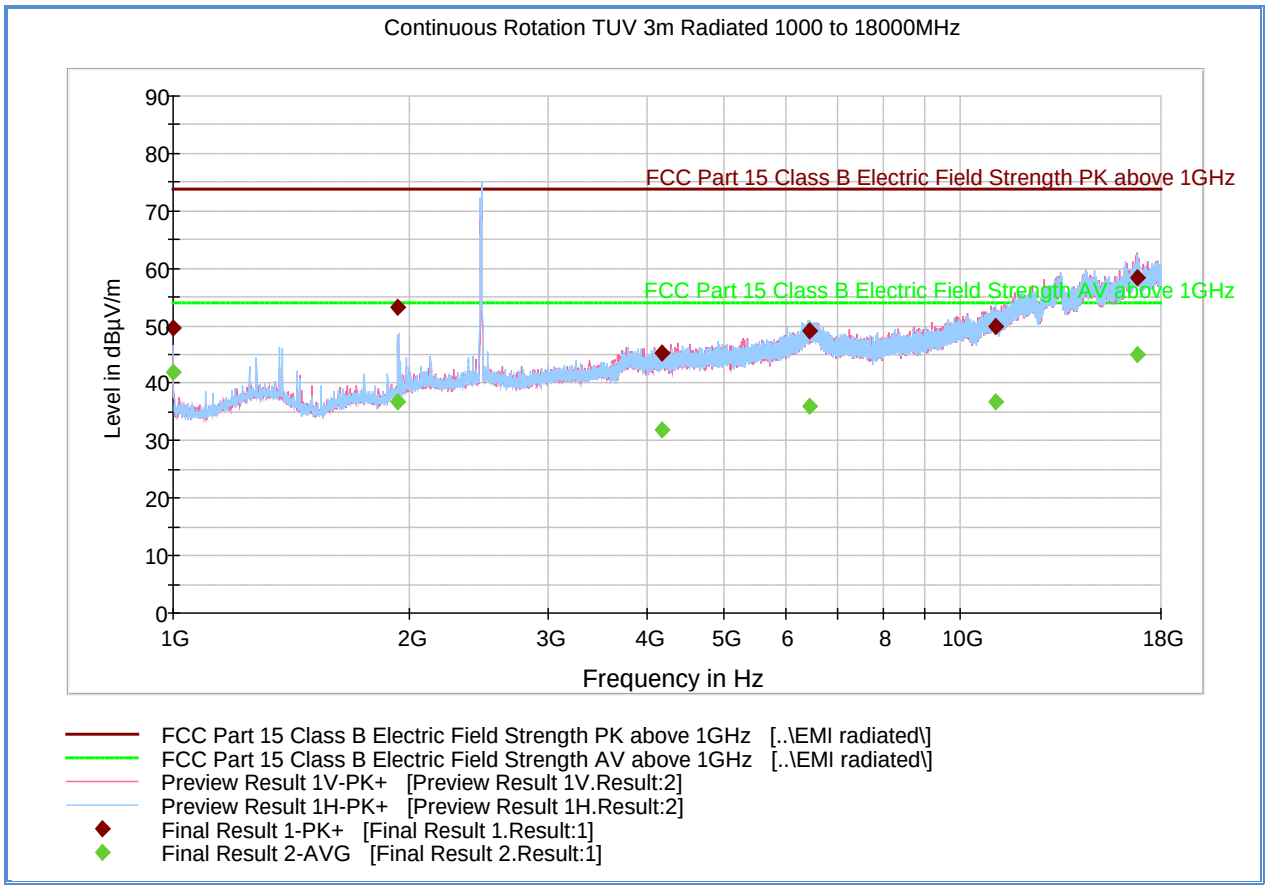
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	51.2	1000.0	1000.000	164.0	H	321.0	-7.2	22.7	73.9
1932.566667	47.3	1000.0	1000.000	410.0	H	20.0	-2.3	26.6	73.9
4226.433333	45.3	1000.0	1000.000	98.0	V	251.0	5.1	28.6	73.9
6531.200000	49.8	1000.0	1000.000	150.0	V	13.0	11.2	24.1	73.9
11113.700000	49.4	1000.0	1000.000	349.9	H	34.0	14.5	24.5	73.9
17745.933333	56.9	1000.0	1000.000	350.0	V	216.0	23.0	17.0	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	45.6	1000.0	1000.000	164.0	H	321.0	-7.2	8.3	53.9
1932.566667	31.5	1000.0	1000.000	410.0	H	20.0	-2.3	22.4	53.9
4226.433333	32.4	1000.0	1000.000	98.0	V	251.0	5.1	21.5	53.9
6531.200000	36.3	1000.0	1000.000	150.0	V	13.0	11.2	17.6	53.9
11113.700000	36.5	1000.0	1000.000	349.9	H	34.0	14.5	17.4	53.9
17745.933333	43.6	1000.0	1000.000	350.0	V	216.0	23.0	10.3	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

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



Peak Data

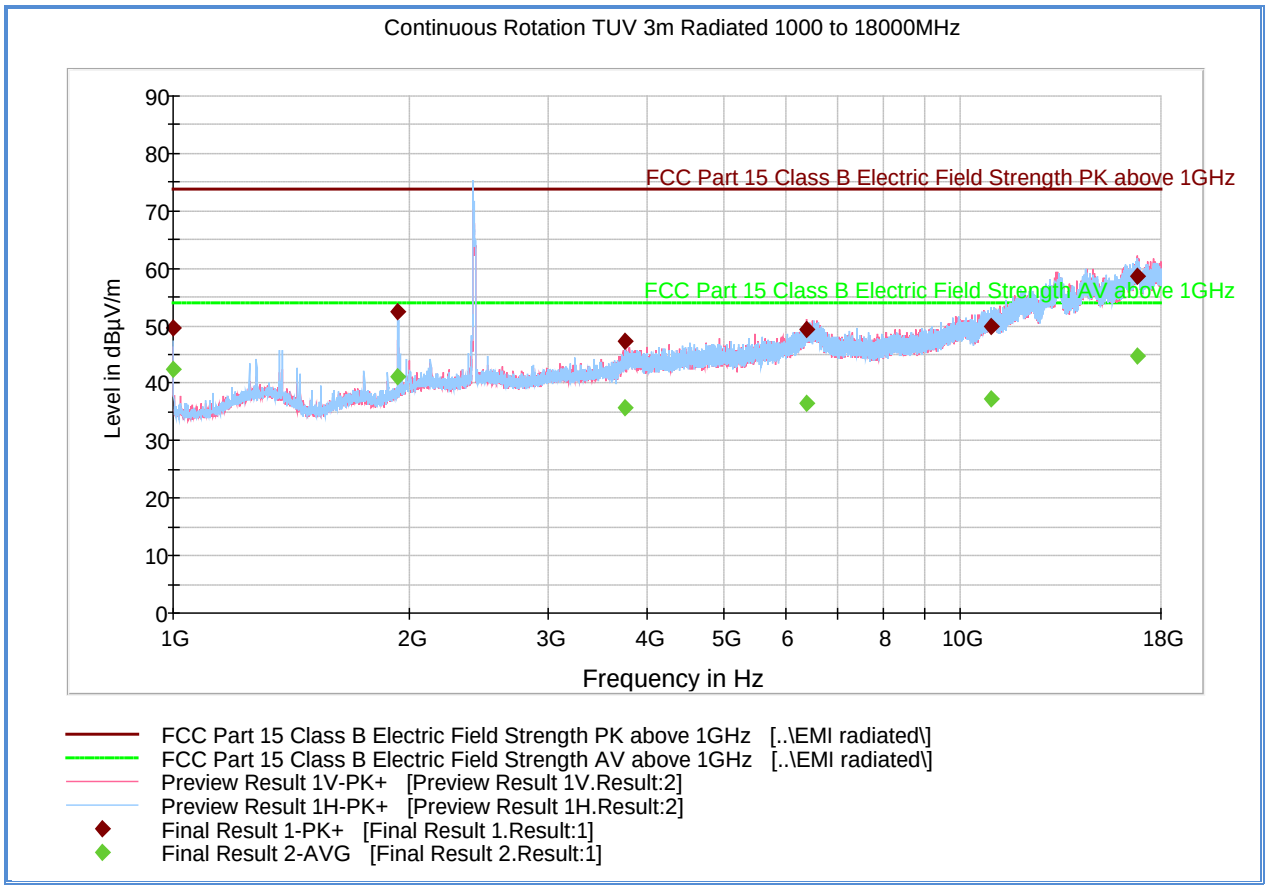
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	49.6	1000.0	1000.000	390.0	H	1.0	-7.2	24.3	73.9
1932.533333	53.1	1000.0	1000.000	391.0	H	311.0	-2.3	20.8	73.9
4176.366667	45.2	1000.0	1000.000	300.0	V	252.0	5.1	28.7	73.9
6449.066667	49.1	1000.0	1000.000	378.0	H	173.0	11.1	24.8	73.9
11107.600000	49.8	1000.0	1000.000	241.0	H	296.0	14.5	24.1	73.9
16787.300000	58.3	1000.0	1000.000	350.0	V	40.0	23.8	15.6	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)
1000.000000	41.8	1000.0	1000.000	390.0	H	1.0	-7.2	12.1	53.9
1932.533333	36.9	1000.0	1000.000	391.0	H	311.0	-2.3	17.0	53.9
4176.366667	31.9	1000.0	1000.000	300.0	V	252.0	5.1	22.0	53.9
6449.066667	35.9	1000.0	1000.000	378.0	H	173.0	11.1	18.0	53.9
11107.600000	36.8	1000.0	1000.000	241.0	H	296.0	14.5	17.1	53.9
16787.300000	45.0	1000.0	1000.000	350.0	V	40.0	23.8	8.9	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

