

Radio Test Report No: **EDCS-1393321**

FCC ID: LDK88611057

IC: 2461B-88611057



Radio Intentional EMC Test Report: EDCS - 1393321

For

CP-8861

5150MHz -5250MHz WLAN Radio 802.11 a/n/ac

FCC ID: LDK88611057

IC: 2461B-88611057

Against the following Specifications :

47 CFR 15.247

RSS-210

RSS-102

RSS GEN

Cisco Systems

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San Jose, CA 95134

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Title: Manager

This report replaces any previously entered test report under **EDCS-1393321**



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Section 1: Overview

1.1 Test Summary

samples were assessed against the tests detailed in section 3 under the requirements of the following specifications:

CFR47 Part 15.407

RSS-210

RSS-GEN



Section 2: Assessment Information

2.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on the samples submitted. The testing was performed by and for the use of Cisco systems Inc:

With regard to this assessment, the following points should be noted:

- a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results due to production and measurement tolerances.
- b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.
- c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).
- d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%

*[Where applicable] For ESD testing the humidity limits used were 30% to 60% and for EFT/B tests the humidity limits used were 25% to 75%.
- e) All AC testing was performed at one or more of the following supply voltages:

110V 60 Hz (+/-20%)

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2.2 Date of start of testing

22-Jan-2014

2.3 Report Issue Date

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2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134
USA

Test Engineers

Jose Aguirre

2.5 Equipment Assessed (EUT)

CP-8861

2.6 EUT Description

The CP-8861 802.11AC IP Phone supports the following modes of operation. The modes are further defined in the radio Theory of Operation. The modes included in this report represent the worst case data for all modes.

This specification is applied to the IEEE802.11a/b/g/n/ac W-LAN + Bluetooth 3.0/HS.

- Broadcom BCM4339 inside
- Compliant with IEEE802.11a/b/g/n/ac
- Compliant with Bluetooth specification v3.0+HS
- Supports standard SDIO v3.0 host interface
- Interface support for Bluetooth is Host Controller Interface (HCI)
- RoHS compliant

802.11A , Legacy OFDM, Non HT-20, 6 to 54 Mbps (6Mbps worst case)

802.11N, HT-20, Single Antenna, M0 to M7 (M0 worst Case)

802.11N, HT-40, Single Antenna, M0 to M7 (M0 worst Case)

802.11AC, HT-80, Single Antennas, M0 to M9 (M0 worst Case)



The following Antenna(s) are supported by this product

Frequency	Part number	Antenna Type	Antenna Gain (dBi)
2400-2483.5MHz	Internal	Omni-directional	3.11
5150-5250MHz	Internal	Omni-directional	3.62
5250-5350MHz	Internal	Omni-directional	3.66
5470–5725MHz	Internal	Omni-directional	3.10
5725-5850MHz	Internal	Omni-directional	3.79

Section 3: Result Summary

3.1 Results Summary Table

Conducted emissions

Basic Standard	Test Procedure	Test Details / Comments	Result
Power Spectral Density	KDB 789033	15.407: For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	Pass
Peak Output Power	KDB 789033	15.407: For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi	Pass
Peak Excursion	KDB 789033	15.407: The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less	Pass
Conducted Spurious Emissions	KDB 789033	15.407: For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.	Pass
Band Edge Measurements	KDB 789033	Emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). (RSS-210 Sec2.7)	Pass
AC conducted Emissions:	ANSI C63.10	AC conducted Emissions: Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table in these sections. The more stringent limit applies at the frequency range boundaries. FCC 15.207 /RSS-Gen 7.2.4	Pass

**Radiated emissions**

Basic Standard	Test Procedure	Test Details / Comments	Result
Radiated Spurious and Harmonic Emissions	ANSI C63.10 KDB 789033	Radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). (RSS-210 Sec2.7)	Pass
RX Spurious Emissions	ANSI C63.10	RX Spurious Emissions: Spurious emissions from the receivers shall not exceed the radiated limits of receiver spurious emissions shown in table 2 in section 6.1. RSS-Gen 4.10	Pass

* MPE measurements reported in separate report.

Section 4: Sample Details

Note: Each sample was evaluated to ensure that its condition was suitable to be used as a test sample prior to the commencement of testing. Please also refer to the "Justification for worst Case test Configuration" section of this report for further details on the selection of EUT samples.

4.1 Sample Details (Photographs of the test samples, where appropriate can be found in appendix H)

Sample No.	Equipment Details	Part Number	Manufacturer	Hardware Rev.	Serial Number
S01	CP-8861	68-5283-01	Cisco Systems	P2	FCH18018UG2
S02	PWR-SPLY	BT-AG4404GE	Bestec	NA	12E000156

4.2 System Details

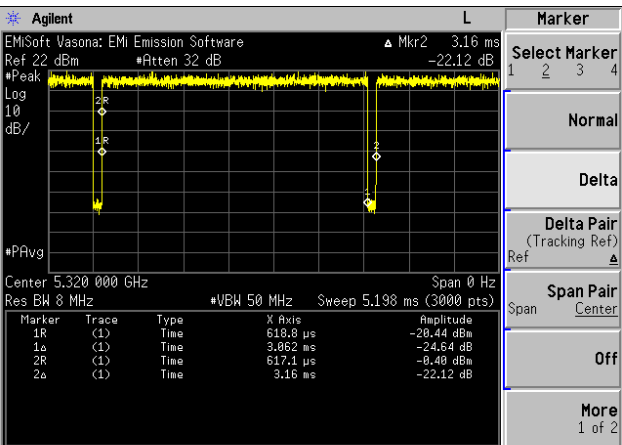
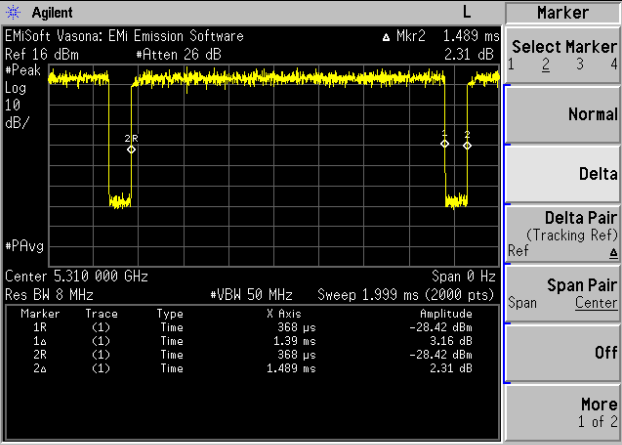
System #	Description	Samples
1	EUT	S01, S02

4.3 Mode of Operation Details

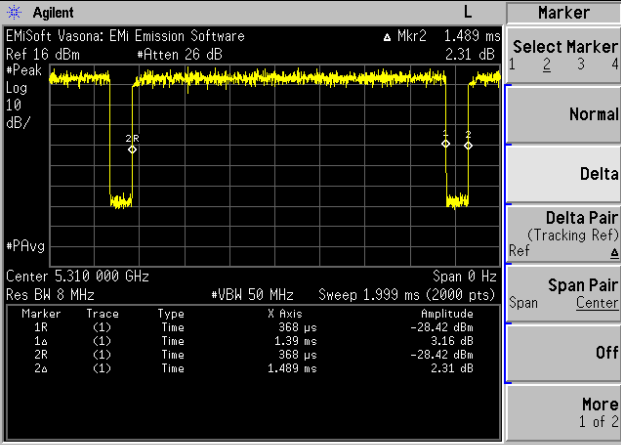
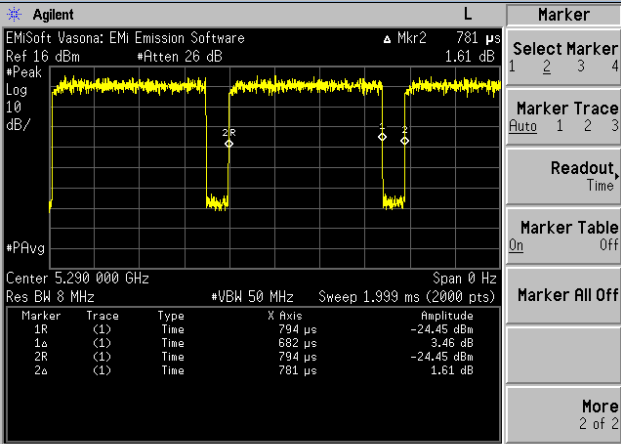
Mode#	Description	Comments
1	Continuous Transmitting	Continuous Transmitting

Appendix A: Test Results**Duty Cycle****KDB 789033 B(2b)**

The zero-span mode on a spectrum analyzer or EMI receiver, if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set $RBW \geq EBW$ if possible; otherwise, set RBW to the largest available value. Set $VBW \geq RBW$. Set detector = peak or average.

Description	Plot
802.11A Non HT-20 Duty Cycle (x) = Tx on/ Tx period Tx on = 3.062mS Tx period = 3.16mS $x = 3.062/3.160 = 0.97$ Duty Cycle Correction Factor (DCCF) $= 10\text{Log}(1/x)$ = 0.14 dB	 Copyright 2000-2004 Agilent Technologies
802.11 N HT-20 Duty Cycle (x) = Tx on/ Tx period Tx on = 1.39mS Tx period = 1.489mS $x = 1.39/1.489 = 0.94$ Duty Cycle Correction Factor (DCCF) $= 10\text{Log}(1/x)$ = 0.3dB	 Copyright 2000-2004 Agilent Technologies



802.11N HT-40 Duty Cycle (x) = Tx on/ Tx period Tx on = 1.39mS Tx period = 1.489mS $x = 1.39/1.489 = 0.94$ Duty Cycle Correction Factor (DCCF) $= 10\text{Log}(1/x)$ = 0.3dB	 Copyright 2000-2004 Agilent Technologies
802.11AC HT80 Duty Cycle (x) = Tx on/ Tx period Tx on = 682uS Tx period = 781uS $x = 682/781 = 0.87$ Duty Cycle Correction Factor (DCCF) $= 10\text{Log}(1/x)$ = 0.59dB	 Copyright 2000-2004 Agilent Technologies

- Worst case data rate



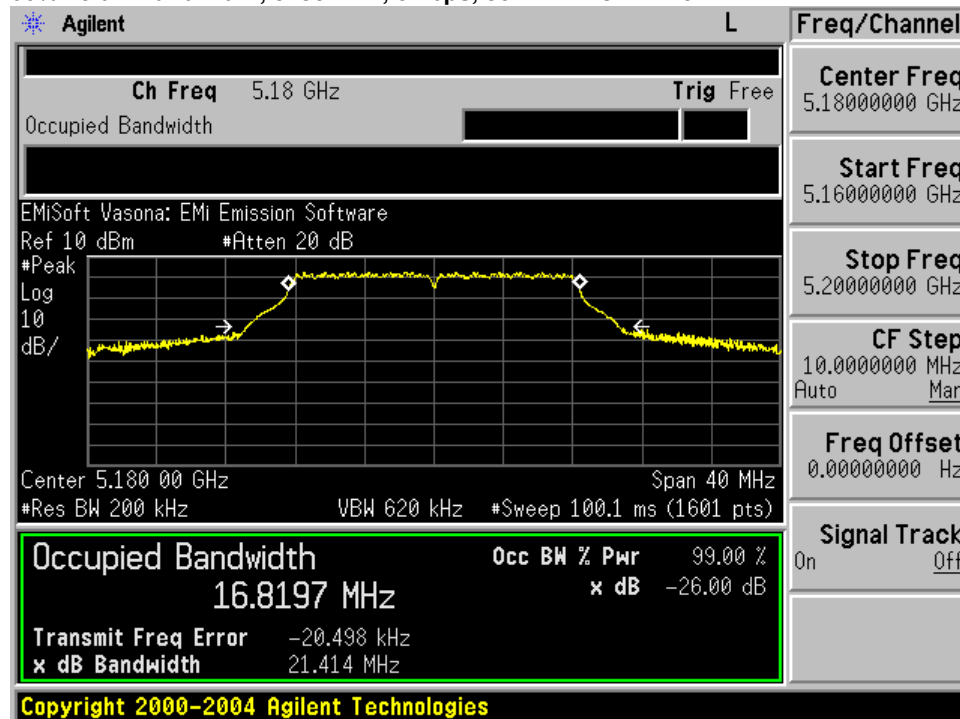
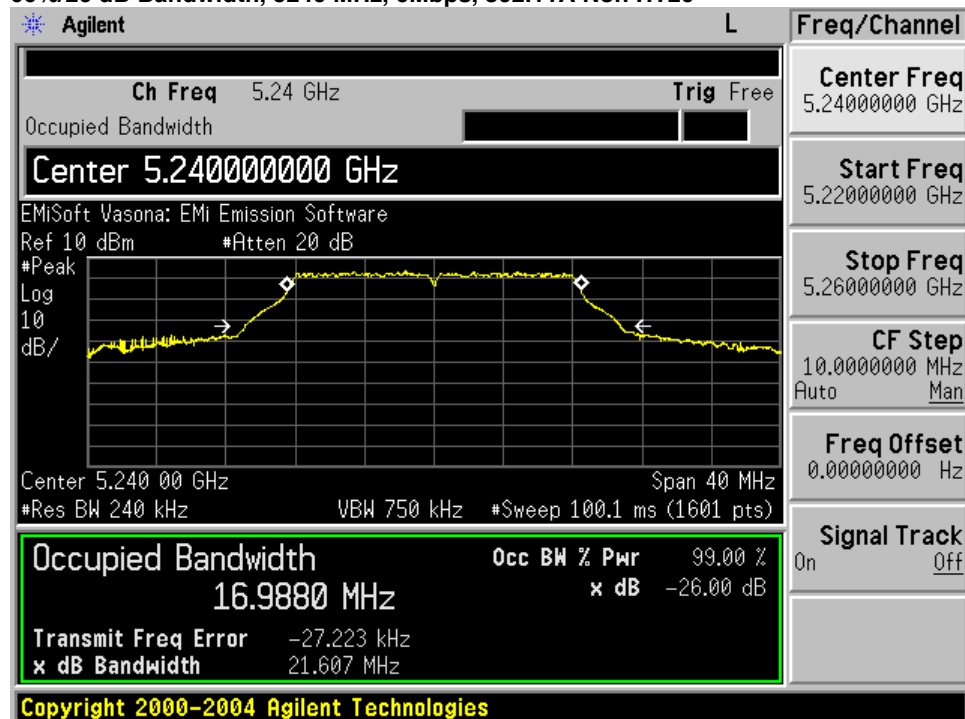
99% and 26dB Bandwidth

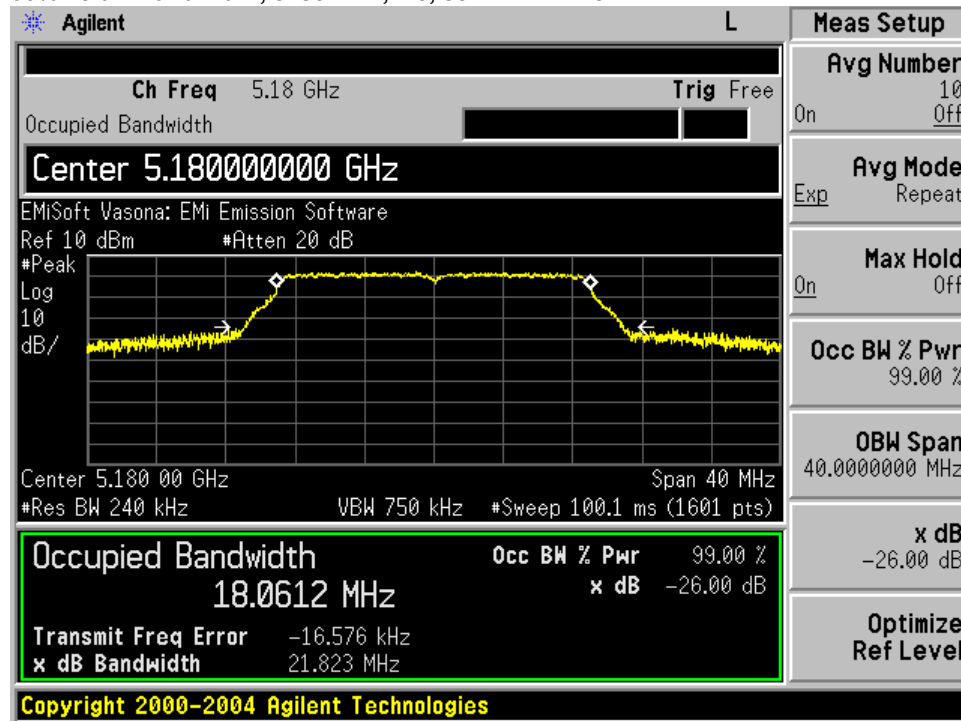
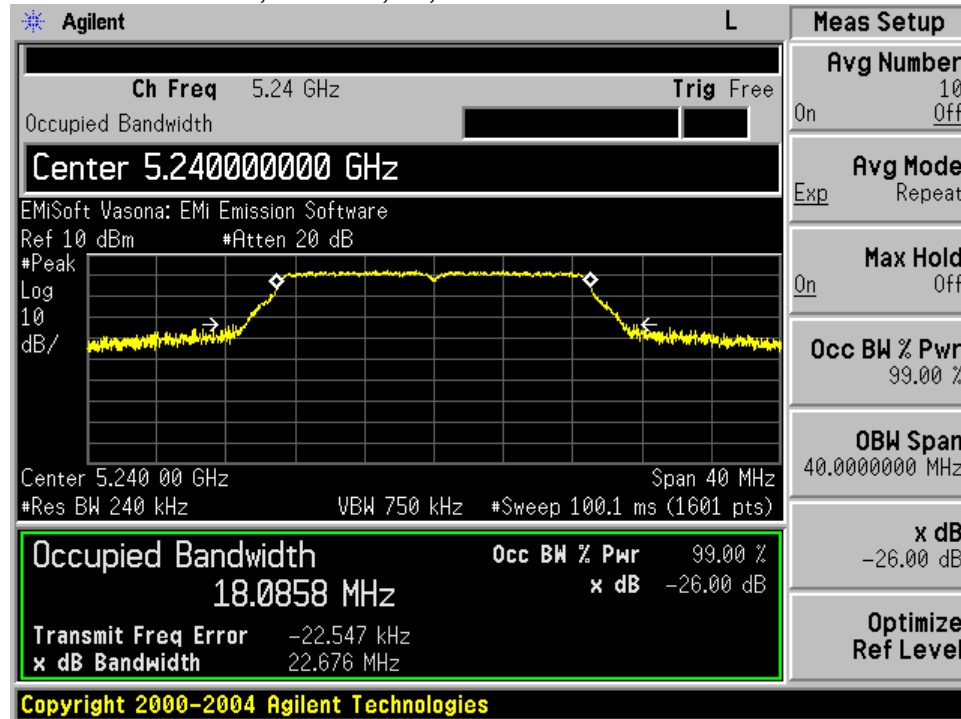
Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).