2.7.23 Test Results Above 1GHz (802.11n HT20 2.4GHz Low Channel)



Peak Data

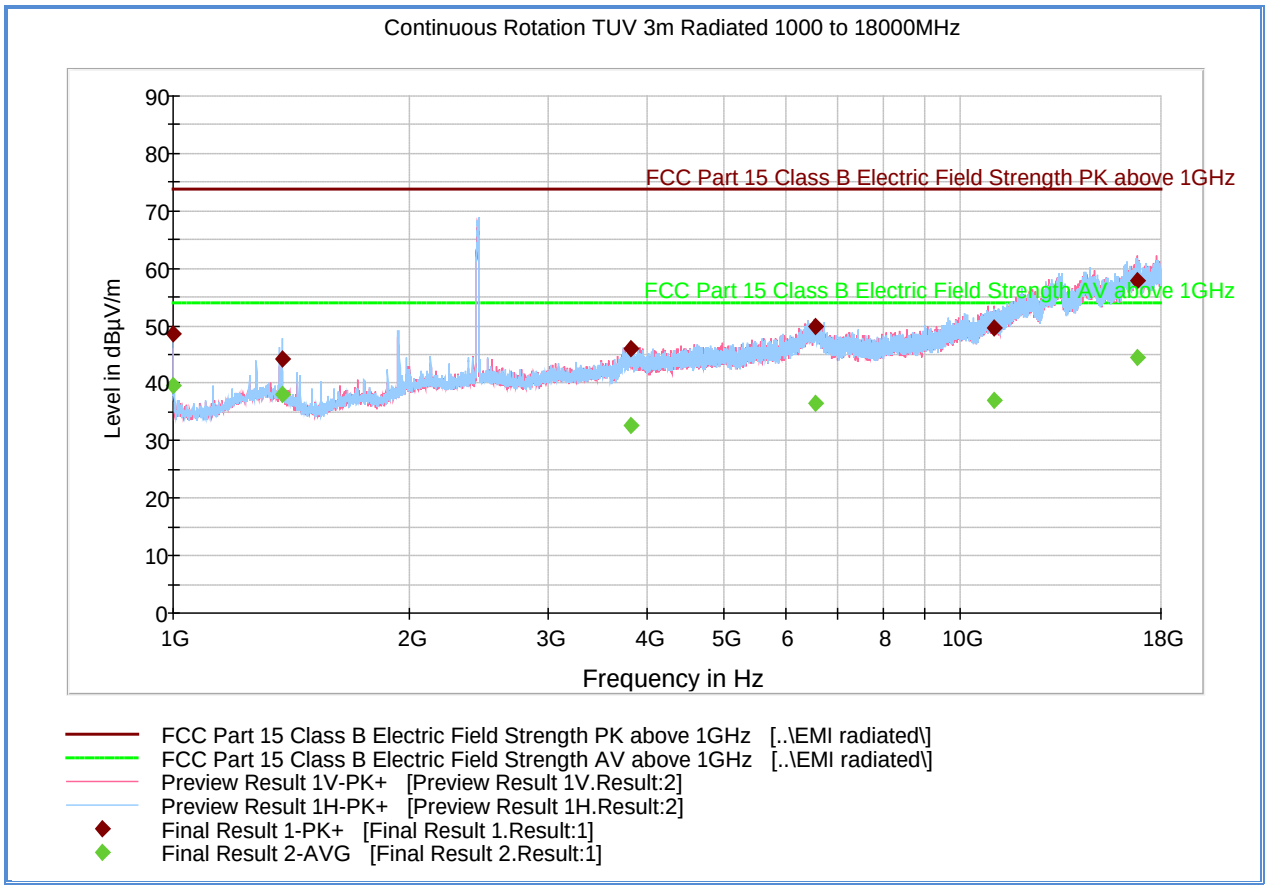
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	49.6	1000.0	1000.000	390.0	H	0.0	-7.2	24.3	73.9
1932.533333	52.5	1000.0	1000.000	393.0	H	280.0	-2.3	21.4	73.9
3749.833333	47.3	1000.0	1000.000	200.0	V	10.0	4.5	26.6	73.9
6370.700000	49.5	1000.0	1000.000	187.0	V	129.0	11.0	24.4	73.9
10968.600000	49.8	1000.0	1000.000	151.0	H	22.0	14.8	24.1	73.9
16776.533333	58.5	1000.0	1000.000	200.0	V	31.0	23.7	15.4	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	42.3	1000.0	1000.000	390.0	H	0.0	-7.2	11.6	53.9
1932.533333	41.2	1000.0	1000.000	393.0	H	280.0	-2.3	12.7	53.9
3749.833333	35.6	1000.0	1000.000	200.0	V	10.0	4.5	18.3	53.9
6370.700000	36.4	1000.0	1000.000	187.0	V	129.0	11.0	17.5	53.9
10968.600000	37.3	1000.0	1000.000	151.0	H	22.0	14.8	16.6	53.9
16776.533333	44.8	1000.0	1000.000	200.0	V	31.0	23.7	9.1	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

2.7.24 Test Results Above 1GHz (802.11n HT20 2.4GHz Mid Channel)



Peak Data

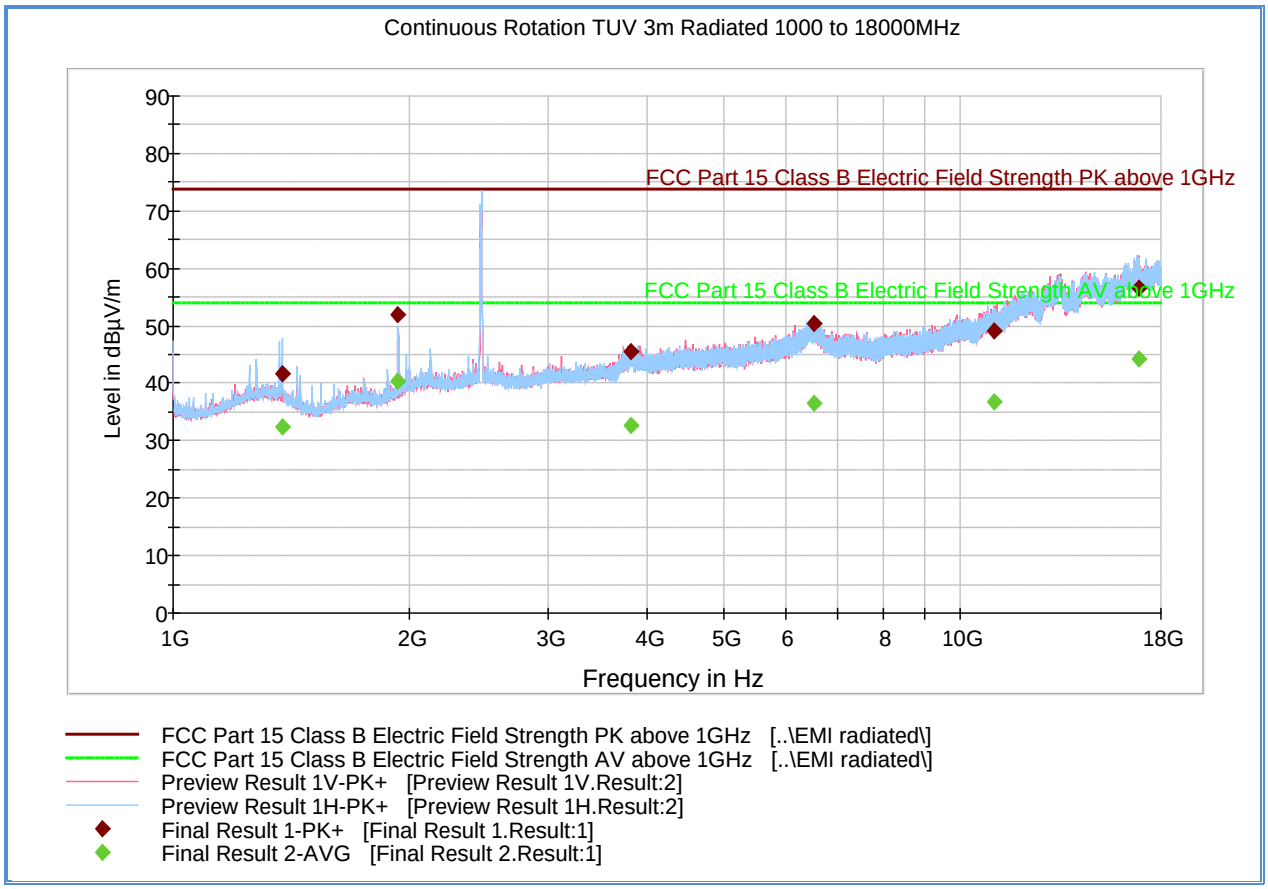
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	48.5	1000.0	1000.000	410.0	H	31.0	-7.2	25.4	73.9
1374.966667	44.3	1000.0	1000.000	137.0	H	163.0	-5.4	29.6	73.9
3812.000000	46.1	1000.0	1000.000	400.1	H	58.0	4.9	27.8	73.9
6549.966667	49.8	1000.0	1000.000	405.1	H	0.0	11.3	24.1	73.9
11061.966667	49.6	1000.0	1000.000	100.0	V	-3.0	14.7	24.3	73.9
16819.633333	57.9	1000.0	1000.000	392.0	V	282.0	23.6	16.0	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	39.7	1000.0	1000.000	410.0	H	31.0	-7.2	14.2	53.9
1374.966667	38.0	1000.0	1000.000	137.0	H	163.0	-5.4	15.9	53.9
3812.000000	32.6	1000.0	1000.000	400.1	H	58.0	4.9	21.3	53.9
6549.966667	36.5	1000.0	1000.000	405.1	H	0.0	11.3	17.4	53.9
11061.966667	37.0	1000.0	1000.000	100.0	V	-3.0	14.7	16.9	53.9
16819.633333	44.5	1000.0	1000.000	392.0	V	282.0	23.6	9.4	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were noise floor figures.

2.7.25 Test Results Above 1GHz (802.11n HT20 2.4GHz 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)
1374.766667	41.5	1000.0	1000.000	151.1	H	163.0	-5.4	32.4	73.9
1932.566667	51.8	1000.0	1000.000	390.0	H	258.0	-2.3	22.1	73.9
3816.466667	45.6	1000.0	1000.000	350.0	V	70.0	4.9	28.3	73.9
6521.433333	50.3	1000.0	1000.000	350.1	V	27.0	11.2	23.6	73.9
11070.366667	49.2	1000.0	1000.000	406.9	V	-13.0	14.6	24.7	73.9
16838.366667	56.6	1000.0	1000.000	406.9	V	183.0	23.4	17.3	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)
1374.766667	32.4	1000.0	1000.000	151.1	H	163.0	-5.4	21.5	53.9
1932.566667	40.3	1000.0	1000.000	390.0	H	258.0	-2.3	13.6	53.9
3816.466667	32.6	1000.0	1000.000	350.0	V	70.0	4.9	21.3	53.9
6521.433333	36.5	1000.0	1000.000	350.1	V	27.0	11.2	17.4	53.9
11070.366667	36.7	1000.0	1000.000	406.9	V	-13.0	14.6	17.2	53.9
16838.366667	44.1	1000.0	1000.000	406.9	V	183.0	23.4	9.8	53.9

Test Notes: No significant emissions observed above 18GHz. Measurements above 18GHz were 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: N/A / Test Configuration B

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

May 11 and 28, 2015/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

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 – 24.8°C
Relative Humidity	49.7 - 50.5%
ATM Pressure	98.9 – 99.9 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.
- There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.

- Only worst-case WiFi mode presented (802.11 n HT20) in terms of band-edge compliance.
- 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.