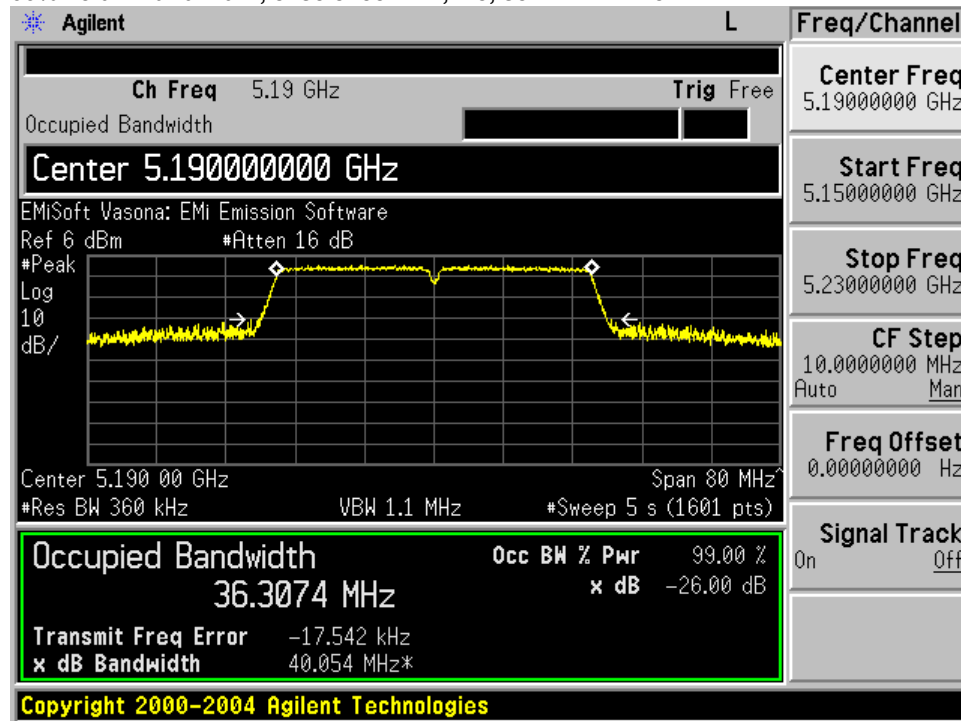
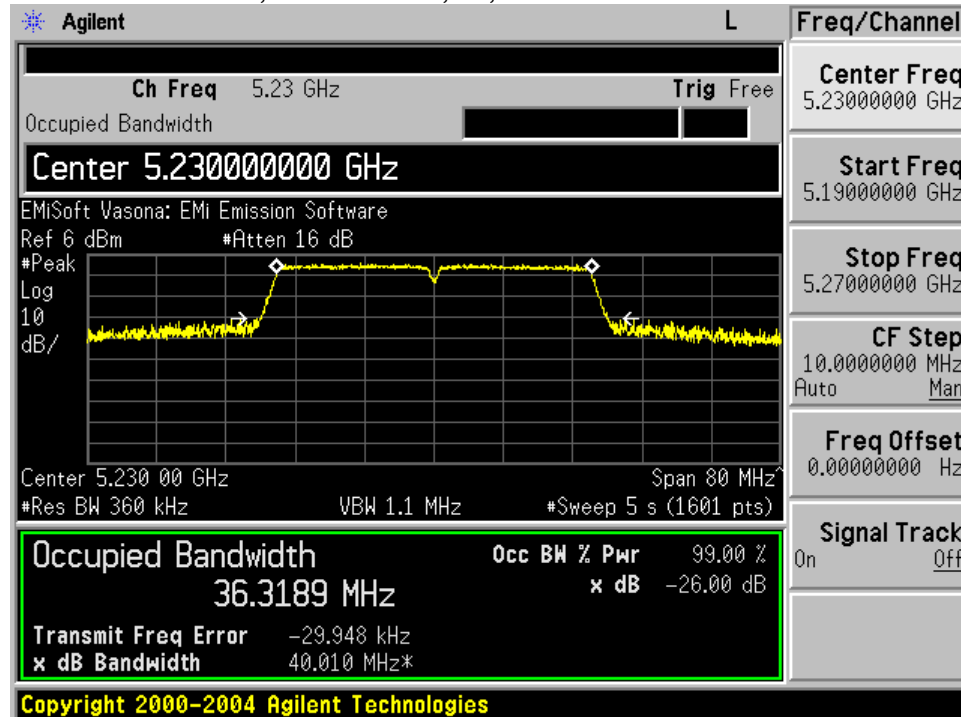
Center Frequency: Frequency from table below
 Span: 2 x Nominal Bandwidth (e.g. 40MHz for a 20MHz channel)
 Reference Level: 20 dBm
 Attenuation: 10 dB
 Sweep Time: 5 s
 Resolution Bandwidth: 1%-3% of 26 dB Bandwidth
 Video Bandwidth: $\geq$ Resolution Bandwidth
 X dB Bandwidth: 26 dB
 Detector: Peak
 Trace: Single

Place the radio in continuous transmit mode. View the transmitter waveform on the spectrum analyzer, and record the pertinent measurements

Frequency	Mode	Data Rate	26dB BW MHz	99% BW (MHz)
5180	802.11A Non HT-20	6	21.414	16.8197
5240	802.11A Non HT-20	6	21.607	16.9889
5180	802.11 N HT-20	M0	21.823	18.0612
5240	802.11 N HT-20	M0	22.676	18.0858
5180/5200	802.11N HT-40	M0	40.054	36.3074
5220/5240	802.11N HT-40	M0	40.010	36.3189
5180/5200/5220/5240	802.11AC HT80	M0	83.994	75.9324

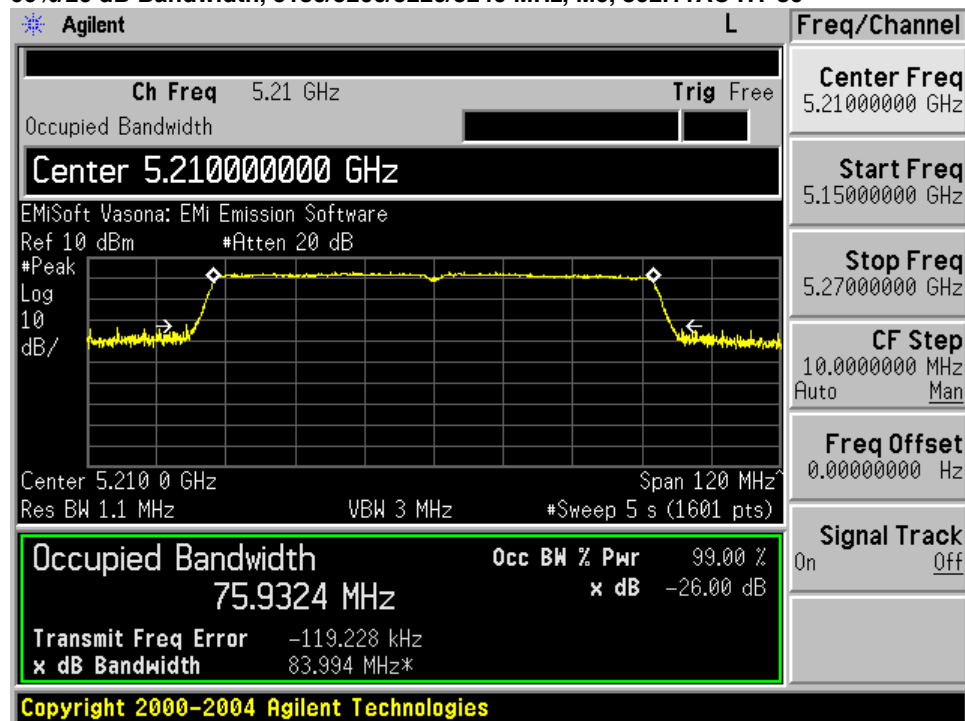
**99%/26 dB Bandwidth, 5180 MHz, 6Mbps, 802.11A Non HT20****99%/26 dB Bandwidth, 5240 MHz, 6Mbps, 802.11A Non HT20**

**99%/26 dB Bandwidth, 5180 MHz, M0, 802.11N HT-20****99%/26 dB Bandwidth, 5240 MHz, M0, 802.11N HT-20**

**99%/26 dB Bandwidth, 5180/5200 MHz, M0, 802.11N HT-40****99%/26 dB Bandwidth, 5220/5240 MHz, M0, 802.11N HT-40**



99%/26 dB Bandwidth, 5180/5200/5220/5240 MHz, M0, 802.11AC HT-80





Peak Output Power

15.407: For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The smallest 26dB bandwidth for all channels is 21.4 MHz. The maximum conducted output power is calculated as $4\text{dBm} + 10 \cdot \log(21.4\text{MHz}) = 17.3\text{dBm}$. Therefore the limit is (50mW) 17dBm, which is the lesser limit.

The maximum supported antenna gain for all bands is 3.8dBi.

Power Spectral Density

15.407: For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below.

Enable "Channel Power" function of analyzer	
Center Frequency:	Frequency from table below
Span:	20 MHz (must be greater than 26dB bandwidth, adjust as necessary)
Ref Level Offset:	Correct for attenuator and cable loss.
Reference Level:	20 dBm
Attenuation:	20 dB
Sweep Time:	100ms, Single sweep
Resolution Bandwidth:	1 MHz
Video Bandwidth:	3 MHz
Detector:	Sample
Trace:	Trace Average 100 traces in Power Averaging Mode
Integration BW:	=26 dB BW from 26 dB Bandwidth Data

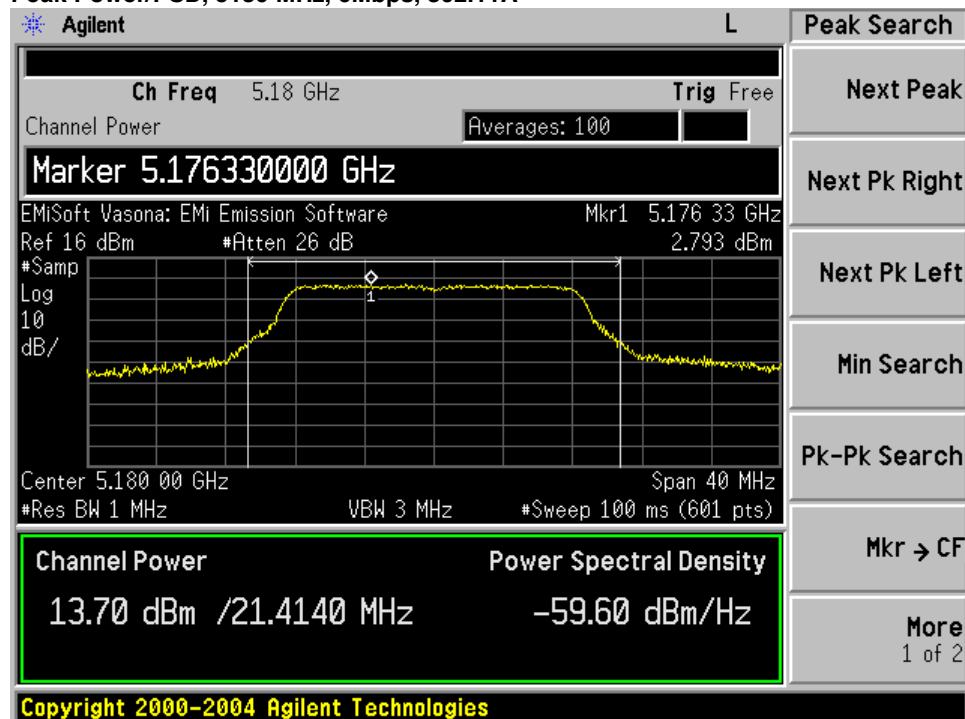
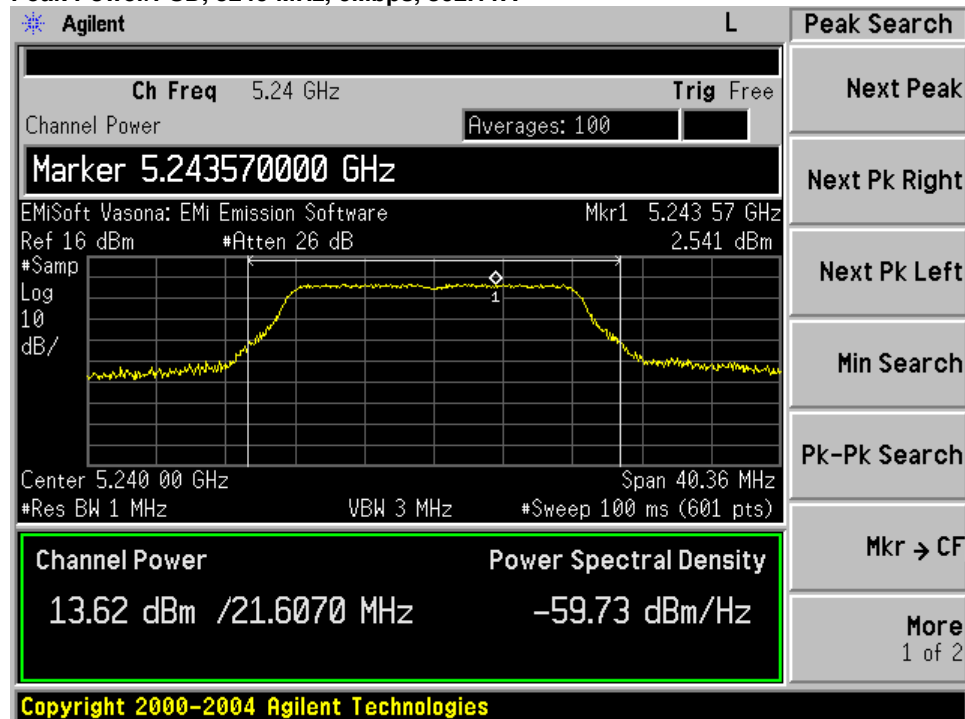
After averaging 100 traces of the transmitter waveform on the spectrum analyzer, record the spectrum analyzer Channel Power. Perform a Marker Peak Search function, and record this value as the Power Spectral Density.

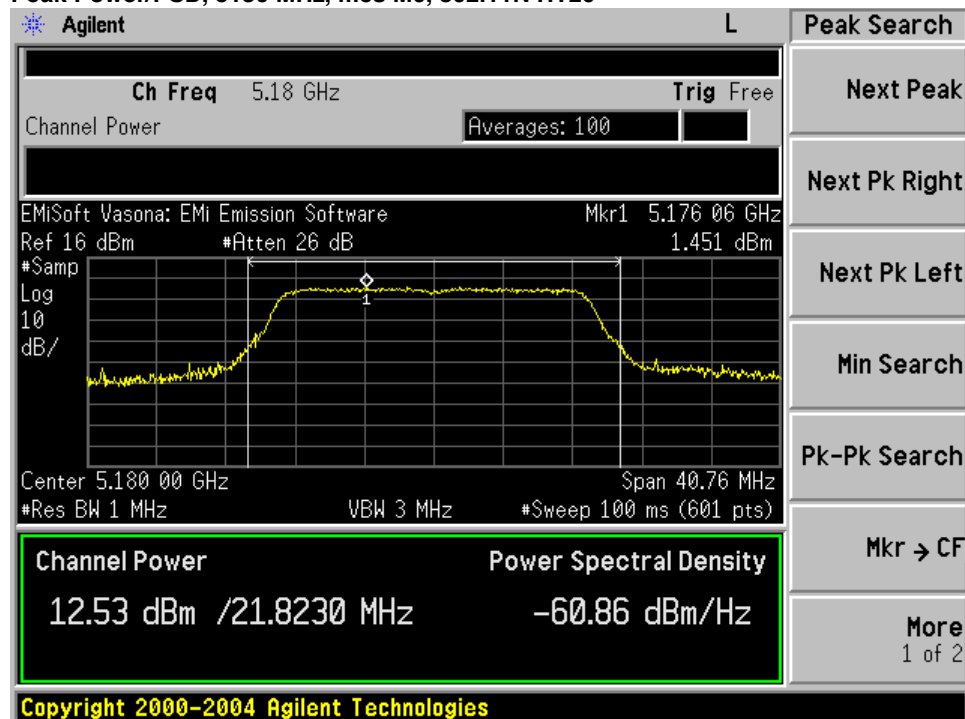
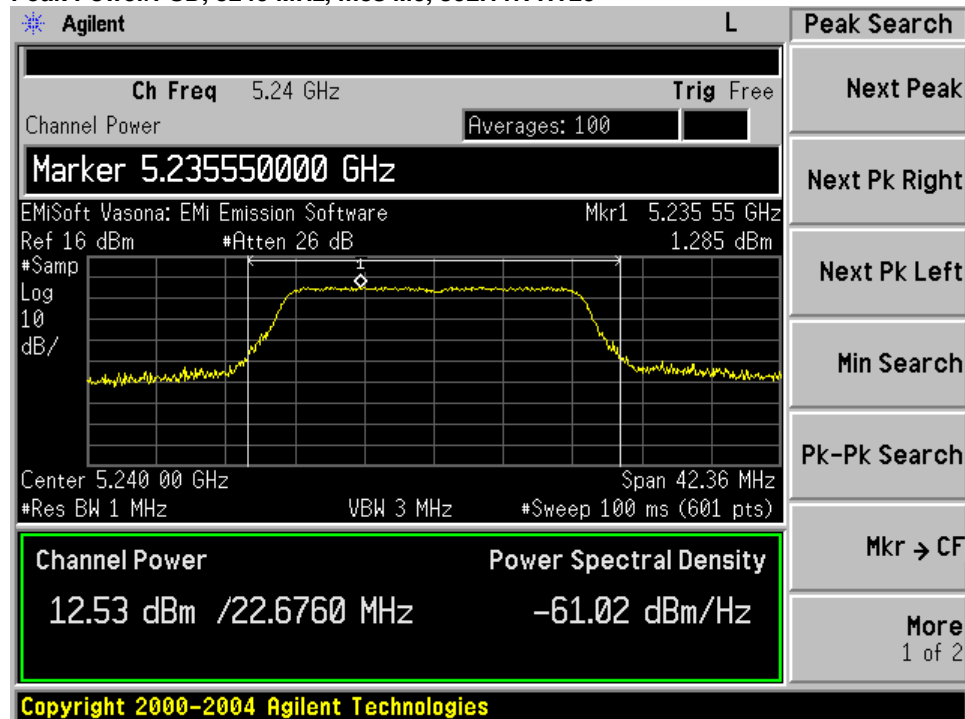
**Peak Output Power**