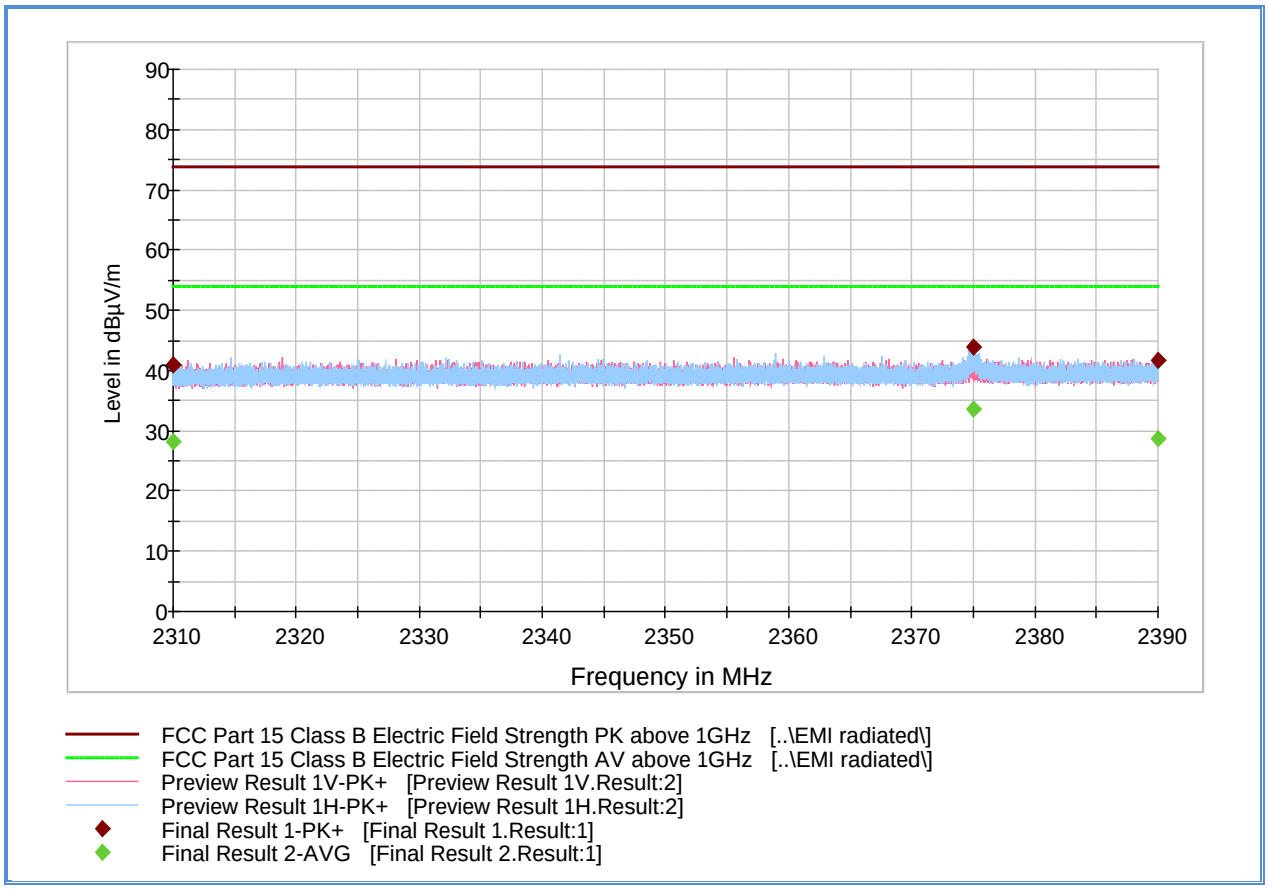
2.8.8 Sample Computation (Radiated Emission)

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 Restricted Band 2310MHz to 2390MHz (Bluetooth LE Low Channel)



Peak Data

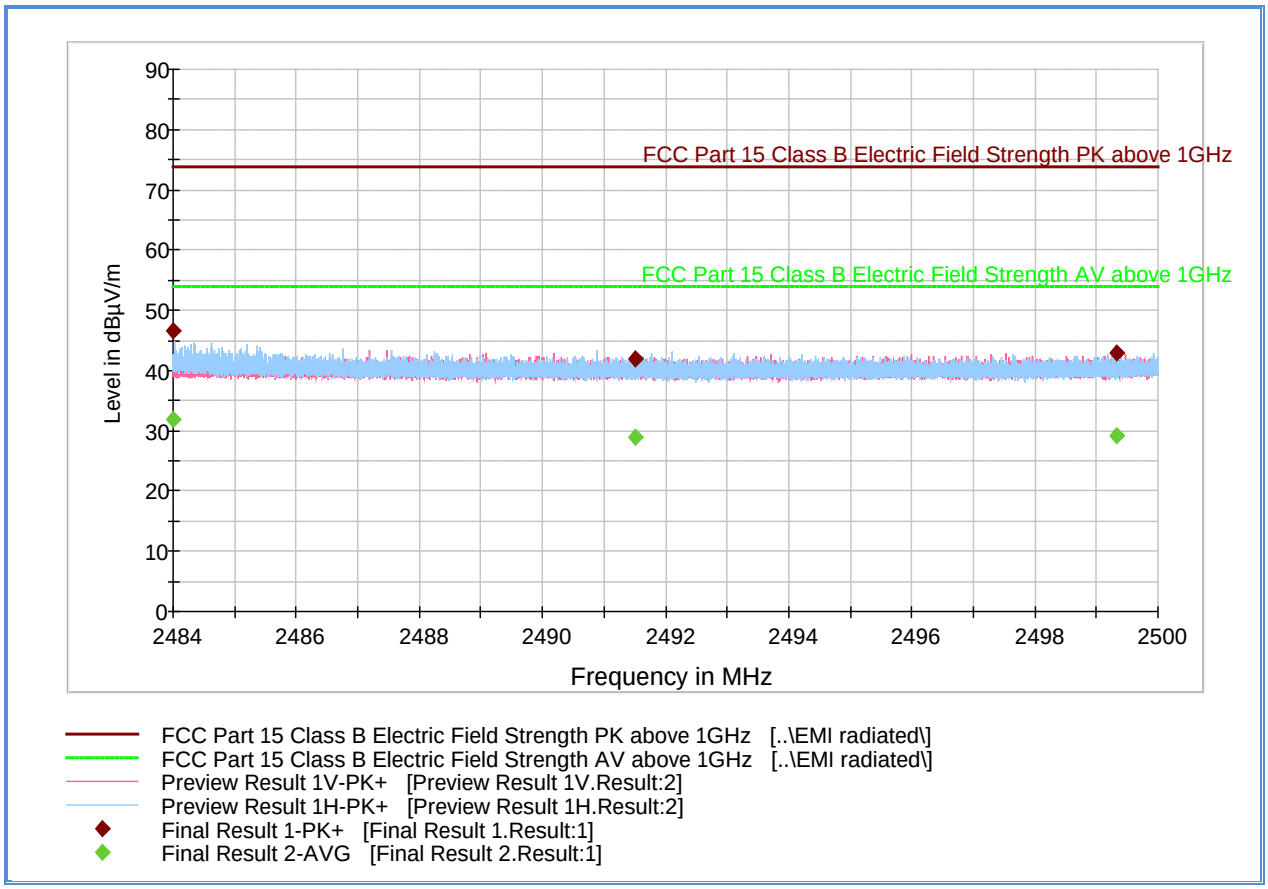
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2310.000000	40.9	1000.0	1000.000	366.1	H	20.0	-0.8	33.0	73.9
2375.024000	43.8	1000.0	1000.000	116.7	H	217.0	-0.7	30.1	73.9
2389.991200	41.6	1000.0	1000.000	259.3	V	162.0	-0.6	32.3	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)
2310.000000	28.3	1000.0	1000.000	366.1	H	20.0	-0.8	25.6	53.9
2375.024000	33.5	1000.0	1000.000	116.7	H	217.0	-0.7	20.4	53.9
2389.997120	28.8	1000.0	1000.000	259.3	V	162.0	-0.6	25.1	53.9

Test Notes:

2.8.11 Test Results Restricted Band 2483.5MHz to 2500MHz (Bluetooth LE High Channel)



Peak Data

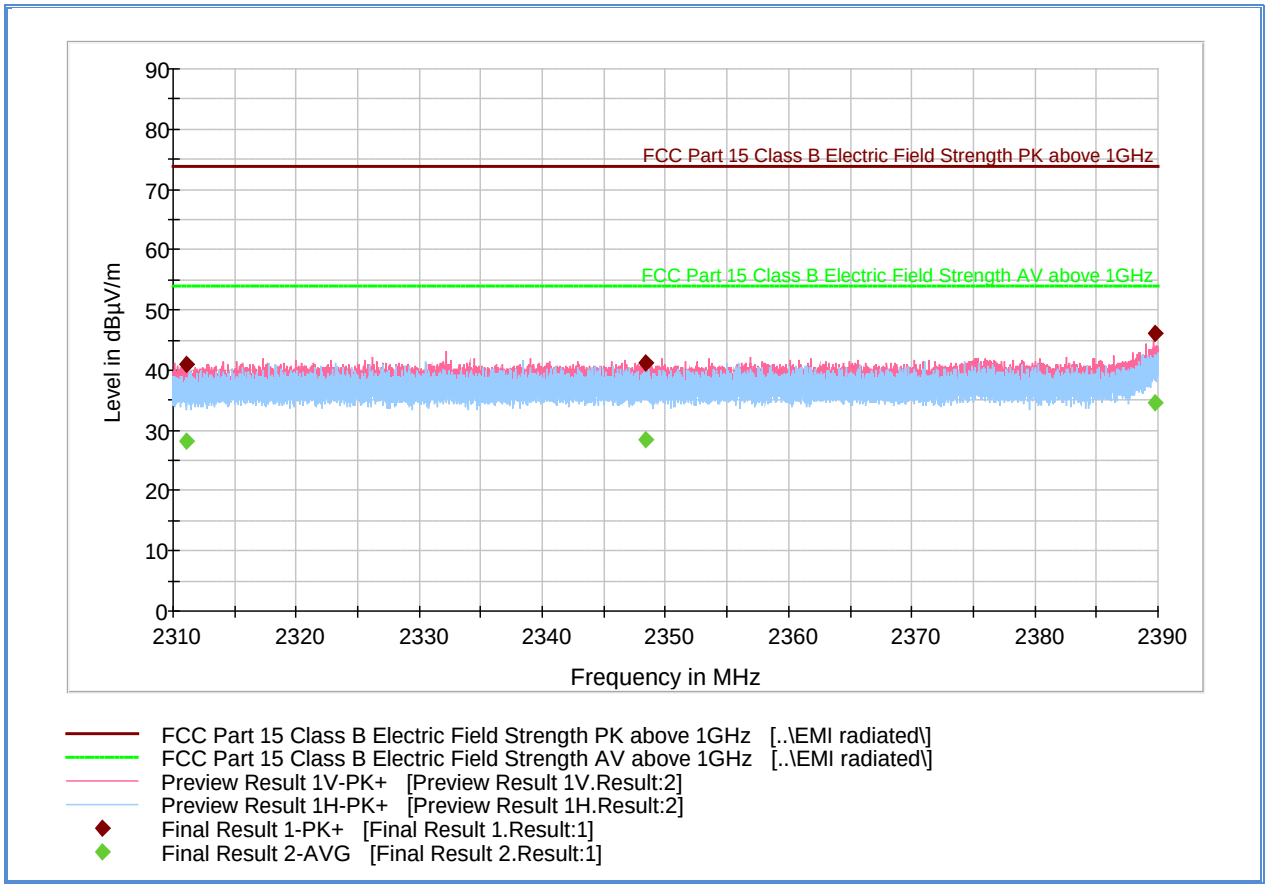
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2484.000000	46.5	1000.0	1000.000	102.7	H	64.0	-0.1	27.4	73.9
2491.515200	41.9	1000.0	1000.000	346.1	H	238.0	-0.1	32.0	73.9
2499.324267	42.9	1000.0	1000.000	322.2	H	198.0	-0.1	31.0	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)
2484.000000	31.9	1000.0	1000.000	102.7	H	64.0	-0.1	22.0	53.9
2491.515200	29.0	1000.0	1000.000	346.1	H	238.0	-0.1	24.9	53.9
2499.324267	29.1	1000.0	1000.000	322.2	H	198.0	-0.1	24.8	53.9

Test Notes:

2.8.12 Test Results Restricted Band 2310MHz to 2390MHz (Low Channel Worst Case WiFi Mode)



Peak Data

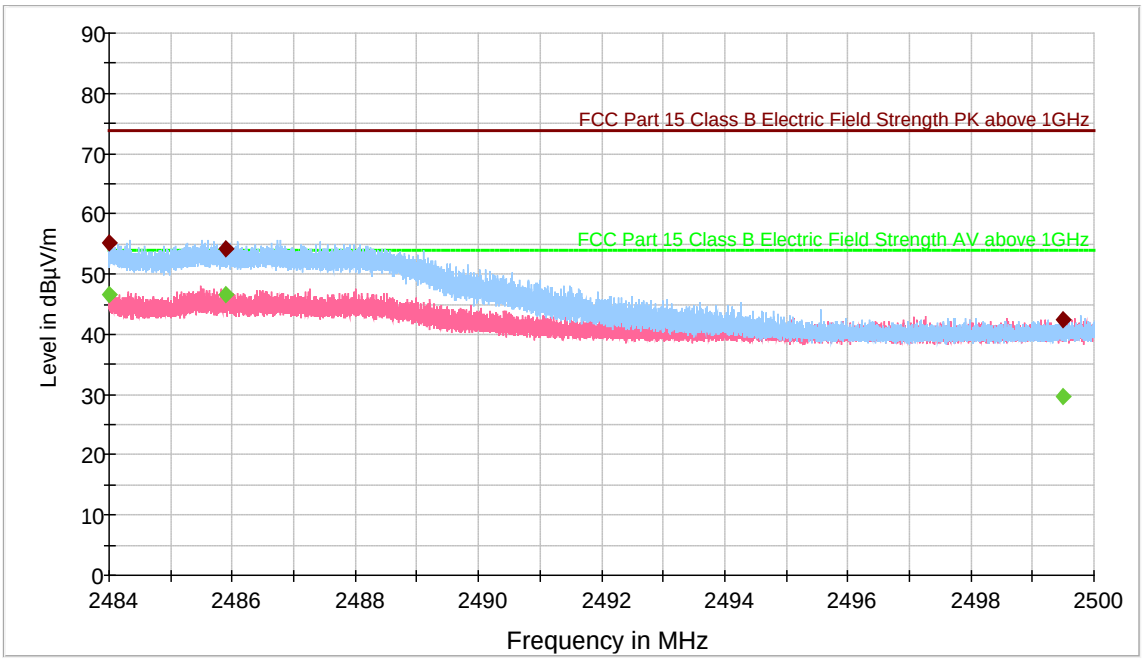
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2311.050667	40.9	1000.0	1000.000	131.7	V	101.0	-0.8	33.0	73.9
2348.330667	41.2	1000.0	1000.000	151.2	V	181.0	-0.8	32.7	73.9
2389.765333	46.0	1000.0	1000.000	124.7	H	192.0	-0.6	27.9	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)
2311.050667	28.2	1000.0	1000.000	131.7	V	101.0	-0.8	25.7	53.9
2348.330667	28.4	1000.0	1000.000	151.2	V	181.0	-0.8	25.5	53.9
2389.765333	34.6	1000.0	1000.000	124.7	H	192.0	-0.6	19.3	53.9