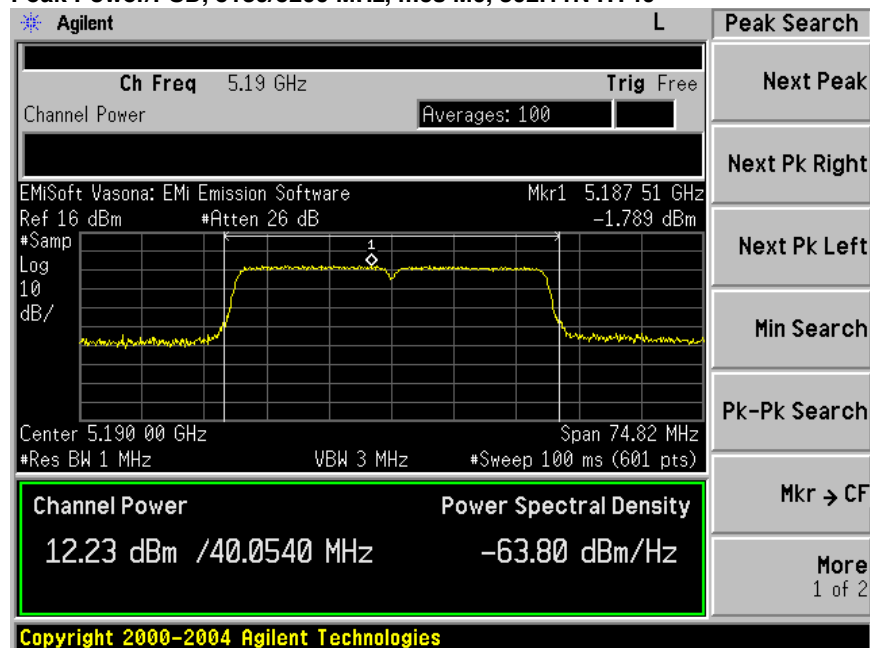
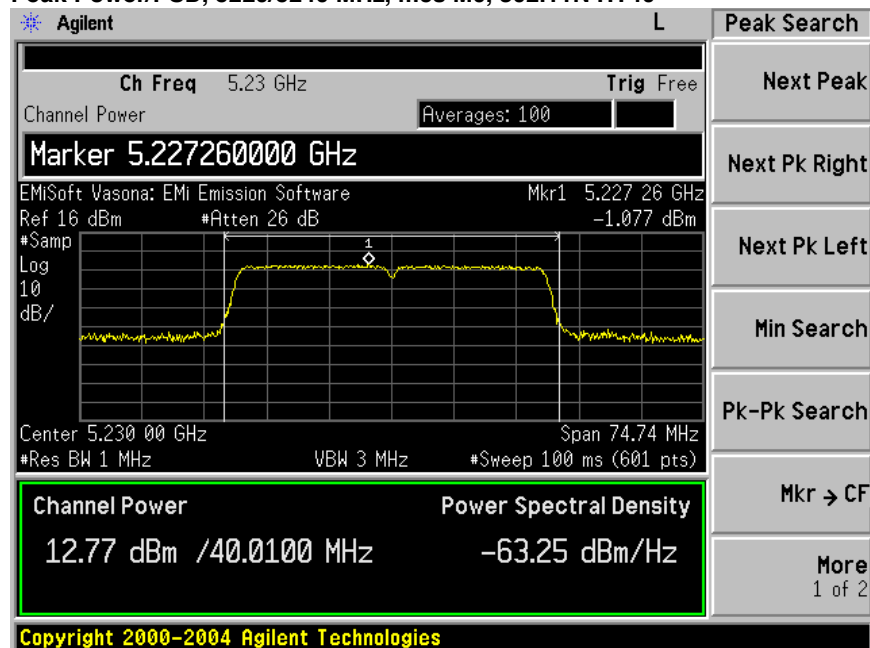
Frequency	Mode	Data Rate	Measured Output power (dBm)	DCCF (dB)	Corr Output Power (dBm)	Limit (dBm)	Margin (dB)
5180	802.11A Non HT-20	6*	13.70	0.14	13.84	17	-3.16
5240	802.11A Non HT-20	6*	13.62	0.14	13.76	17	-3.24
5180	802.11 N HT-20	M0*	12.53	0.3	12.83	17	-4.17
5240	802.11 N HT-20	M0*	12.53	0.3	12.83	17	-4.17
5180/5200	802.11N HT-40	M0*	12.23	0.3	12.53	17	-4.47
5220/5240	802.11N HT-40	M0*	12.77	0.3	13.07	17	-3.93
5180/5200/5220/5240	802.11AC HT80	M0*	12.00	0.59	12.59	17	-4.41

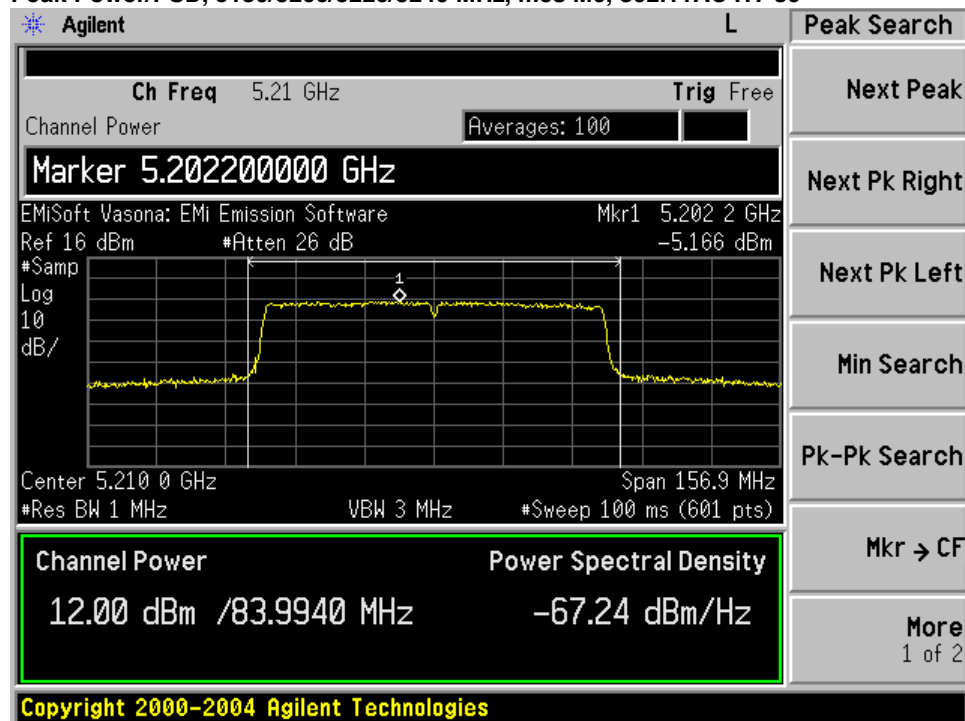
Power Spectral Density

Frequency	Mode	Data Rate	Measured Output power (dBm)	DCCF (dB)	Corr Output Power (dBm)	Limit (dBm)	Margin (dB)
5180	802.11A Non HT-20	6*	2.793	0.14	2.933	4	-1.067
5240	802.11A Non HT-20	6*	2.541	0.14	2.681	4	-1.319
5180	802.11 N HT-20	M0*	1.451	0.3	1.751	4	-2.249
5240	802.11 N HT-20	M0*	1.285	0.3	1.585	4	-2.415
5180/5200	802.11N HT-40	M0*	-1.789	0.3	-1.489	4	-5.489
5220/5240	802.11N HT-40	M0*	-1.077	0.3	-0.777	4	-4.777
5180/5200/5220/5240	802.11AC HT80	M0*	-5.166	0.59	-4.576	4	-8.576

Peak Power/PSD, 5180 MHz, 6Mbps, 802.11A**Peak Power/PSD, 5240 MHz, 6Mbps, 802.11A**

Peak Power/PSD, 5180 MHz, mcs M0, 802.11N HT20**Peak Power/PSD, 5240 MHz, mcs M0, 802.11N HT20**

**Peak Power/PSD, 5180/5200 MHz, mcs M0, 802.11N HT40****Peak Power/PSD, 5220/5240 MHz, mcs M0, 802.11N HT40**

**Peak Power/PSD, 5180/5200/5220/5240 MHz, mcs M0, 802.11AC HT-80**



Peak Excursion

15.407: The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

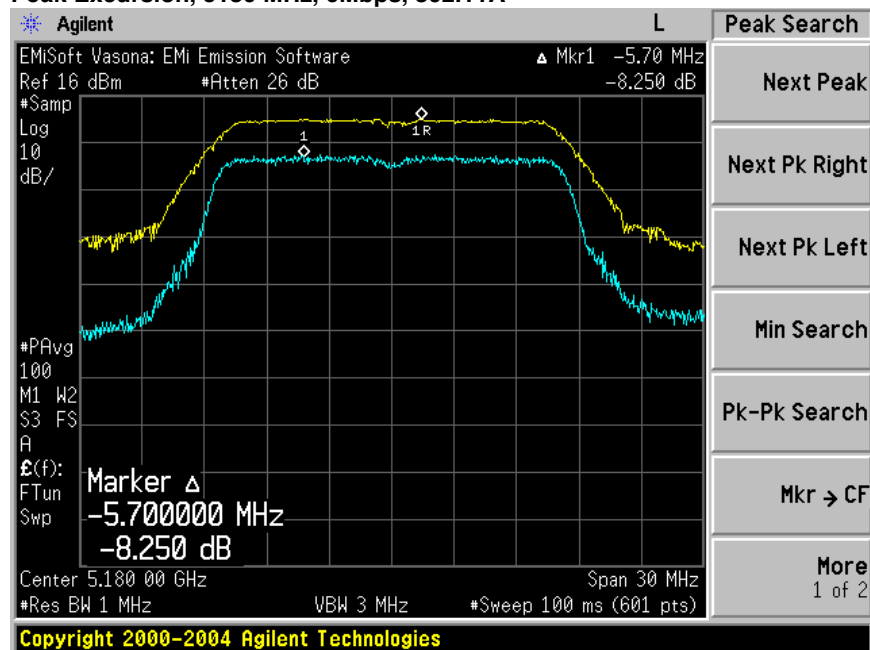
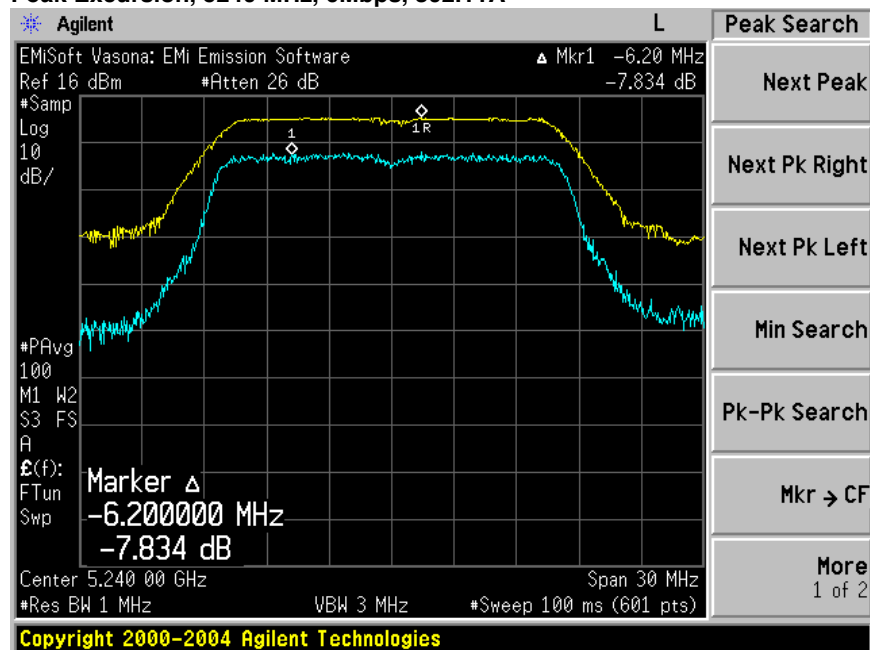
Set the spectrum analyzer span to view the entire emission bandwidth. The largest difference between the following two traces must be ≤ 13 dB for all frequencies across the emission bandwidth.

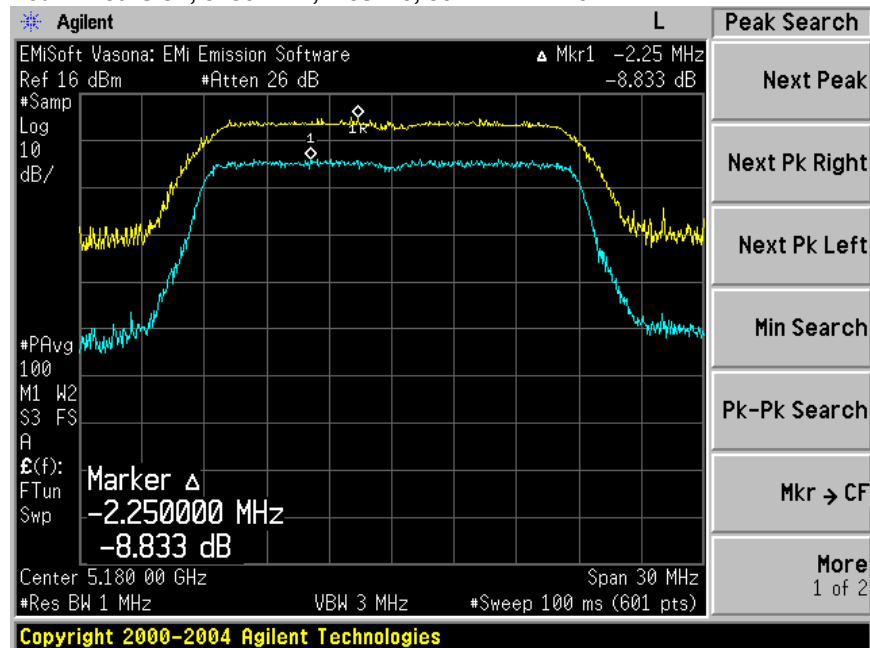
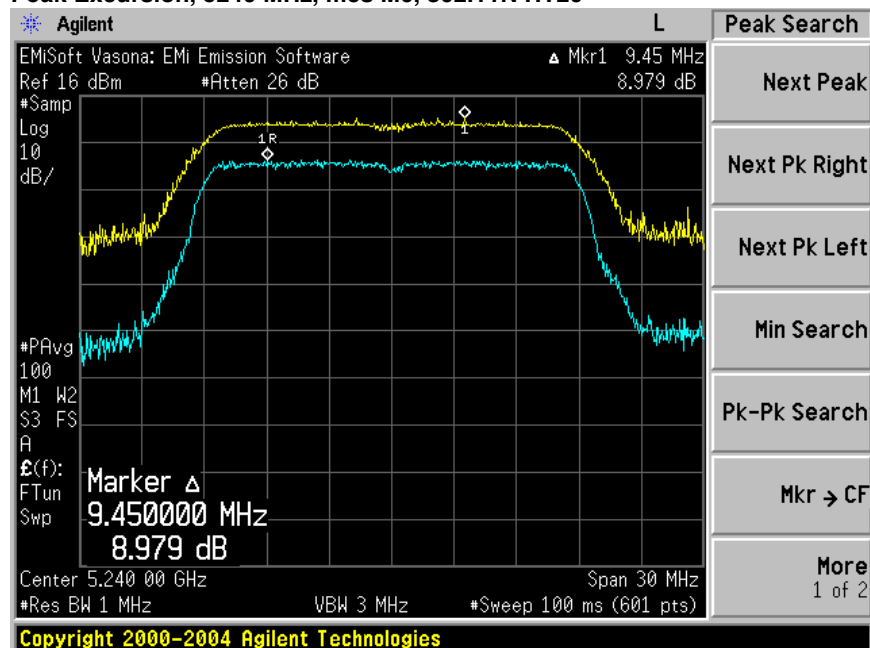
Set the spectrum analyzer span to view the entire emission bandwidth. The largest difference between the following two traces must be ≤ 13 dB for all frequencies across the emission bandwidth.

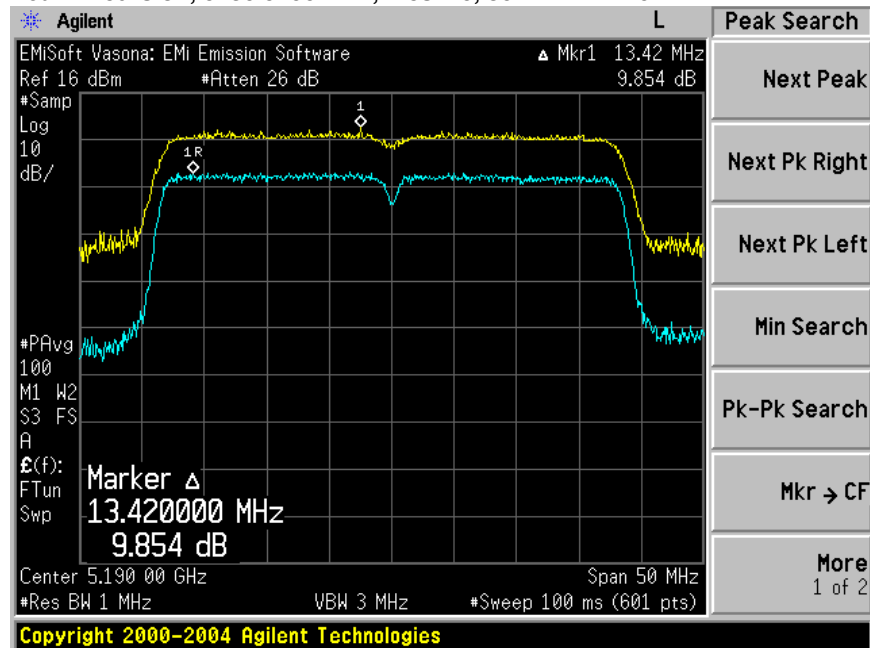
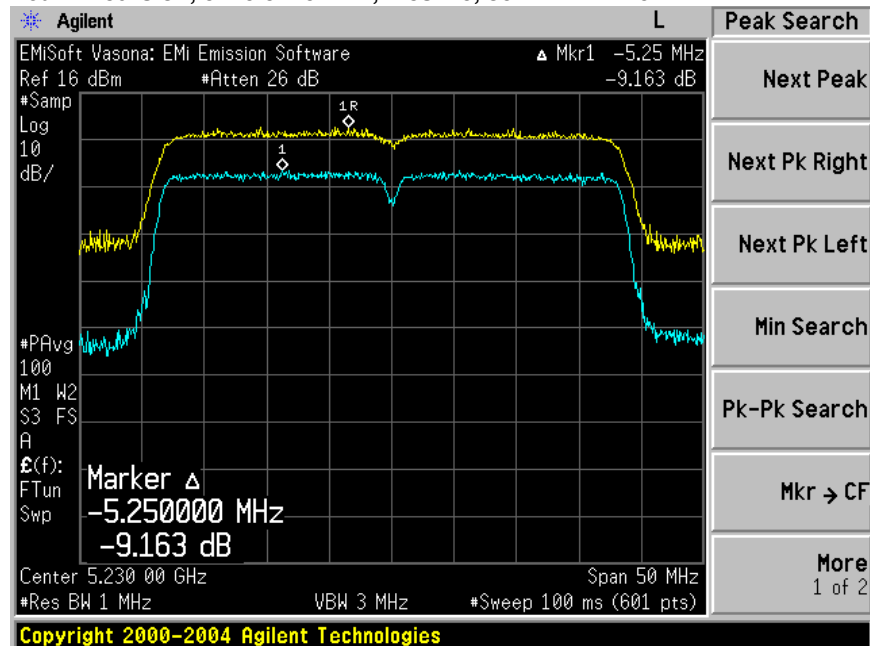
1st Trace: (Peak) Set Span to encompass the entire emission bandwidth of the signal. RBW = 1 MHz, VBW = 3 MHz Detector = Peak Sweep = 10 s Trace 1 = Max-hold Ref Level Offset = correct for attenuator and cable loss Ref Level = 20dBm Atten = 10dBm	2nd Trace: (Average) Trace 2 = clear right Detector = Sample Avg/VBW type = Pwr(RMS) Average = 100 Sweep = single Set marker Deltas Trace 1 & Peak search Marker Delta Trace 2 & Peak search
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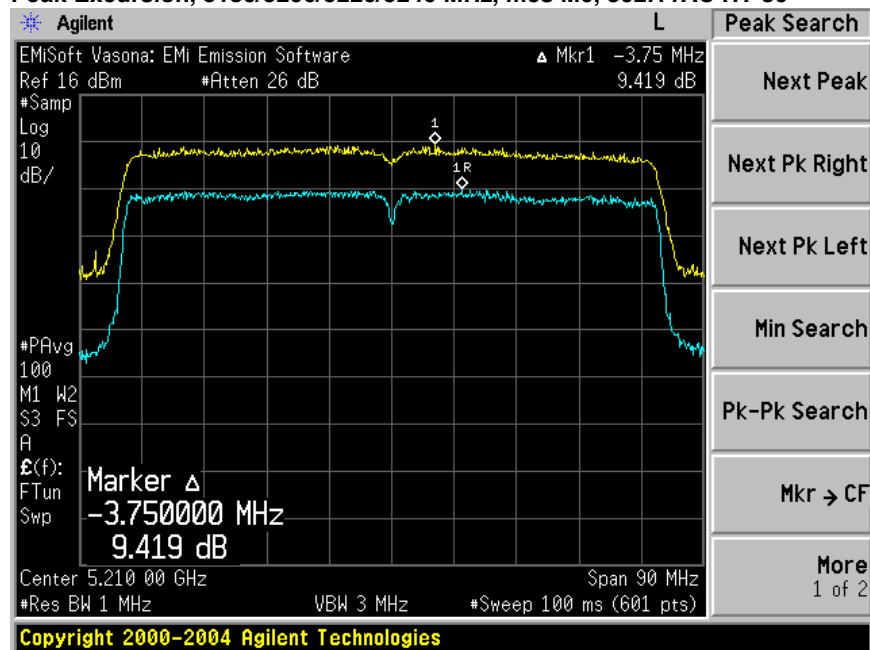
Record the difference between the Peak and Average Markers

Frequency	Mode	Data Rate	Ratio Pk/Avg (dB)	Limit (dB)	Margin (dB)
5180	802.11A Non HT-20	6*	8.25	≤ 13	-4.75
5240	802.11A Non HT-20	6*	7.83	≤ 13	-5.17
5180	802.11 N HT-20	M0*	8.83	≤ 13	-4.17
5240	802.11 N HT-20	M0*	8.98	≤ 13	-4.02
5180/5240	802.11N HT-40	M0*	9.85	≤ 13	-3.15
5180/5240	802.11N HT-40	M0*	9.16	≤ 13	-3.84
5180/5200/5220/5240	802.11AC HT80	M0*	9.42	≤ 13	-3.58

Peak Excursion, 5180 MHz, 6Mbps, 802.11A**Peak Excursion, 5240 MHz, 6Mbps, 802.11A**

Peak Excursion, 5180 MHz, mcs M0, 802.11N HT20**Peak Excursion, 5240 MHz, mcs M0, 802.11N HT20**

**Peak Excursion, 5180/5200 MHz, mcs M0, 802.11N HT-40****Peak Excursion, 5220/5240 MHz, mcs M0, 802.11N HT-40**

**Peak Excursion, 5180/5200/5220/5240 MHz, mcs M0, 802.11AC HT-80**



Conducted Spurious Emissions

15.407: For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.

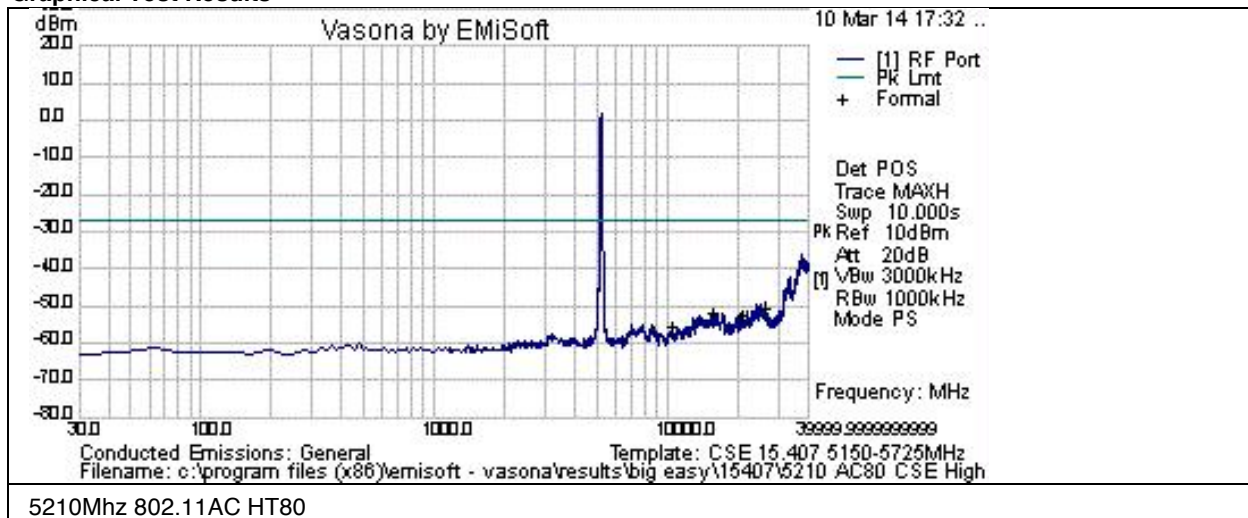
Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

Span:	30 MHz-40 GHz
Reference Level:	20 dBm
Attenuation:	10 dB
Sweep Time:	10 s
Resolution Bandwidth:	1 MHz
Video Bandwidth:	3 MHz
Detector:	Peak
Trace:	Single
Marker:	Peak

Record the marker waveform peak to spur difference

**Conducted Spurious Emissions 5210MHz 802.11AC HT80, mcs M0**

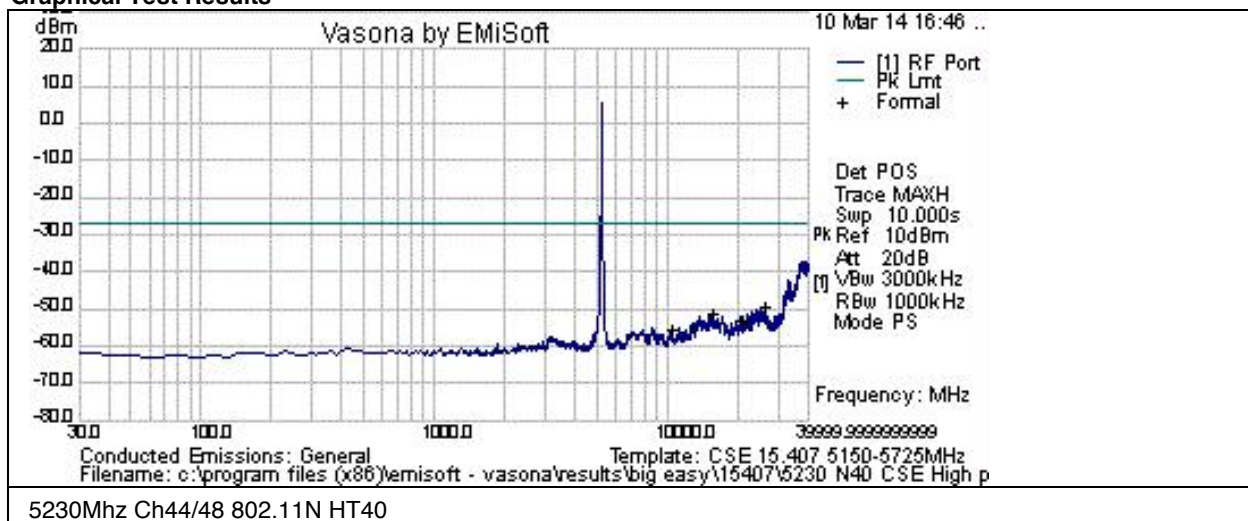
Subtest Number: 159636 - 7		Subtest Date: 10-Mar-2014	
Engineer	Jose Aguirre		
Lab Information	Building B, Radio Area		
Subtest Results			
Line Under Test	[B] Antenna port		
Transducer	Direct		
Subtest Result	Pass		
Highest Frequency	40000.0		
Lowest Frequency	30.0		
Comments on the above Test Results	5210Mhz 802.11AC HT80		

Graphical Test Results**Test Results Table 5210Mhz 802.11AC HT80**

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurem ent Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
10419.983	-56.3	1	0	-55.3	Pk	RF	-27	-28.3	Pass	
15630.327	-52.9	1	0	-51.8	Pk	RF	-27	-24.8	Pass	
20840.449	-53.4	1.1	0	-52.3	Pk	RF	-27	-25.3	Pass	
26049.114	-51.8	1.2	0	-50.7	Pk	RF	-27	-23.7	Pass	

**Conducted Spurious Emissions 5230MHz 802.11N HT40, mcs M0**

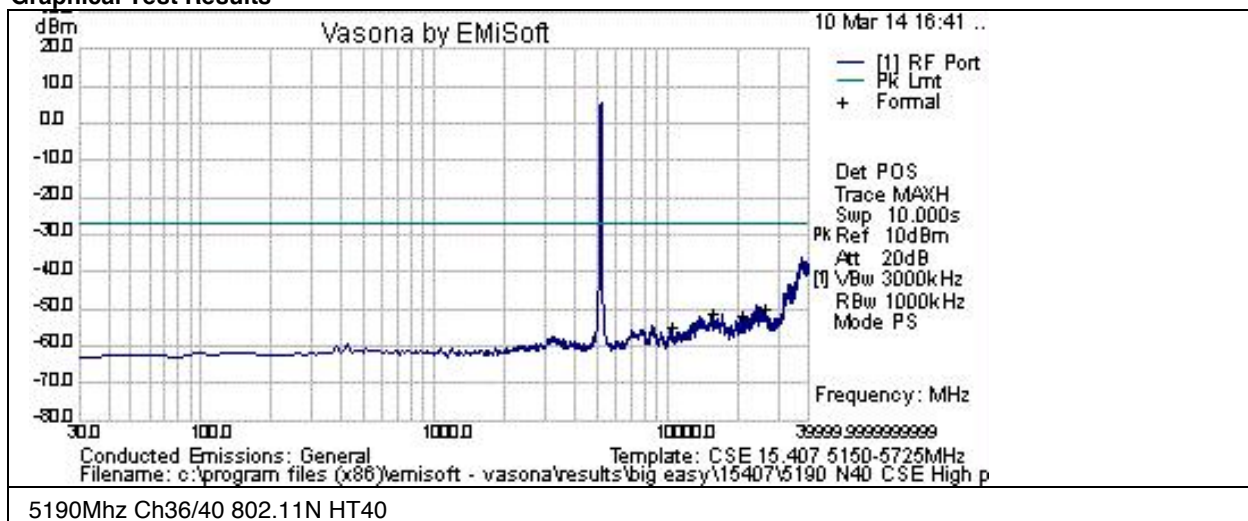
Subtest Number: 159636 - 6		Subtest Date: 10-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building B, Radio Area	
Subtest Results		
Line Under Test	[B] Antenna port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	40000.0	
Lowest Frequency	30.0	
Comments on the above Test Results	5230Mhz Ch44/48 802.11N HT40	

Graphical Test Results**Test Results Table 5230Mhz Ch44/48 802.11N HT40**

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurem ent Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
10460.607	-56.4	1	0	-55.4	Pk	RF	-27	-28.4	Pass	
15689.858	-52.2	1	0	-51.2	Pk	RF	-27	-24.2	Pass	
20919.935	-53.9	1.1	0	-52.8	Pk	RF	-27	-25.8	Pass	
26150.001	-50.6	1.2	0	-49.4	Pk	RF	-27	-22.4	Pass	

**Conducted Spurious Emissions 5190MHz 802.11N HT40, mcs M0**

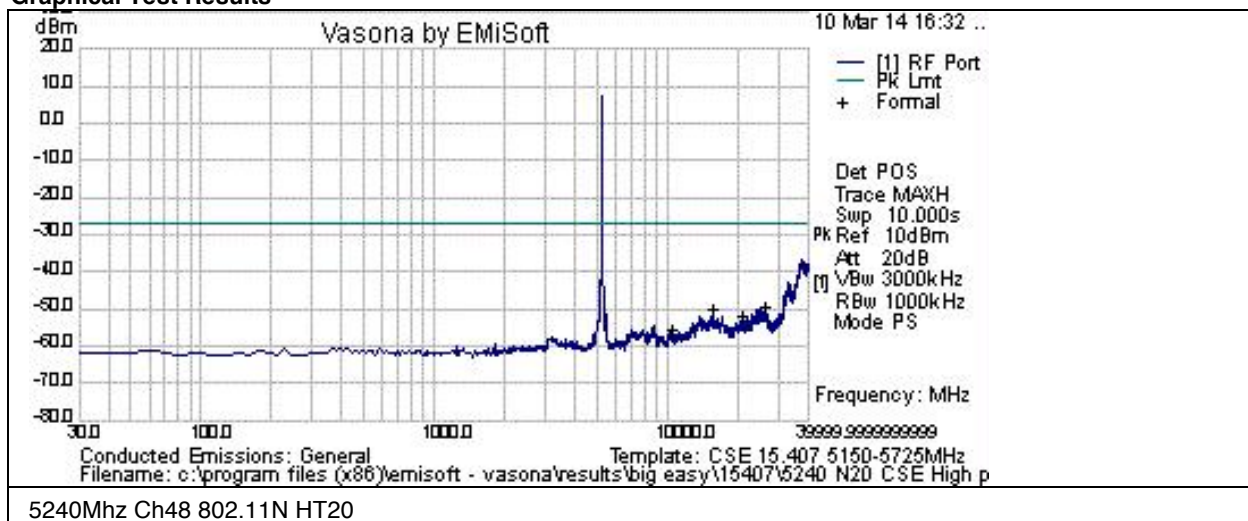
Subtest Number: 159636 - 5		Subtest Date: 10-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building B, Radio Area	
Subtest Results		
Line Under Test	[B] Antenna port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	40000.0	
Lowest Frequency	30.0	
Comments on the above Test Results	5190Mhz Ch36/40 802.11N HT40	

Graphical Test Results**Test Results Table 5190Mhz Ch36/40 802.11N HT40**

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurem ent Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
10379.908	-56.1	1	0	-55.1	Pk	RF	-27	-28.1	Pass	
15569.52	-52	1	0	-51	Pk	RF	-27	-24	Pass	
20759.362	-53	1.1	0	-51.9	Pk	RF	-27	-24.9	Pass	
25949.502	-51.1	1.2	0	-49.9	Pk	RF	-27	-22.9	Pass	

**Conducted Spurious Emissions 5240MHz 802.11N HT20, mcs M0**

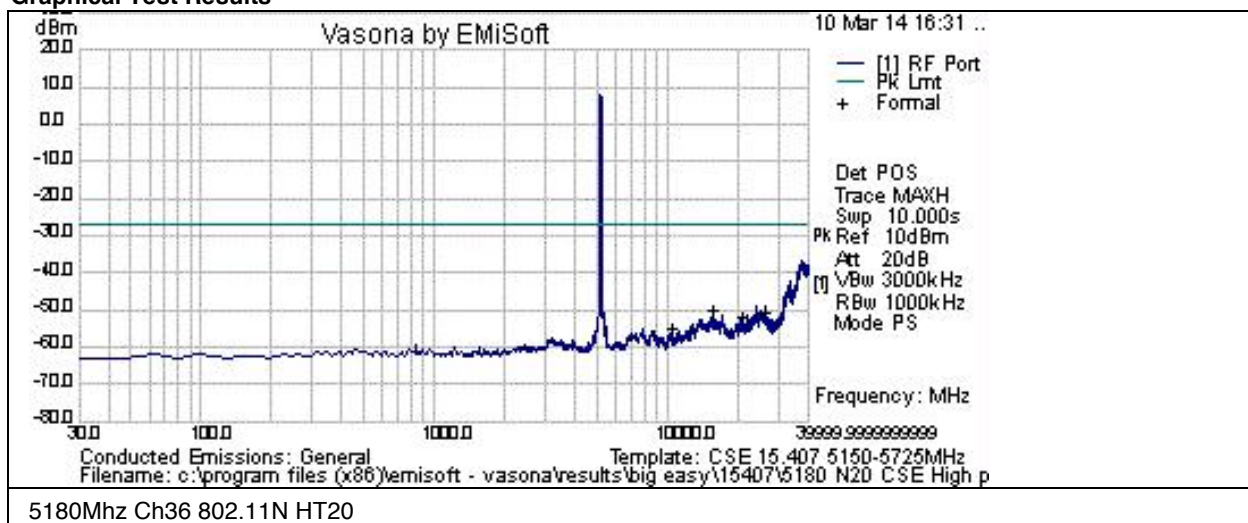
Subtest Number: 159636 - 4		Subtest Date: 10-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building B, Radio Area	
Subtest Results		
Line Under Test	[B] Antenna port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	40000.0	
Lowest Frequency	30.0	
Comments on the above Test Results	5240Mhz Ch48 802.11N HT20	

Graphical Test Results**Test Results Table 5240Mhz Ch48 802.11N HT20**

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurem ent Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
10480.731	-56.4	1	0	-55.4	Pk	RF	-27	-28.4	Pass	
15720.771	-51.2	1	0	-50.2	Pk	RF	-27	-23.2	Pass	
20959.919	-53.1	1.1	0	-52	Pk	RF	-27	-25	Pass	
26200.259	-50.6	1.2	0	-49.4	Pk	RF	-27	-22.4	Pass	