Test Notes:

2.8.13 Test Results Restricted Band 2483.5MHz to 2500MHz (High Channel Worst Case WiFi 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)
2484.000000	55.2	1000.0	1000.000	101.7	H	72.0	-0.1	18.7	73.9
2485.903467	54.2	1000.0	1000.000	102.7	H	71.0	-0.1	19.7	73.9
2499.500000	42.4	1000.0	1000.000	181.6	V	-15.0	-0.1	31.5	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)
2484.000000	46.5	1000.0	1000.000	101.7	H	72.0	-0.1	7.4	53.9
2485.903467	46.6	1000.0	1000.000	102.7	H	71.0	-0.1	7.3	53.9
2499.500000	29.7	1000.0	1000.000	181.6	V	-15.0	-0.1	24.2	53.9

Test Notes:

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: N/A / Test Configuration A

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

May 11 and 28, 2015/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

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.3 – 24.8°C
Relative Humidity	49.7 - 50.5%
ATM Pressure	98.9 – 99.9 kPa

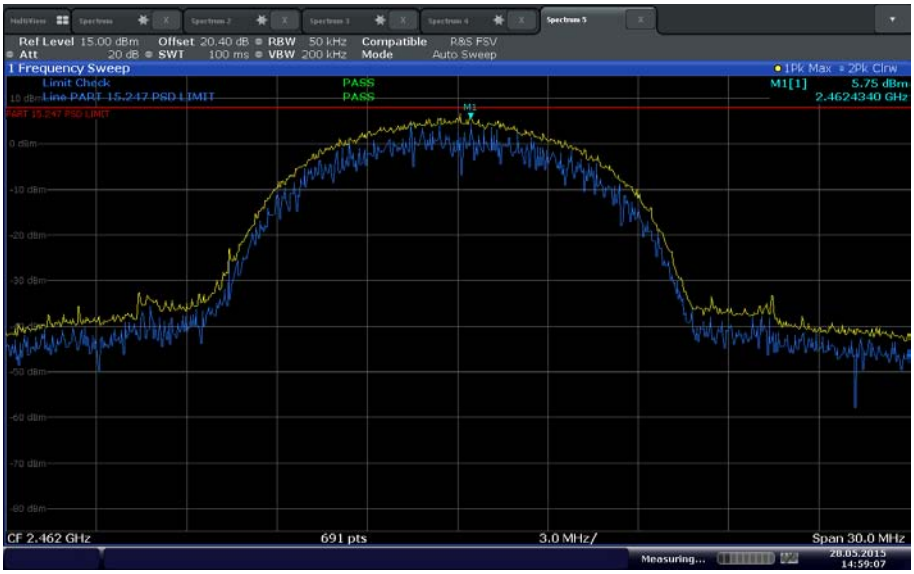
2.9.7 Additional Observations

- This is a conducted test.
- Test procedure is per Section 10.2 of KDB 558074 (June 05, 2014). For Bluetooth LE, Section 10.5 applies.
- A correction factor of 20.4 dB was used to compensate for the external attenuator and cable used.
- Detector is Peak for Section 10.2 and RMS power averaging for Section 10.5.
- Max hold for Section 10.2 and Trace averaging mode over 100 traces for Section 10.5.
- Sweep time is Auto Couple.
- EUT complies with 100 kHz RBW using 802.11g, 802.11n and Bluetooth LE. 802.11b complies using 50 kHz RBW.

2.9.8 Test Results Summary

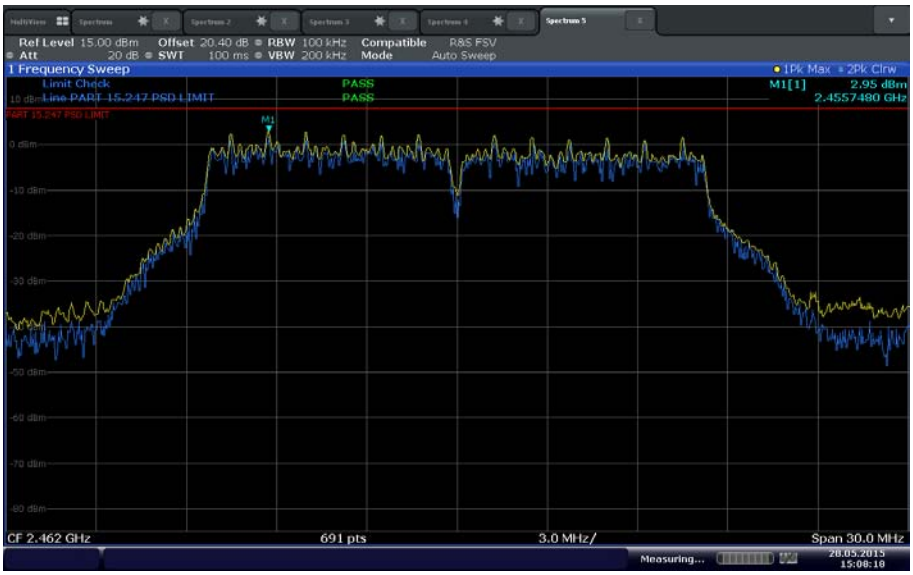
Mode	Channel	Marker Reading using 100 kHz RBW (dBm)	Duty Cycle Correction Factor	Calculated PSD (dBm)	PSD Limit (dBm)	Compliance
802.11b	1 (2412 MHz)	5.57	-	5.57	8	Complies
	6 (2437 MHz)	5.29	-	5.29	8	Complies
	11 (2462 MHz)	5.75	-	5.75	8	Complies
802.11g	1 (2412 MHz)	2.32	-	2.32	8	Complies
	6 (2437 MHz)	2.34	-	2.34	8	Complies
	11 (2462 MHz)	2.95	-	2.95	8	Complies
802.11n HT20	1 (2412 MHz)	1.54	-	1.54	8	Complies
	6 (2437 MHz)	1.83	-	1.83	8	Complies
	11 (2462 MHz)	2.06	-	2.06	8	Complies
Bluetooth LE	37 (2402 MHz)	-11.99	8.713	-3.277	8	Complies
	17 (2440 MHz)	-12.78	8.713	-4.067	8	Complies
	39 (2480 MHz)	-13.56	8.713	-4.847	8	Complies