**Conducted Spurious Emissions 5180MHz 802.11N HT20, mcs M0**

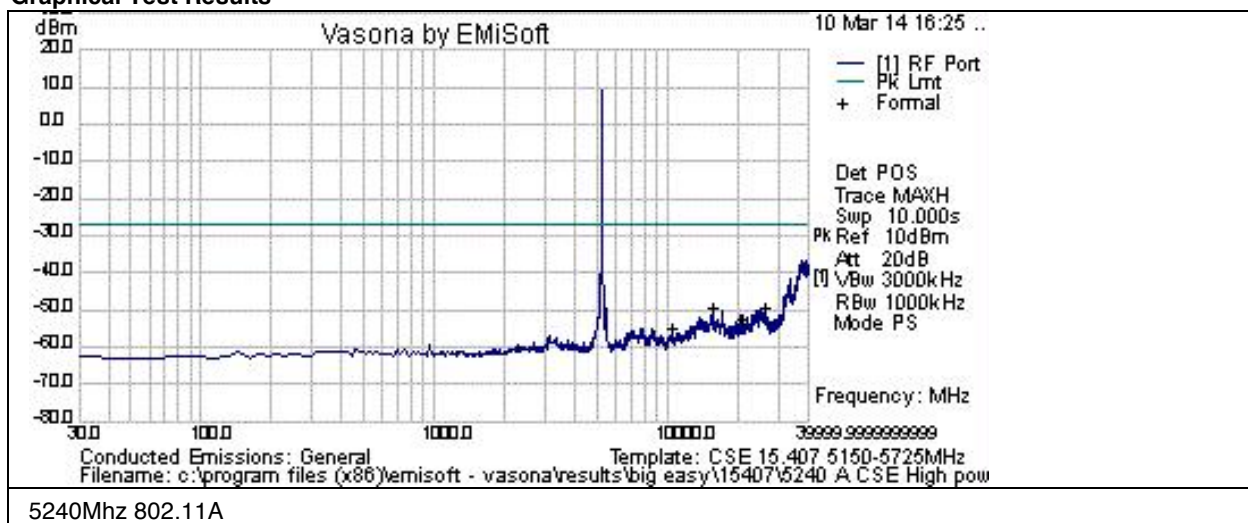
Subtest Number: 159636 - 3		Subtest Date: 10-Mar-2014	
Engineer	Jose Aguirre		
Lab Information	Building B, Radio Area		
Subtest Results			
Line Under Test	[B] Antenna port		
Transducer	Direct		
Subtest Result	Pass		
Highest Frequency	40000.0		
Lowest Frequency	30.0		
Comments on the above Test Results	5180Mhz Ch36 802.11N HT20		

Graphical Test Results**Test Results Table 5180Mhz Ch36 802.11N HT20**

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurem ent Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
10360.897	-56	1	0	-55	Pk	RF	-27	-28	Pass	
15539.794	-51.1	1	0	-50	Pk	RF	-27	-23	Pass	
20719.786	-52.6	1.1	0	-51.6	Pk	RF	-27	-24.6	Pass	
25899.327	-51.8	1.2	0	-50.6	Pk	RF	-27	-23.6	Pass	

**Conducted Spurious Emissions 5240MHz 802.11A , 6Mbps rate**

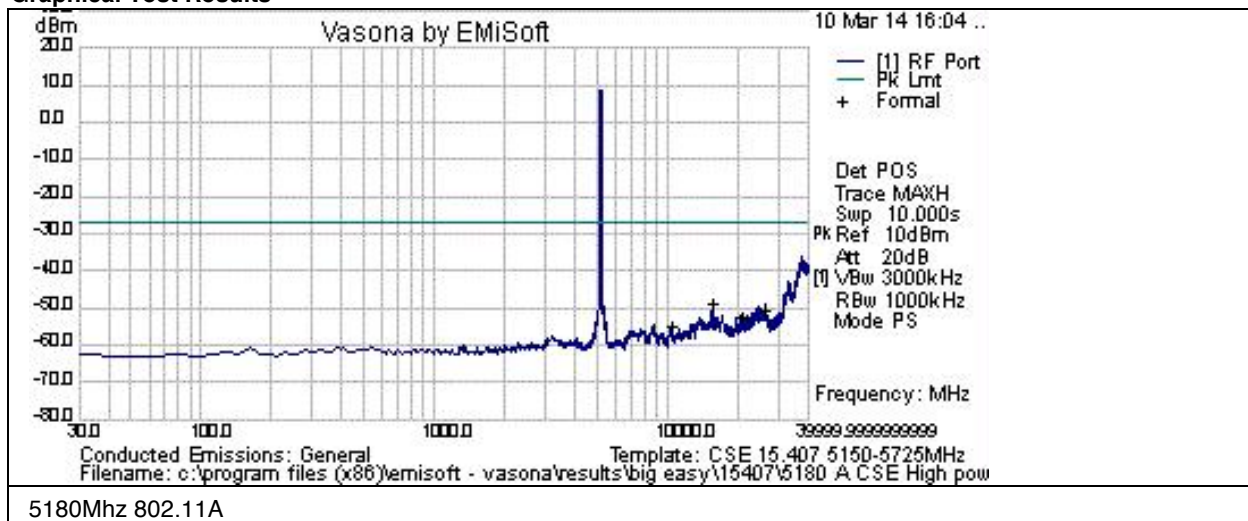
Subtest Number: 159636 - 2		Subtest Date: 10-Mar-2014	
Engineer	Jose Aguirre		
Lab Information	Building B, Radio Area		
Subtest Results			
Line Under Test	[B] Antenna port		
Transducer	Direct		
Subtest Result	Pass		
Highest Frequency	40000.0		
Lowest Frequency	30.0		
Comments on the above Test Results	5240Mhz Ch48 802.11A		

Graphical Test Results**Test Results Table 5240Mhz 802.11A**

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
10480.133	-55.6	1	0	-54.6	Pk	RF	-27	-27.6	Pass	
15720.453	-50.2	1	0	-49.2	Pk	RF	-27	-22.2	Pass	
20959.233	-53.3	1.1	0	-52.2	Pk	RF	-27	-25.2	Pass	
26199.675	-50.2	1.2	0	-49	Pk	RF	-27	-22	Pass	

**Conducted Spurious Emissions 5180MHz 802.11A , 6Mbps rate**

Subtest Number: 159636 - 1		Subtest Date: 10-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building B, Radio Area	
Subtest Results		
Line Under Test	[B] Antenna port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	40000.0	
Lowest Frequency	30.0	
Comments on the above Test Results	5180Mhz Ch36 802.11A	

Graphical Test Results**Test Results Table 5180Mhz 802.11A**

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurem ent Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
10360.117	-55.6	1	0	-54.6	Pk	RF	-27	-27.6	Pass	
15540.232	-50	1	0	-49	Pk	RF	-27	-22	Pass	
20720.012	-53.3	1.1	0	-52.2	Pk	RF	-27	-25.2	Pass	
25899.999	-51.8	1.2	0	-50.7	Pk	RF	-27	-23.7	Pass	



Conducted Bandedge

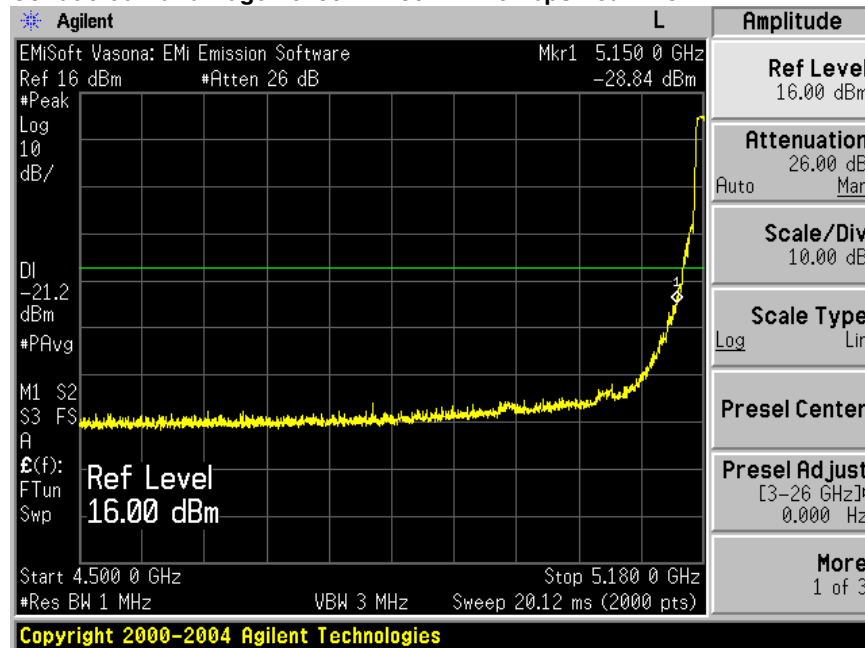
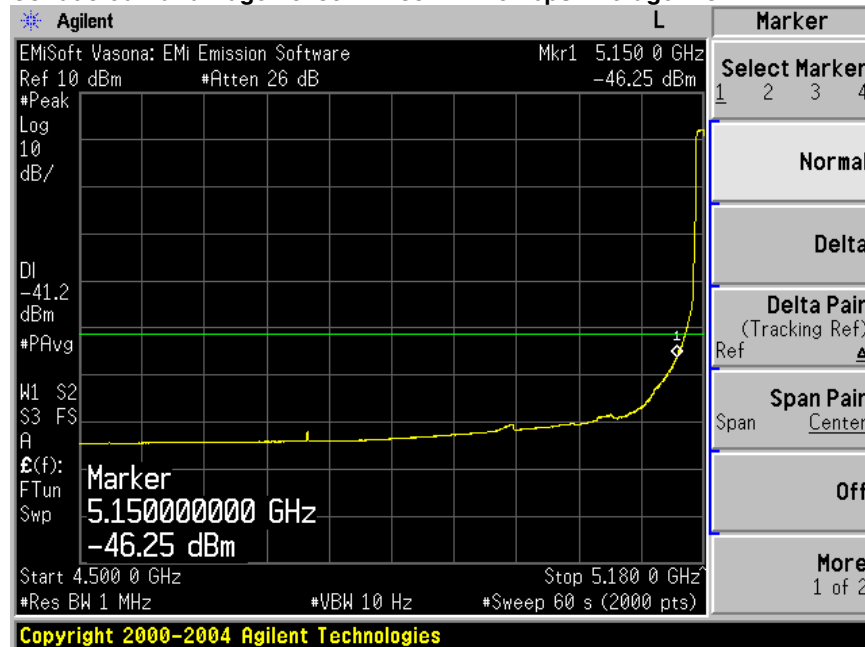
Conducted emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

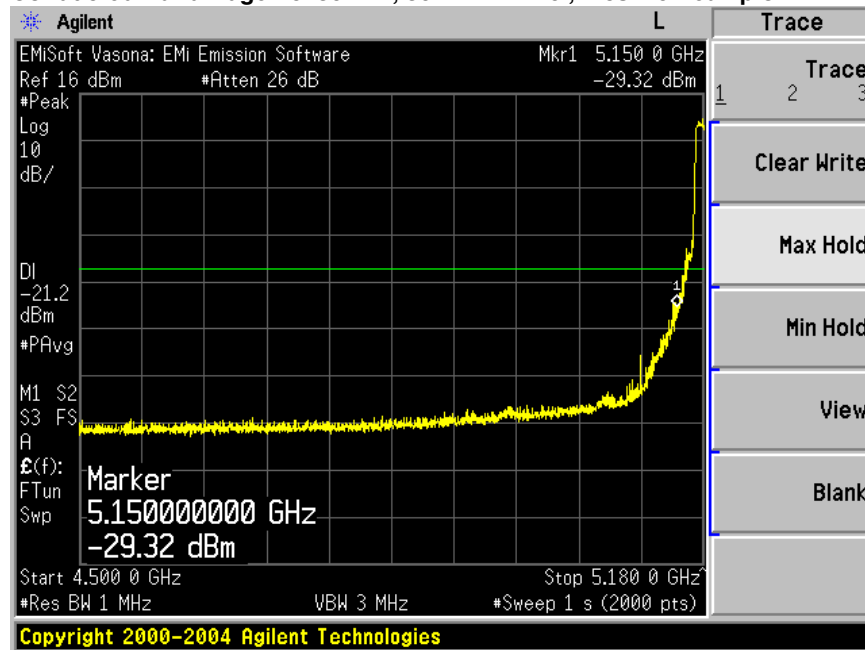
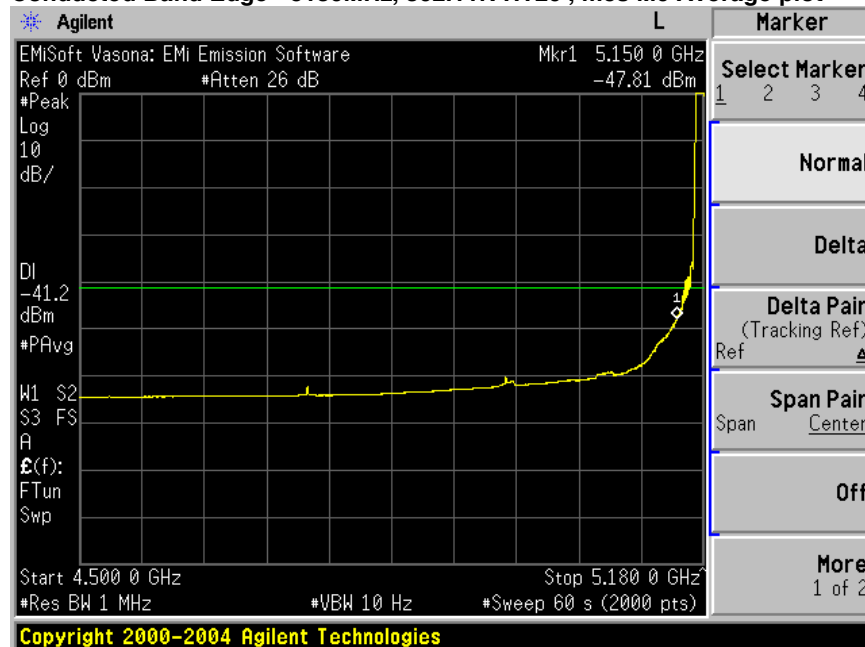
Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

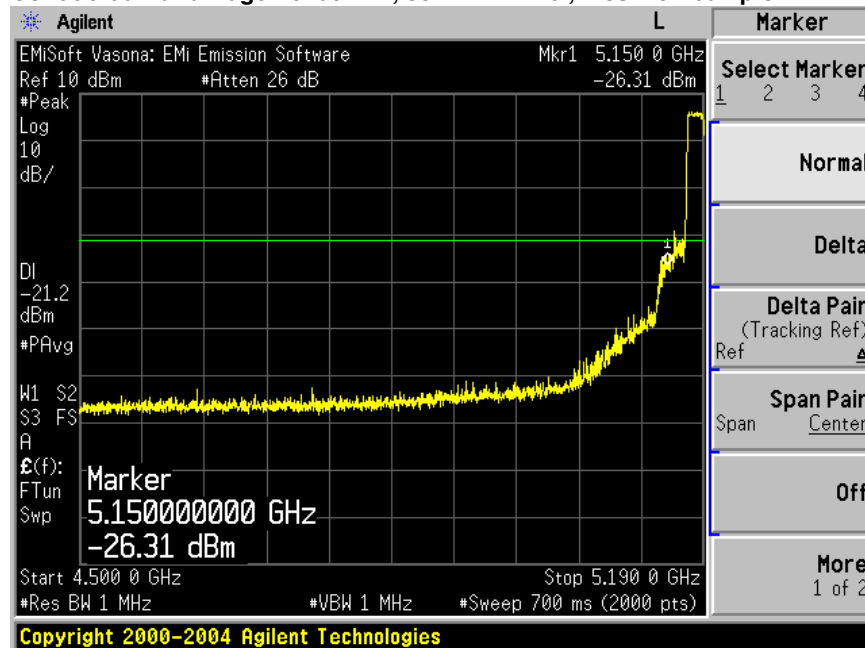
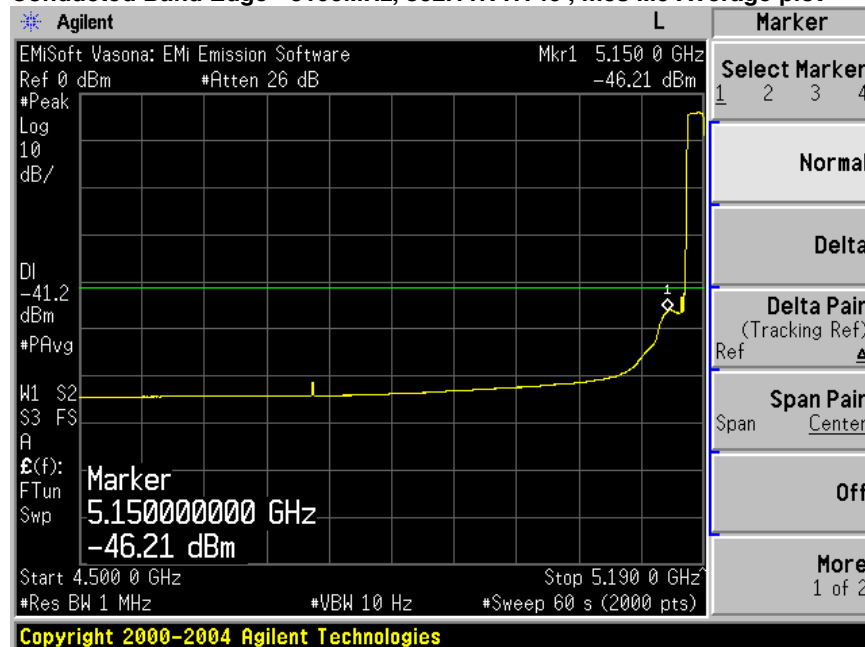
Reference Level:	110 dBuV
Attenuation:	20 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	1 MHz for peak, 10 Hz for average
Detector:	Peak

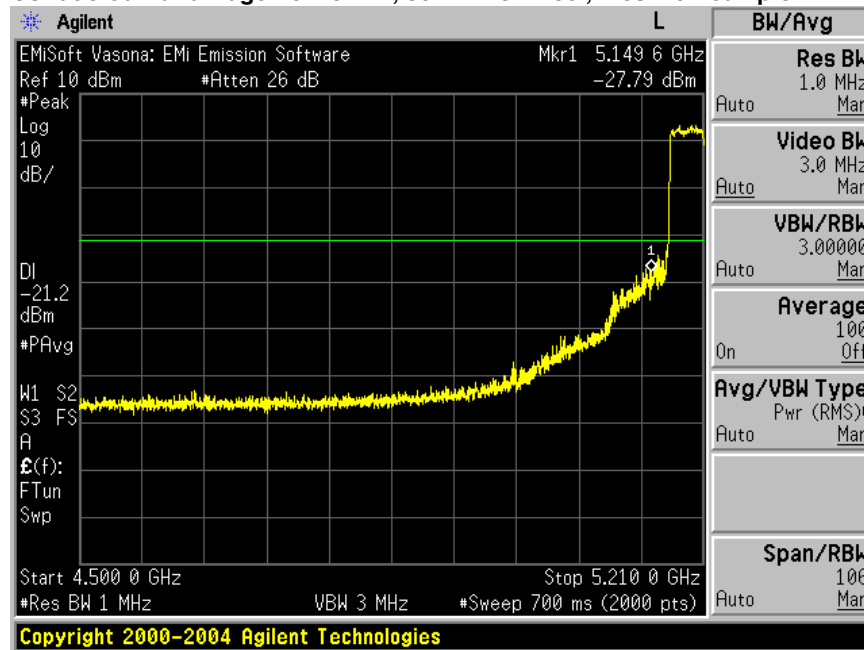
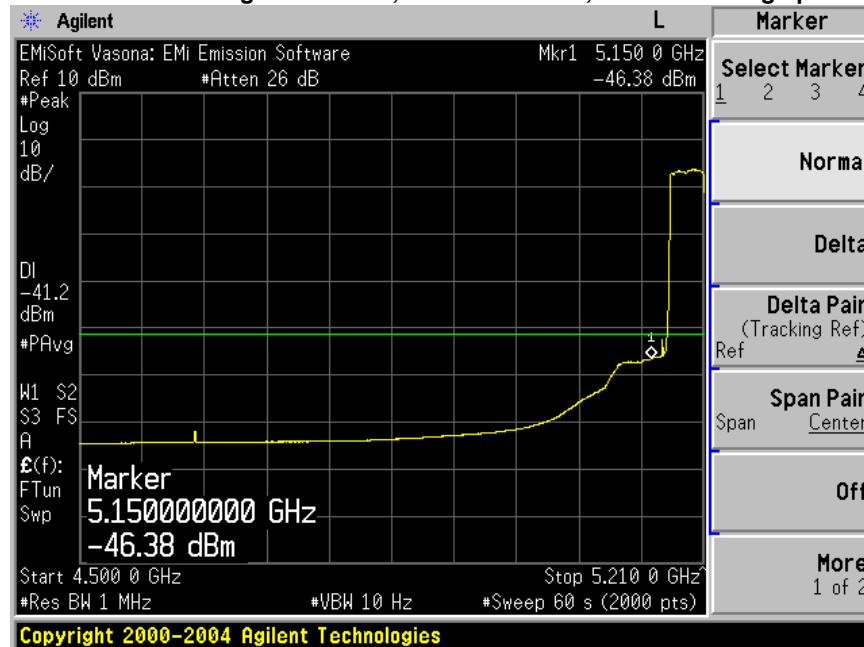
Save 2 plots: 1) Average Plot , Limit= 54dBuV @3m = -41.2dBm eirp
 2) Peak plot, Limit = 74dBuV @3m = -21.2dBm eirp

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands.

**Conducted Band Edge - 5180MHz 802.11A 6Mbps Peak Plot****Conducted Band Edge - 5180MHz 802.11A 6Mbps Average Plot**

Conducted Band Edge - 5180MHz, 802.11N HT20 , mcs M0 Peak plot**Conducted Band Edge - 5180MHz, 802.11N HT20 , mcs M0 Average plot**

**Conducted Band Edge - 5190MHz, 802.11N HT40 , mcs M0 Peak plot****Conducted Band Edge - 5190MHz, 802.11N HT40 , mcs M0 Average plot**

**Conducted Band Edge - 5210MHz, 802.11AC HT80 , mcs M0 Peak plot****Conducted Band Edge - 5210MHz, 802.11AC HT80 , mcs M0 Average plot**



Radiated Spurious Emissions

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

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span:	1GHz – 18 GHz
Reference Level:	80 dBuV
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	1 MHz for peak, 10 Hz for average
Detector:	Peak

Terminate the access Point RF ports with 50 ohm loads.

Maximize Turntable (find worst case table angle),
Maximize Antenna (find worst case height)

Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= 54dBuV @3m
 2) Peak plot (Vertical and Horizontal), Limit = 74dBuV @3m

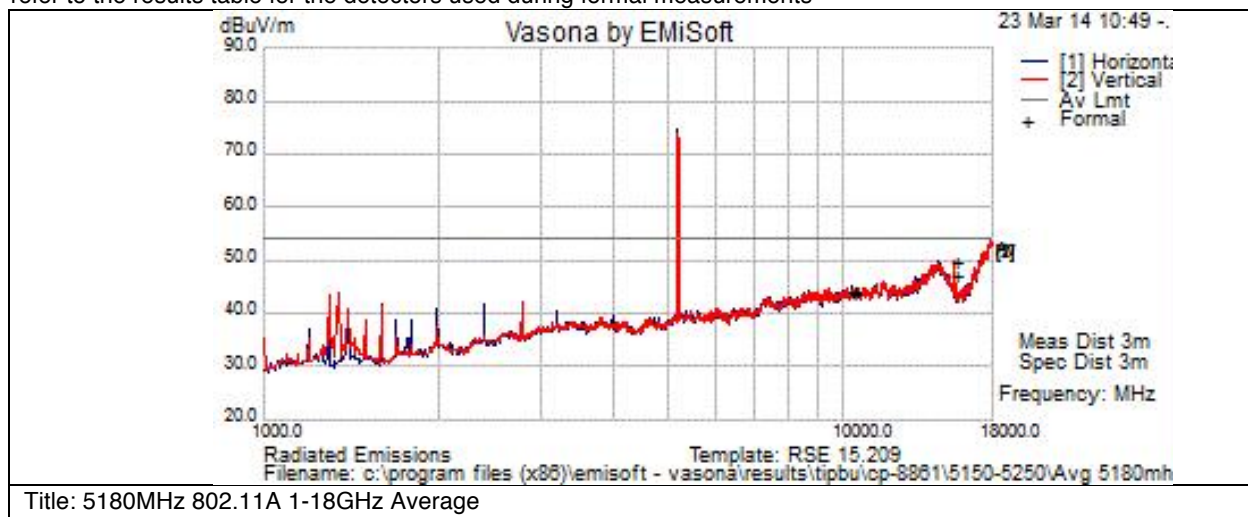
Place a marker at the end of the restricted band closest to the transmit frequency to show compliance.
Also measure any emissions in the restricted bands.

**Radiated Spurious, 5180 MHz, 802.11A, Single Transmit Path, Average**

Subtest Number: 161052 - 1		Subtest Date: 23-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5180MHz 802.11A 1-18GHz Average	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5180MHz 802.11A 1-18GHz Average	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10360.215	21.3	18	4.9	44.1	Pk	V	110	235	74	-29.9	Pass	
15540	26.9	20.7	2.2	49.8	Pk	V	110	235	74	-24.2	Pass	
10360.771	20.9	18	4.9	43.8	Pk	H	133	226	74	-30.2	Pass	
15540	24	20.7	2.2	46.9	Pk	H	133	226	74	-27.1	Pass	

**Radiated Spurious, 5180 MHz, 802.11N, HT20 Single Transmit Path, Average**

Subtest Number: 161052 - 2		Subtest Date: 23-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5180MHz 802.11N 20MHzBW 1-18GHz Average	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5180MHz 802.11N 20MHzBW 1-18GHz Average	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

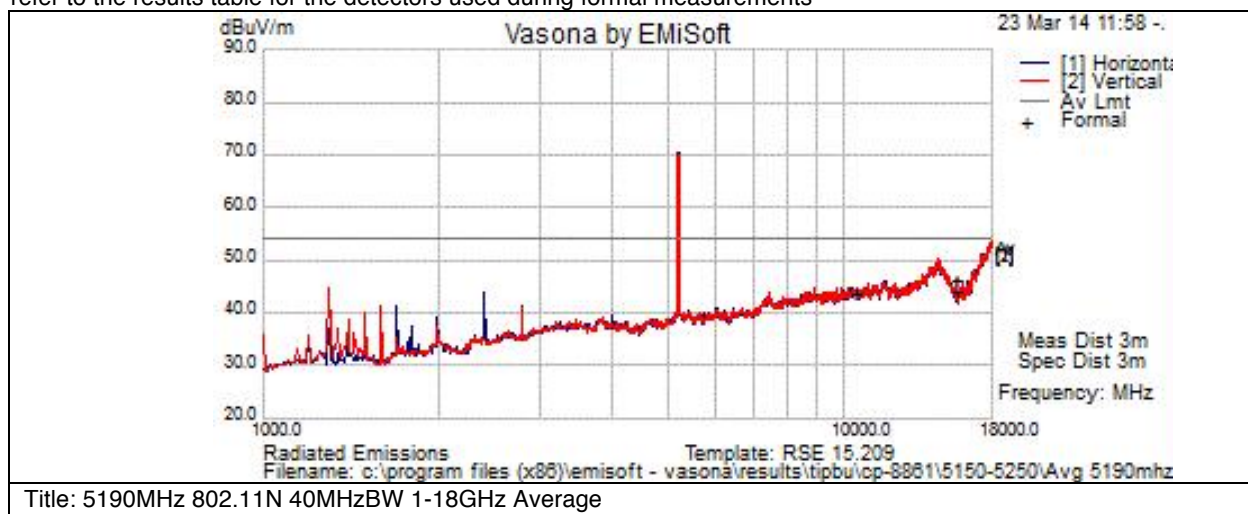
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10360.15	21.1	18	4.9	44	Pk	V	110	235	74	-30	Pass	
15540.23	26.9	20.7	2.2	49.8	Pk	V	110	235	74	-24.2	Pass	
10360.112	20.9	18	4.9	43.8	Pk	H	133	226	74	-30.2	Pass	
15540.65	23.8	20.7	2.2	46.7	Pk	H	133	226	74	-27.3	Pass	

**Radiated Spurious, 5180/5200 MHz, 802.11N, HT40, Single Transmit Path, Average**

Subtest Number: 161052 - 7		Subtest Date: 23-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5190MHz 802.11N 40MHzBW 1-18GHz Average	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5190MHz 802.11N 40MHzBW 1-18GHz Average	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

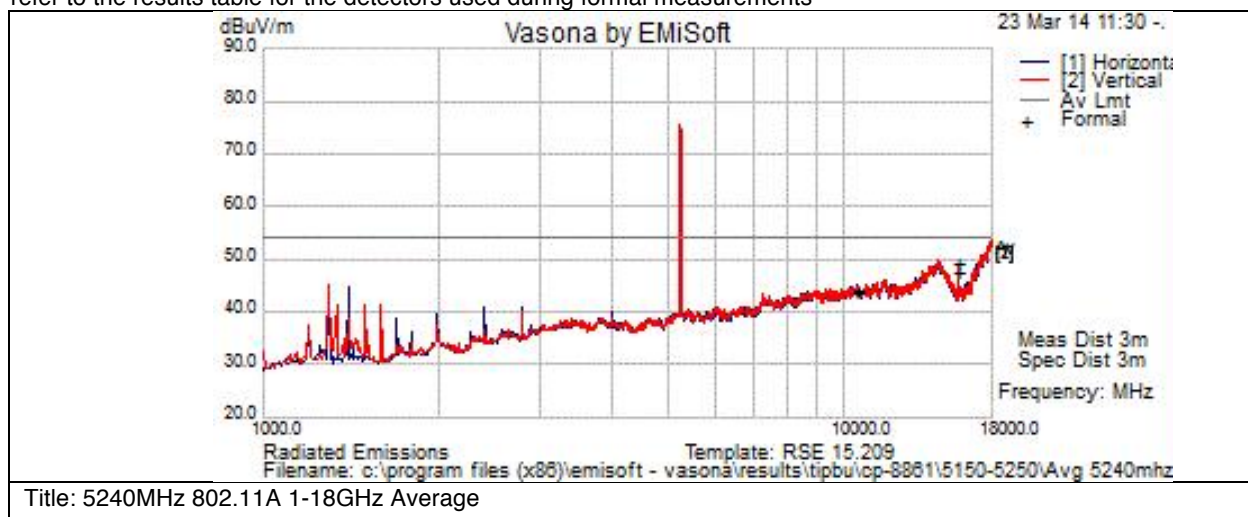
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10380.78	20.6	18	4.9	43.5	Av	V	110	235	54	-10.5	Pass	
15570	23.2	20.8	2.1	46.1	Av	V	110	235	54	-7.9	Pass	
10379.104	20.7	18	4.9	43.6	Av	H	130	225	54	-10.4	Pass	
15570	21.3	20.8	2.1	44.2	Av	H	130	225	54	-9.8	Pass	

**Radiated Spurious, 5240 MHz, 802.11A, Single Transmit Path, Average**

Subtest Number: 161052 - 4		Subtest Date: 23-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5240MHz 802.11A 1-18GHz Average	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5240MHz 802.11A 1-18GHz Average	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10480.12	20.8	18	5.1	44	Pk	V	111	234	74	-30	Pass	
10480.223	20.2	18	5.1	43.4	Pk	H	130	225	74	-30.6	Pass	
15725.819	27.4	20.8	1.2	49.4	Pk	V	111	234	74	-24.6	Pass	
15725.819	25.3	20.8	1.2	47.3	Pk	H	130	225	74	-26.7	Pass	

**Radiated Spurious, 5240 MHz, 802.11N, HT20 Single Transmit Path, Average**

Subtest Number: 161052 - 5		Subtest Date: 23-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5240MHz 802.11N 20MHzBW 1-18GHz Average	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5240MHz 802.11N 20MHzBW 1-18GHz Average	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

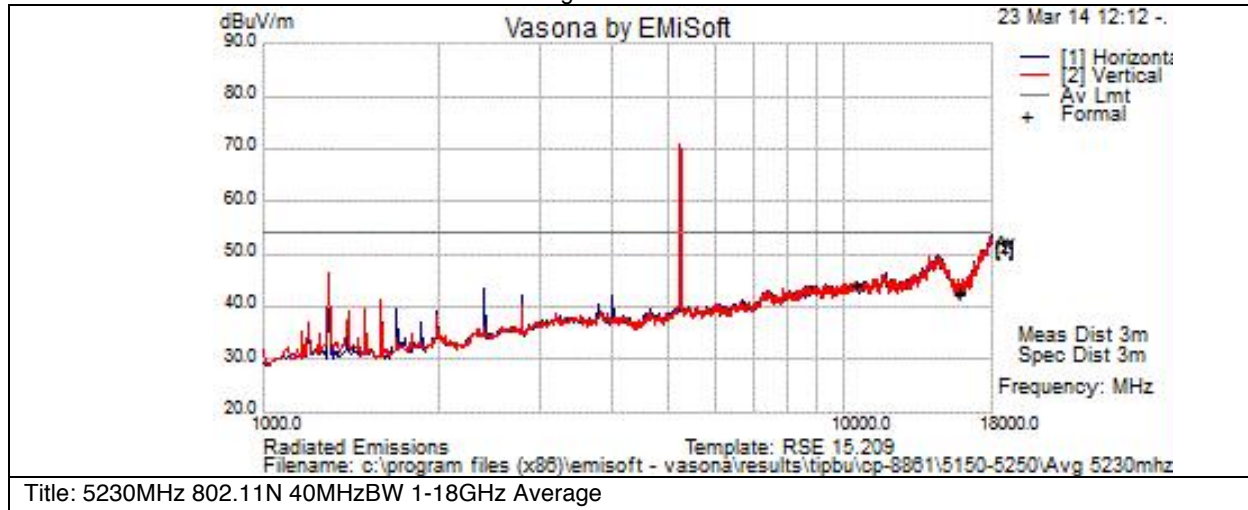
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10480.258	21.2	18	5.1	44.4	Av	V	111	234	54	-9.6	Pass	
10479.907	21.7	18	5.1	44.8	Av	H	130	225	54	-9.2	Pass	
15726.12	24.3	20.8	1.2	46.3	Av	V	111	234	54	-7.7	Pass	
15725.359	22.7	20.8	1.2	44.7	Av	H	130	225	54	-9.3	Pass	

**Radiated Spurious, 5220/5240 MHz, 802.11N, HT40, Single Transmit Path, Average**

Subtest Number: 161052 - 9		Subtest Date: 23-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5230MHz 802.11N 40MHzBW 1-18GHz Average	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5230MHz 802.11N 40MHzBW 1-18GHz Average	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

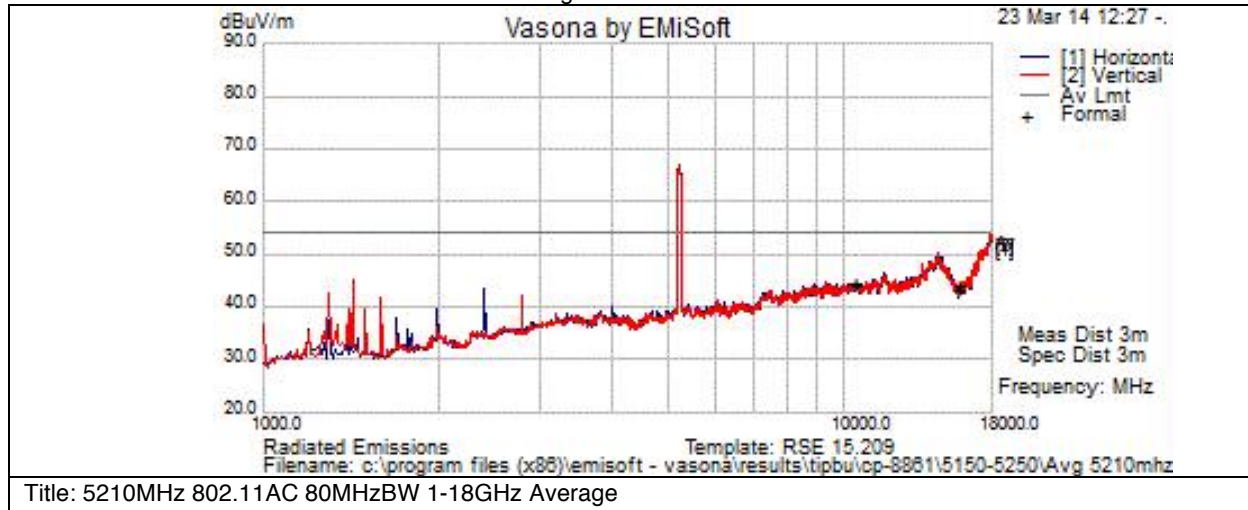
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10459.717	20.8	18	5.2	44	Av	V	110	235	54	-10	Pass	
15689.151	20.4	20.8	1.4	42.6	Av	V	110	235	54	-11.4	Pass	
10460.454	20.9	18	5.2	44	Av	H	130	225	54	-10	Pass	
15690.632	20.3	20.8	1.3	42.5	Av	H	130	225	54	-11.5	Pass	

**Radiated Spurious, 5180/5200/5220/5240 MHz, 802.11AC, HT80, Single Transmit Path, Average**

Subtest Number: 161052 - 11		Subtest Date: 23-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5210MHz 802.11AC 80MHzBW 1-18GHz Average	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5210MHz 802.11AC 80MHzBW 1-18GHz Average	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