2.9.9 **Test Results Plots**



Date: 28.MAY.2015 14:59:07

802.11b Worst Case Channel

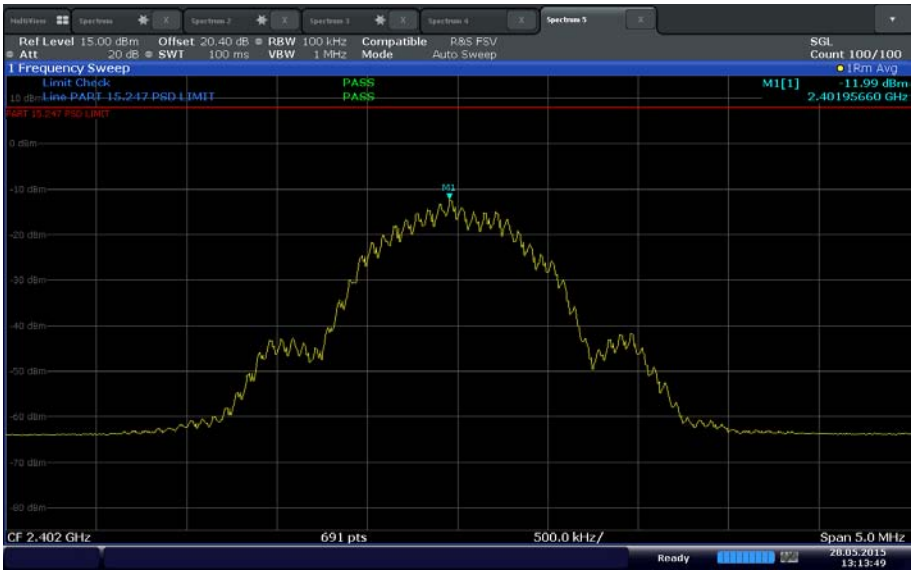


Date: 28.MAY.2015 15:08:18

802.11g Worst Case Channel

Date: 28.MAY.2015 15:13:21

802.11n HT20 Worst Case Channel



Date: 28.MAY.2015 13:13:49

Bluetooth LE Worst Case 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
Antenna Conducted Port Setup						
7569	Series Power Meter	N1911A P-	MY45100625	Agilent	04/22/14	0522/15
7570	50MHz-18GHz Wideband Power Sensor	N1921A	MY45240588	Agilent	04/09/14	05/09/15
7611	Signal/Spectrum Analyzer	FSW26	102017	Rhode & Schwarz	03/25/15	03/25/16
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	04/29/15	04/29/16
8825	20dB Attenuator	46-20-34	BK5773	Weinschel Corp.	Verified by 1003 and 7611	
Radiated Test Setup						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	01/30/14	01/30/16
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	08/29/14	08/29/15
1016	Pre-amplifier	PAM-0202	187	PAM	12/10/14	12/10/15
1051	Double-ridged waveguide horn antenna	3115	9408-4329	EMCO	02/28/14	02/28/16
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/11/15	03/11/16
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	03/20/15	03/20/16
1150	Horn antenna	3160-09	012054-004	ETS	04/26/13	05/26/15
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	05/02/13	06/02/15
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 1003 and 7611	
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 1003 and 7611	
6815	2.4GHz Band Notch Filter	BRM50702	008	Micro-Tronics	Verified by 1003 and 7611	
Conducted Emissions						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	04/10/15	04/10/16
7567	LISN	FCC-LISN-50-25-2-10	120304	Fischer Custom Comm.	07/01/14	07/01/15
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	02/20/15	02/20/16
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	02/20/15	02/20/16
Miscellaneous						
6792	Multimeter	3478A	2911A70964	Hewlett Packard	08/12/14	08/12/15
11312	Mini Environmental Quality Meter	850027	CF099-56010-340	Sper Scientific	04/09/15	04/09/16
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

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

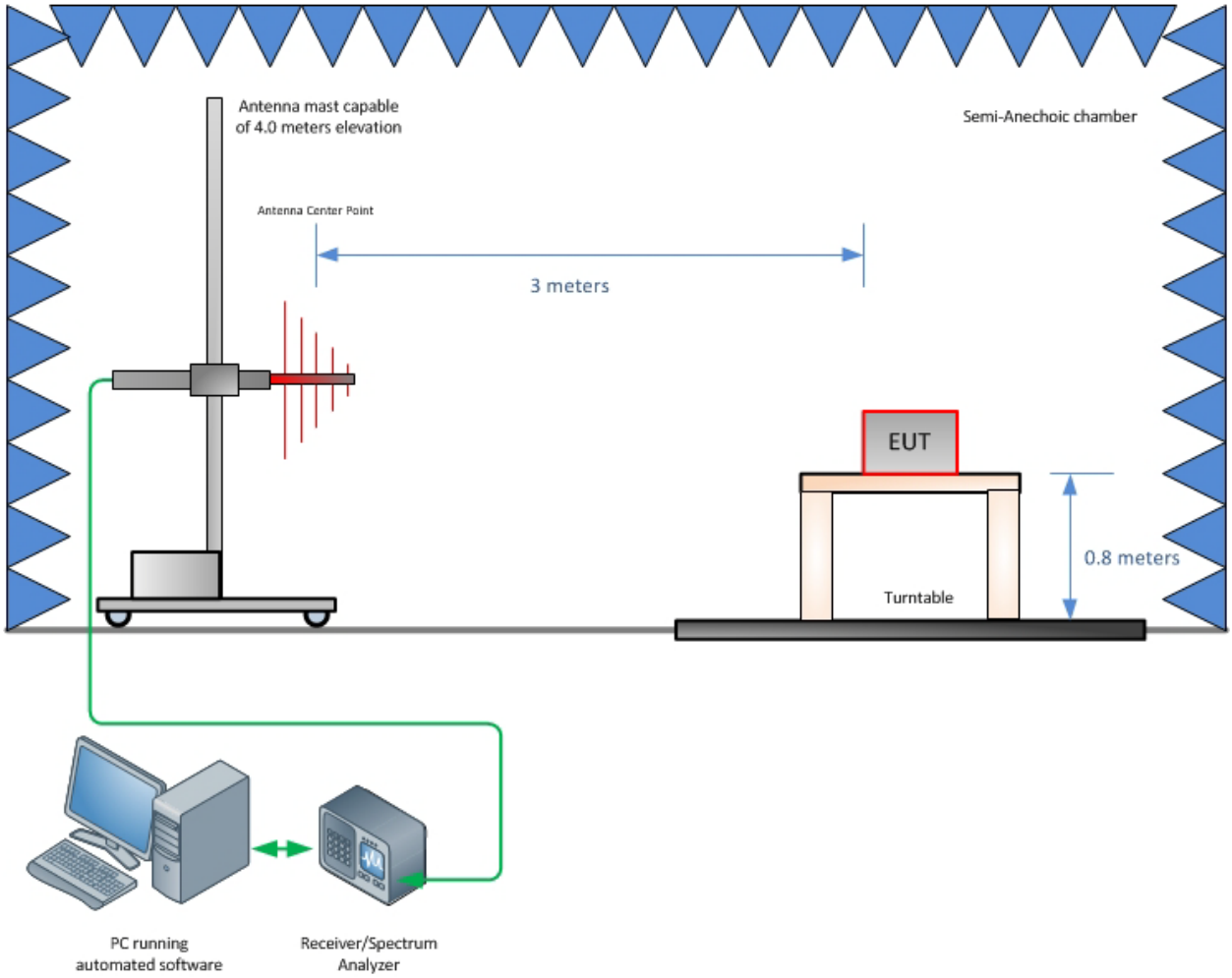
3.2.1 AC Conducted Measurements

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.36	0.21	0.04
2	Cables	Rectangular	0.50	0.29	0.08
3	LISN	Rectangular	0.66	0.38	0.15
4	Attenuator	Rectangular	0.30	0.17	0.03
5	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	0.80
				Coverage Factor (k):	2
				Expanded Uncertainty:	1.59