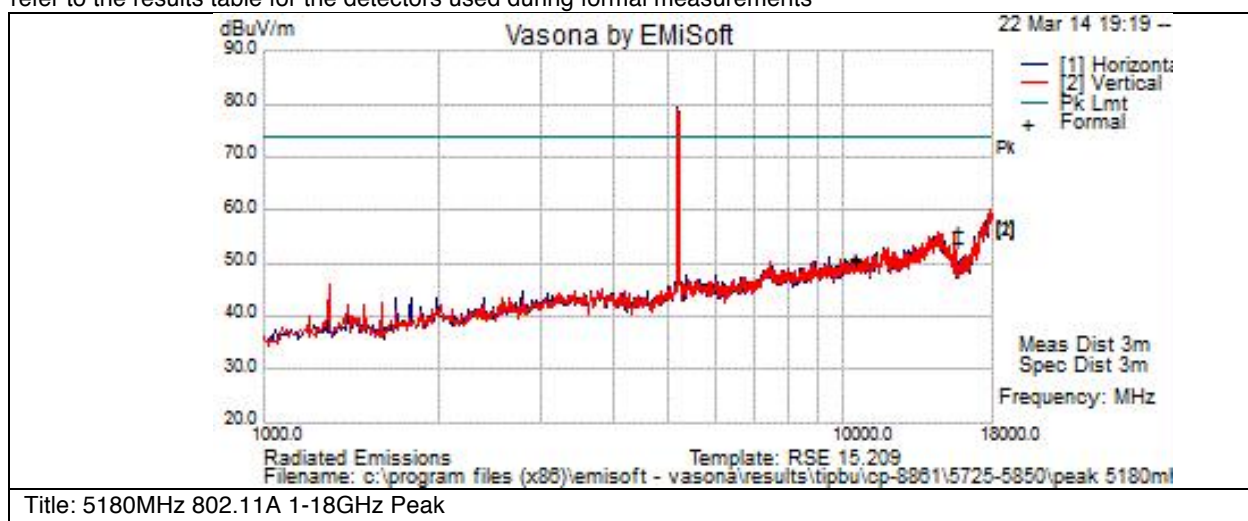
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10418.115	20.9	18	5	43.9	Av	V	110	235	54	-10.1	Pass	
15630.215	21	20.8	1.5	43.3	Av	V	110	235	54	-10.7	Pass	
10418.809	21.4	18	5	44.4	Av	H	128	225	54	-9.6	Pass	
15631.051	21.6	20.8	1.5	43.9	Av	H	128	225	54	-10.1	Pass	

**Radiated Spurious, 5180 MHz, 802.11A, Single Transmit Path, Peak**

Subtest Number: 161012 - 1		Subtest Date: 22-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5180MHz 802.11A 1-18GHz Peak	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5180MHz 802.11A 1-18GHz Peak	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

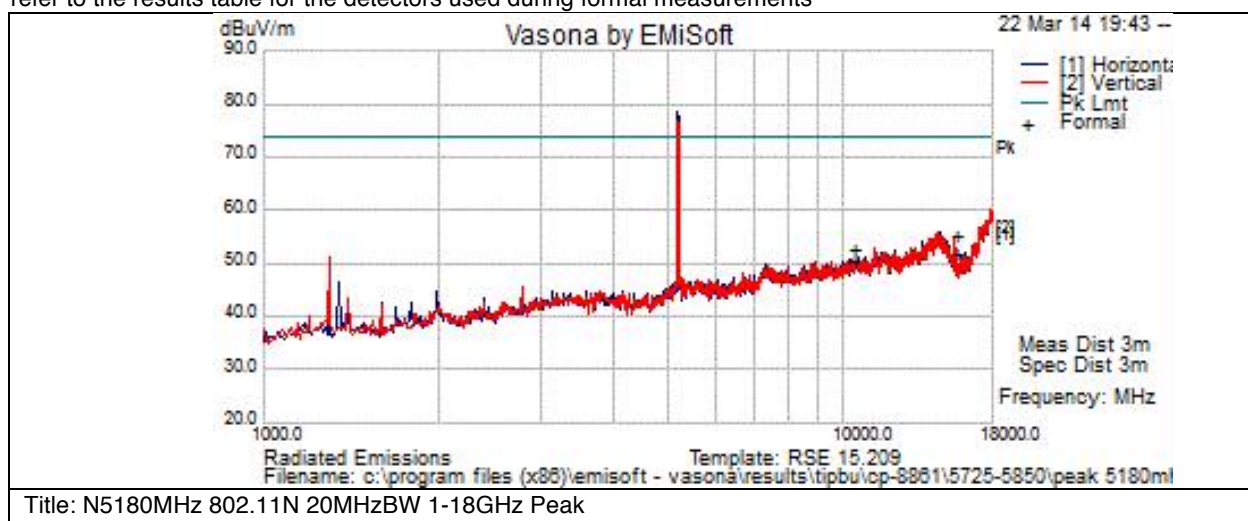
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10360.469	27.7	18	4.9	50.6	Pk	V	100	220	74	-23.4	Pass	
15540.912	33.3	20.7	2.2	56.2	Pk	V	100	220	74	-17.8	Pass	
10360.88	28	18	4.9	50.9	Pk	H	130	180	74	-23.1	Pass	
15539.615	31.2	20.7	2.2	54.1	Pk	H	130	180	74	-19.9	Pass	

**Radiated Spurious, 5180 MHz, 802.11N, HT20 Single Transmit Path, Peak**

Subtest Number: 161012 - 2		Subtest Date: 22-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5180MHz 802.11N 20MHzBW 1-18GHz Peak	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5180MHz 802.11N 20MHzBW 1-18GHz Peak	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

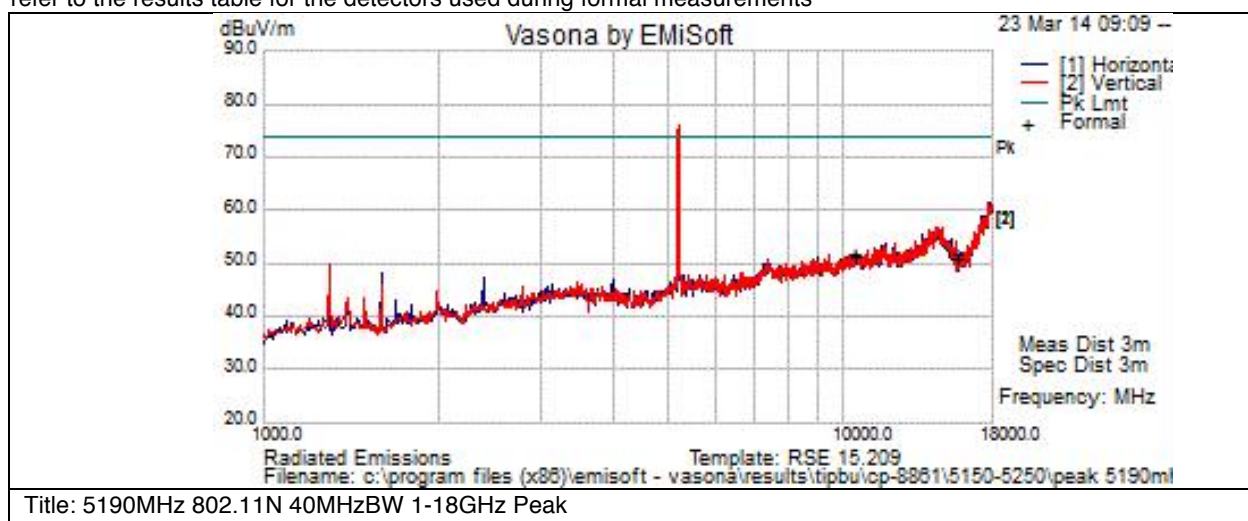
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10359.909	27.7	18	4.9	50.5	Pk	V	111	234	74	-23.5	Pass	
15541.264	32.3	20.7	2.2	55.2	Pk	V	111	234	74	-18.8	Pass	
10359.909	30	18	4.9	52.8	Pk	H	130	223	74	-21.2	Pass	
15541.354	28.9	20.7	2.2	51.8	Pk	H	130	223	74	-22.2	Pass	

**Radiated Spurious, 5180/5200 MHz, 802.11N, HT40, Single Transmit Path, Peak**

Subtest Number: 161012 - 7		Subtest Date: 23-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5190MHz 802.11N 40MHzBW 1-18GHz Peak	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5190MHz 802.11N 40MHzBW 1-18GHz Peak	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

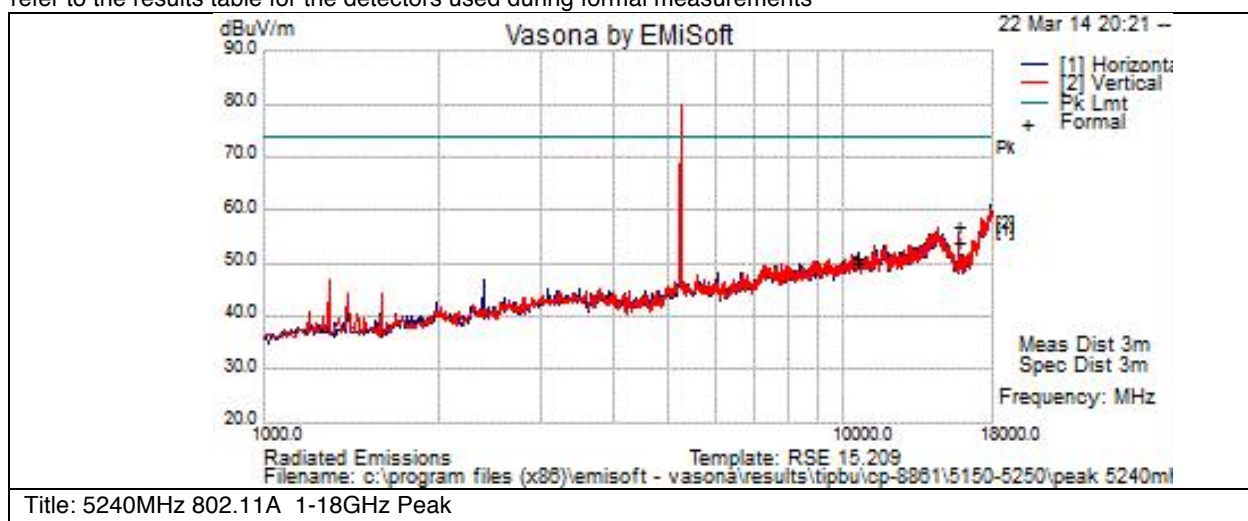
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10378.5	29.1	18	4.9	52	Pk	V	101	234	74	-22	Pass	
15571.396	28	20.8	2.1	50.9	Pk	V	101	234	74	-23.1	Pass	
10378.643	28.6	18	4.9	51.5	Pk	H	130	223	74	-22.5	Pass	
15568.441	28.9	20.8	2.1	51.8	Pk	H	130	223	74	-22.2	Pass	

**Radiated Spurious, 5240 MHz, 802.11A, Single Transmit Path, Peak**

Subtest Number: 161012 - 6		Subtest Date: 22-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5240MHz 802.11A 1-18GHz Peak	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5240MHz 802.11A 1-18GHz Peak	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

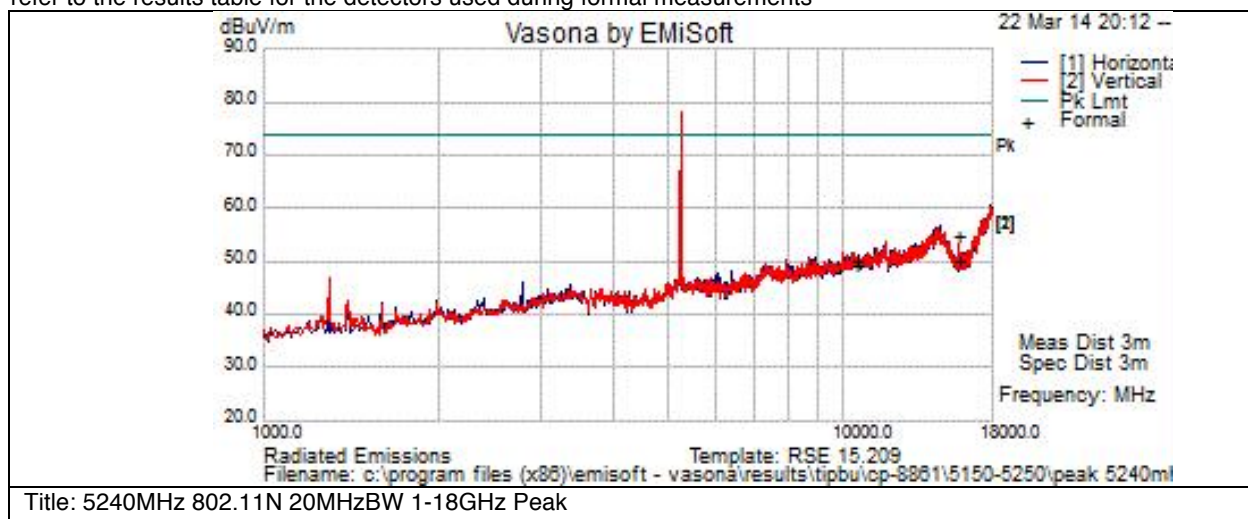
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10480	27.9	18	5.1	51.1	Pk	V	111	234	74	-22.9	Pass	
15720	34.8	20.8	1.2	56.8	Pk	V	111	234	74	-17.2	Pass	
10480	27	18	5.1	50.2	Pk	H	130	223	74	-23.8	Pass	
15720	32.1	20.8	1.2	54.1	Pk	H	130	223	74	-19.9	Pass	

**Radiated Spurious, 5240 MHz, 802.11N, HT20 Single Transmit Path, Peak**

Subtest Number: 161012 - 5		Subtest Date: 22-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5240MHz 802.11N 20MHzBW 1-18GHz Peak	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5240MHz 802.11N 20MHzBW 1-18GHz Peak	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

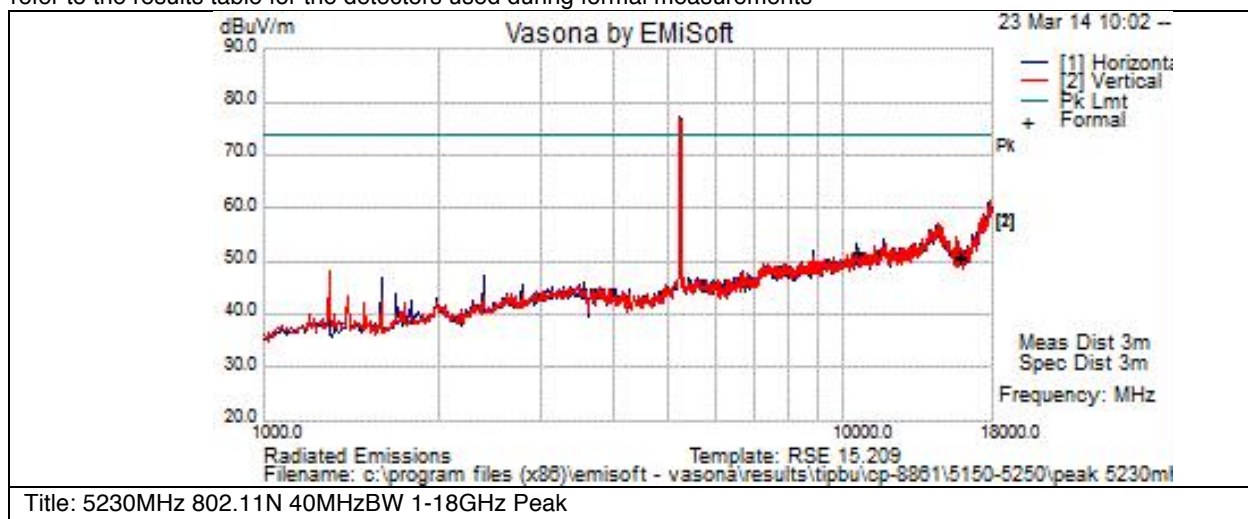
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10480	27	18	5.1	50.2	Pk	V	111	234	74	-23.8	Pass	
15720	32.8	20.8	1.2	54.8	Pk	V	111	234	74	-19.2	Pass	
10480	26	18	5.1	49.2	Pk	H	130	223	74	-24.8	Pass	
15720	28.1	20.8	1.2	50.1	Pk	H	130	223	74	-23.9	Pass	

**Radiated Spurious, 5220/5240 MHz, 802.11N, HT40, Single Transmit Path, Peak**

Subtest Number: 161012 - 10		Subtest Date: 23-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5230MHz 802.11N 40MHzBW 1-18GHz Peak	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5230MHz 802.11N 40MHzBW 1-18GHz Peak	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

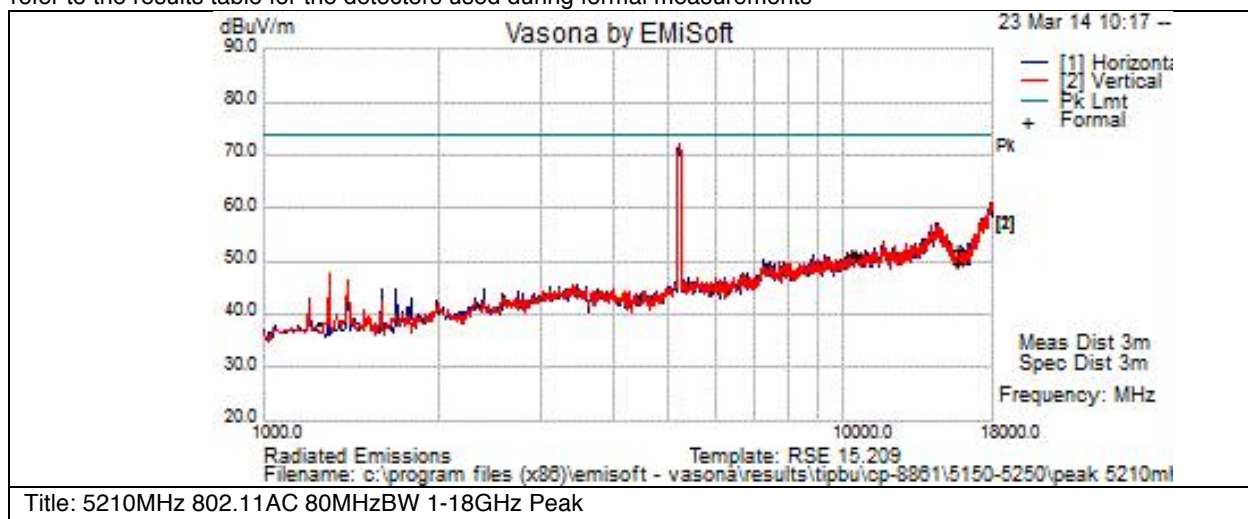
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10461.188	28.6	18	5.2	51.8	Pk	V	111	234	74	-22.2	Pass	
15690.379	28.9	20.8	1.3	51.1	Pk	V	111	234	74	-22.9	Pass	
10459.215	28.6	18	5.2	51.8	Pk	H	130	223	74	-22.2	Pass	
15688.32	28.3	20.8	1.4	50.5	Pk	H	130	223	74	-23.5	Pass	