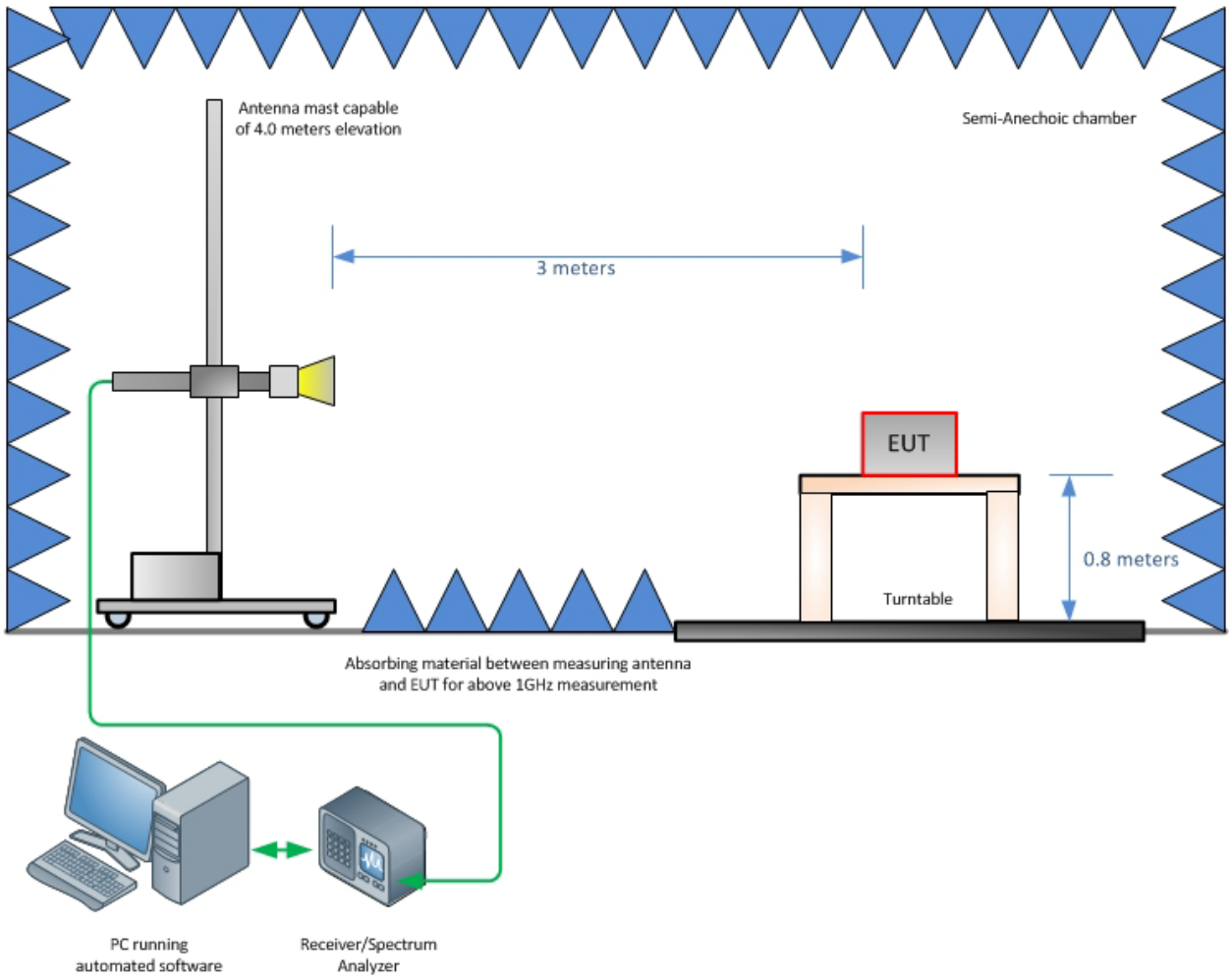
SECTION 4

DIAGRAM OF TEST SETUP

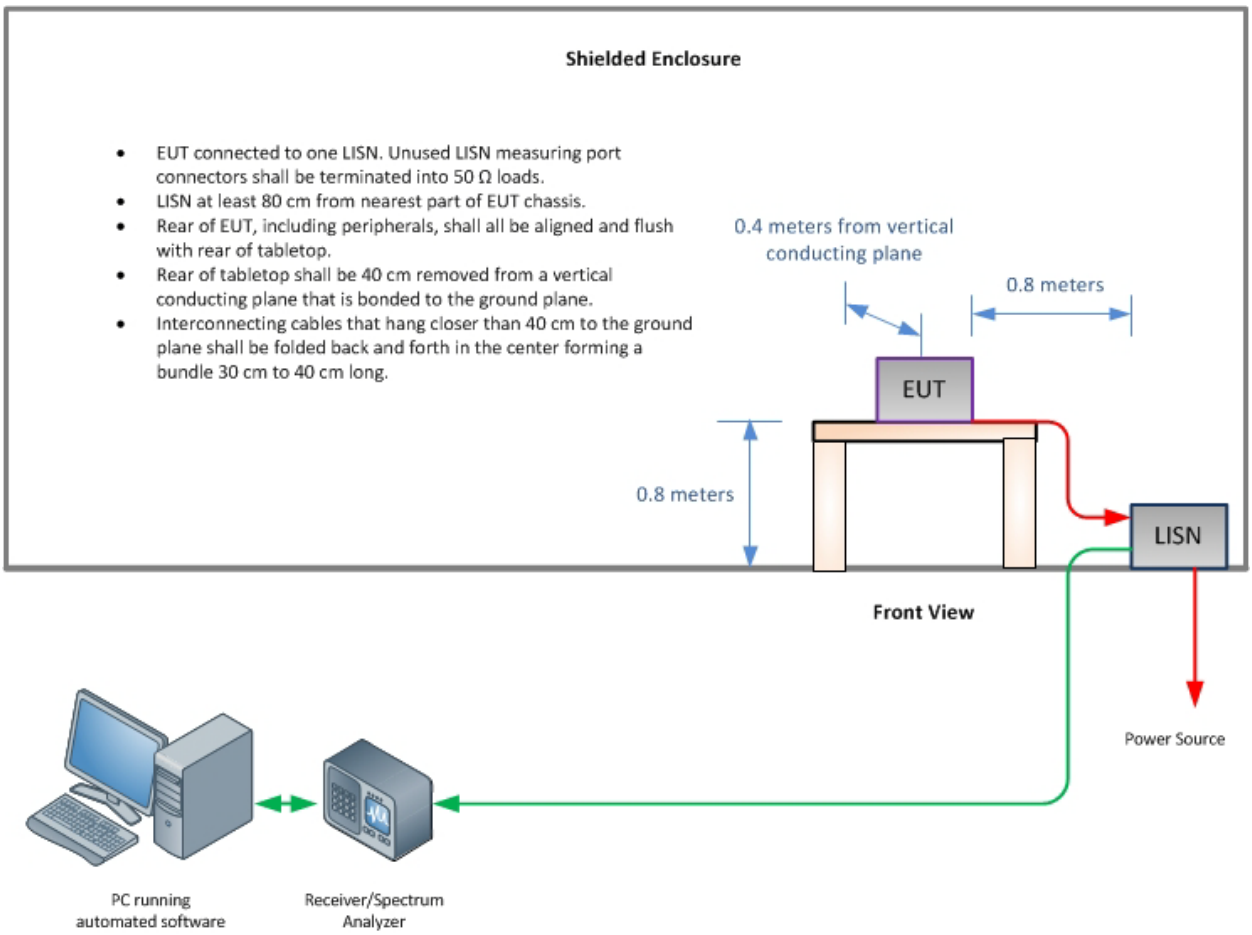
4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



Conducted Emission Test Setup

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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