**Radiated Spurious, 5180/5200/5220/5240 MHz, 802.11AC, HT80, Single Transmit Path, Peak**

Subtest Number: 161012 - 11		Subtest Date: 23-Mar-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5210MHz 802.11AC 80MHzBW 1-18GHz Peak	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5210MHz 802.11AC 80MHzBW 1-18GHz Peak	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

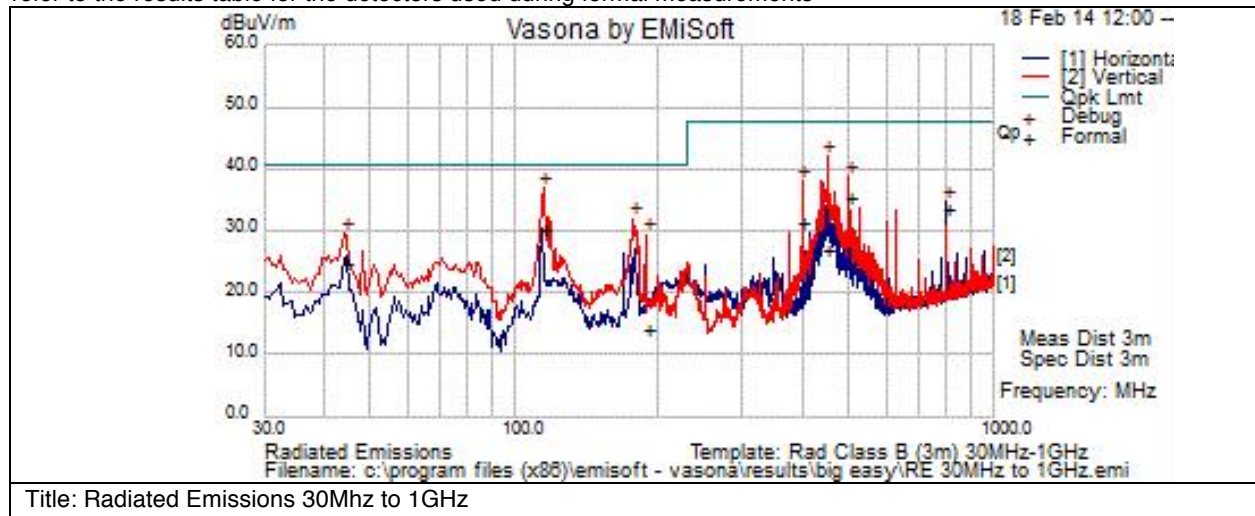
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
10420	27.7	18	5	50.7	Pk	V	111	234	74	-23.3	Pass	
15630	29.7	20.8	1.5	52	Pk	V	111	234	74	-22	Pass	
10420	28.2	18	5	51.2	Pk	H	130	223	74	-22.8	Pass	
15630	27.3	20.8	1.5	49.6	Pk	H	130	223	74	-24.4	Pass	

**Transmitter Spurious Emissions 30MHz to 1GHz Worst case mode**

Subtest Number: 157293 - 1		Subtest Date: 18-Feb-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 10m Anechoic	
Subtest Results		
Subtest Title	Radiated Emissions 30Mhz to 1GHz	
Subtest Result	Pass	
Highest Frequency	1000.0	
Lowest Frequency	30.0	
Comments on the above Test Results	Radiated Emissions 30Mhz to 1GHz	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
114.994	43.6	0.4	-14	30	Qp	V	132	296	40.5	-10.4	Pass	
499.975	45.2	0.9	-10.8	35.3	Qp	V	101	359	47.5	-12.2	Pass	
800.048	39.8	1.1	-7.2	33.6	Qp	H	103	170	47.5	-13.8	Pass	
44.244	41.2	0.3	-16.9	24.6	Qp	V	298	360	40.5	-15.9	Pass	
400.025	42.3	0.8	-12	31.1	Qp	V	291	0	47.5	-16.4	Pass	
450.106	37.2	0.9	-11.3	26.8	Qp	V	140	221	47.5	-20.7	Pass	
190.006	29.5	0.6	-16	14.1	Qp	V	119	70	40.5	-26.4	Pass	



Receiver Spurious Emissions

RSS-Gen section 4.10 & 6.1

The receiver shall be operated in the normal receive mode near the mid-point of the band in which the receiver is designed to operate.

For either method, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator frequency, intermediate or carrier frequency), Or 30 MHz, whichever is higher, to at least 3 times the highest tuneable or local oscillator frequency whichever is higher, without exceeding 40 GHz.

For emissions below 1000 MHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limit can be demonstrated using measuring equipment employing a peak detector function properly adjusted for factors such as pulse desensitization as required, with an equal or greater measurement bandwidth relative to the applicable CISPR quasi-peak bandwidth.

Spurious emissions from receivers shall not exceed the radiated limits shown in the table 2 in section 6.1 of RSS-Gen.

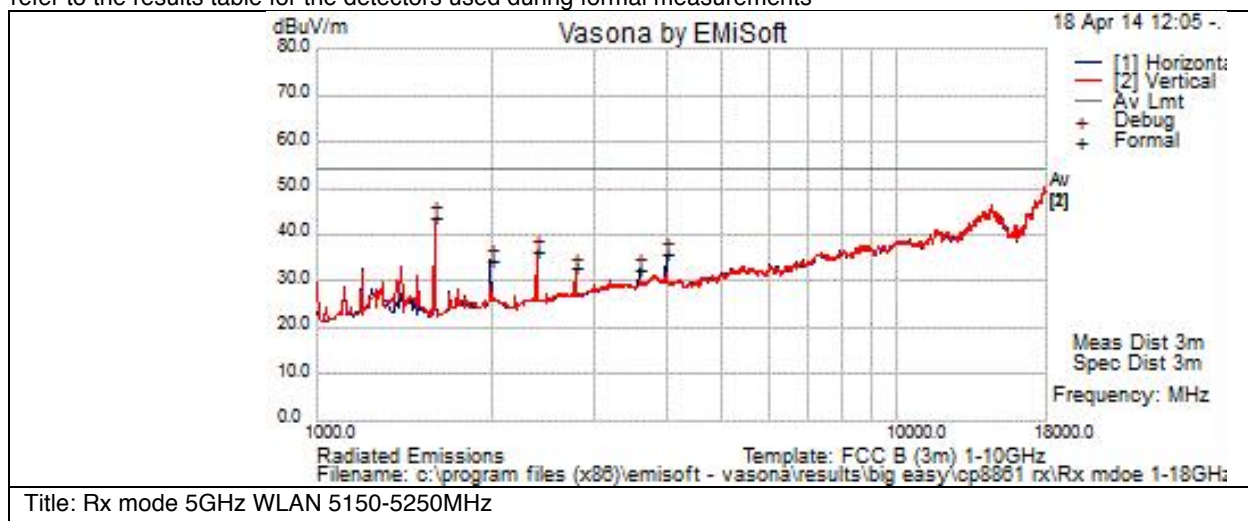
This report represents the worst case data for all supported operating modes and antennas. There were no measurable emissions above 15 GHz.

**Receiver Spurious Emissions 1GHz to 18GHz Average Plot**

Subtest Number: 164252 - 3		Subtest Date: 18-Apr-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	Rx mode 5GHz WLAN 5150-5250MHz	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	Rx mode 5GHz WLAN 5150-5250MHz	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1595	47.2	4.4	-8	43.5	Av	V	100	90	54	-10.5	Pass	
1994.5	34.8	4.9	-5.3	34.4	Av	H	100	270	54	-19.6	Pass	
2394	37.3	5.4	-6.1	36.5	Av	V	100	0	54	-17.5	Pass	
2793.909	32.7	5.8	-5.8	32.6	Av	V	101	360	54	-21.4	Pass	
3600.31	30.7	6.7	-4.8	32.6	Av	H	101	360	54	-21.4	Pass	
4000.5	32.4	7.1	-3.7	35.7	Av	H	100	270	54	-18.3	Pass	

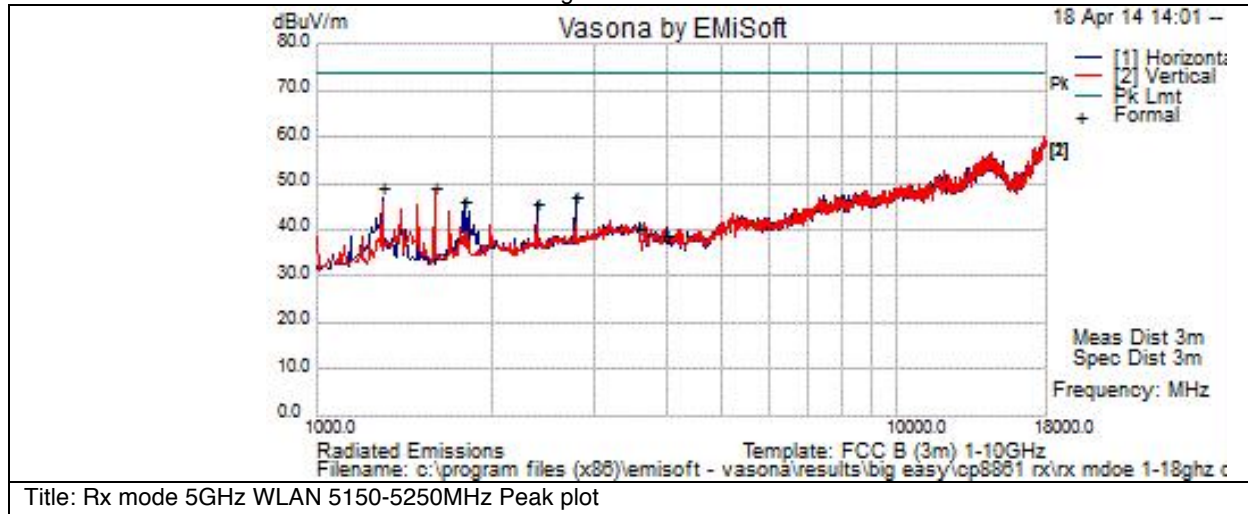


Receiver Spurious Emissions 1GHz to 18GHz Peak Plot

Subtest Number: 164252 - 10		Subtest Date: 18-Apr-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	Rx mode 5GHz WLAN 5150-5250MHz Peak plot	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	Rx mode 5GHz WLAN 5150-5250MHz Peak plot	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Test Results Table

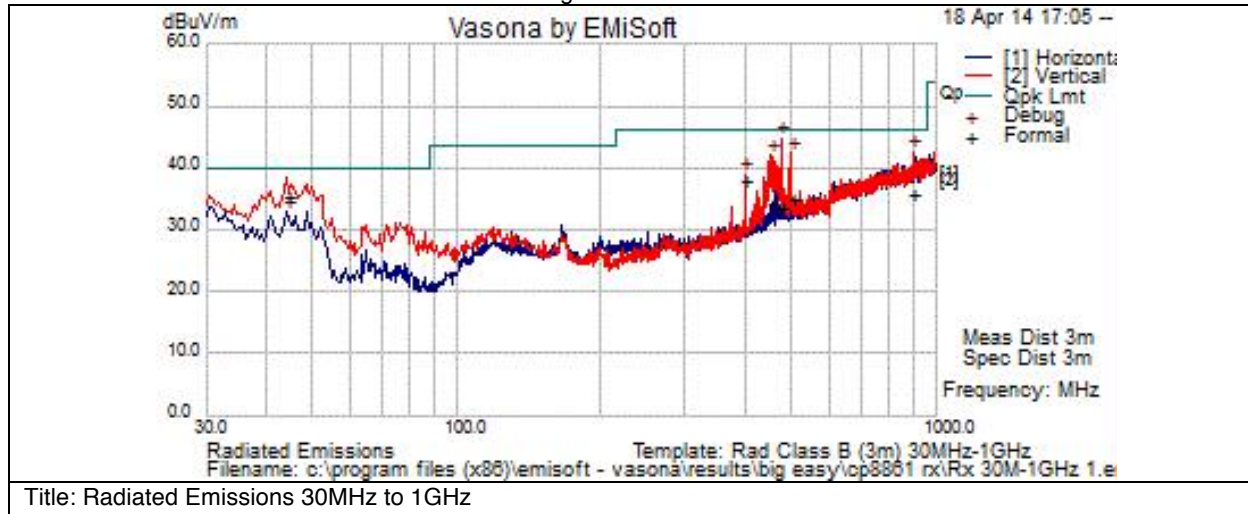
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1300.114	53.7	3.9	-8.8	48.8	Pk	H	160	310	74	-25.2	Pass	
1600.125	52.9	4.4	-8.1	49.2	Pk	V	130	60	74	-24.8	Pass	
1800.253	48.6	4.6	-7.2	46	Pk	H	148	35	74	-28	Pass	
2400.335	46.3	5.4	-6.1	45.5	Pk	H	156	19	74	-28.5	Pass	
2800.18	47.2	5.8	-5.9	47.2	Pk	H	130	75	74	-26.8	Pass	
3600.12	38.2	6.7	-4.8	40.1	Pk	H	113	174	74	-33.9	Pass	
4000.466	35.4	7.1	-3.7	38.7	Pk	H	115	200	74	-35.3	Pass	

**Receiver Spurious Emissions 30MHz to 1GHz**

Subtest Number: 164252 - 13		Subtest Date: 18-Apr-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	Radiated Emissions 30MHz to 1GHz	
Subtest Result	Pass	
Highest Frequency	1000.0	
Lowest Frequency	30.0	
Comments on the above Test Results	Radiated Emissions 30MHz to 1GHz	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

**Test Results Table**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
474.99	13.3	2.3	17.7	33.3	Qp	V	108	4	46	-12.7	Pass	
894.755	10.2	3.2	22.3	35.7	Qp	V	191	99	46	-10.3	Pass	
499.983	14.9	2.4	17.8	35.1	Qp	V	120	6	46	-10.9	Pass	
452.92	15.1	2.3	16.9	34.3	Qp	V	118	70	46	-11.7	Pass	
400.033	19.9	2.2	15.7	37.8	Qp	V	116	116	46	-8.2	Pass	
44.261	23.7	0.7	10.8	35.2	Qp	V	117	337	40	-4.8	Pass	

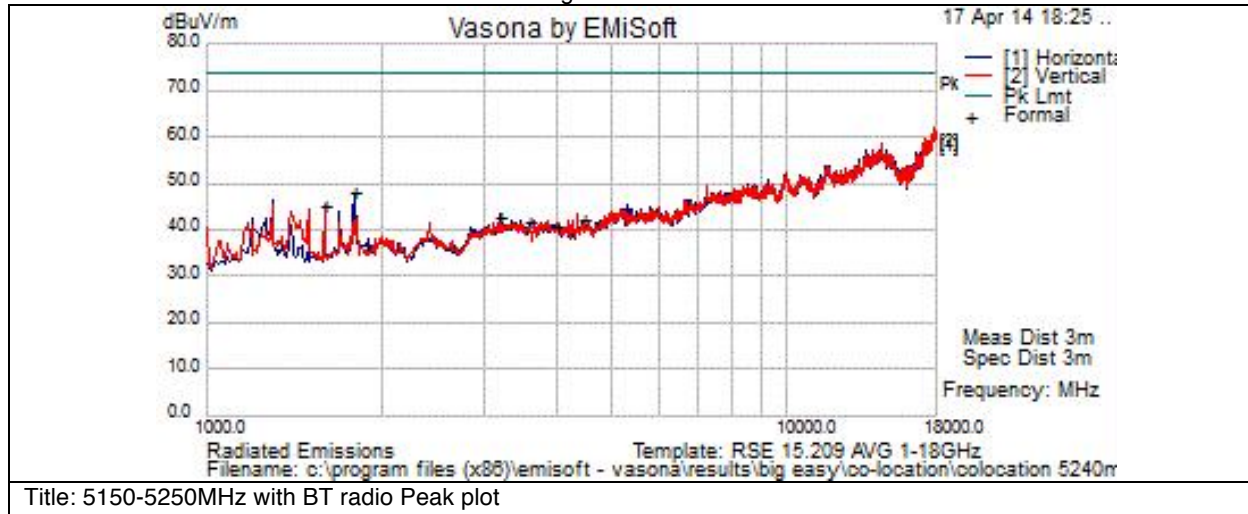


Co-Location Spurious Emissions

Subtest Number: 164061 - 6		Subtest Date: 17-Apr-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5150-5250MHz with BT radio Peak plot	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5150-5250MHz with BT radio Peak plot	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Test Results Table

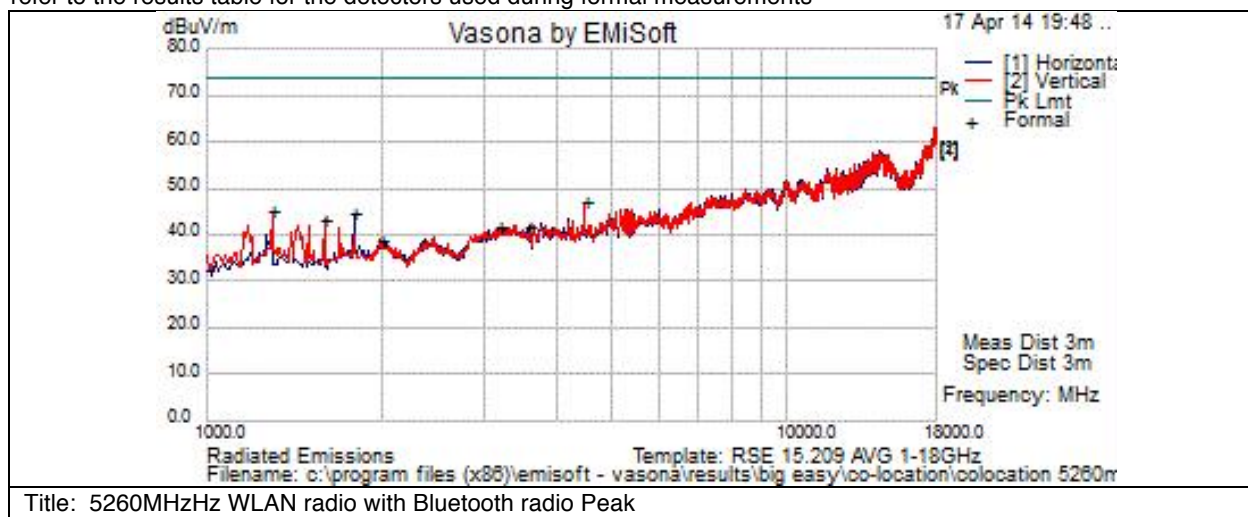
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1595	48.6	4.3	-8	44.9	Pk	V	100	163	74	-29.1	Pass	
3196.759	40.8	6.2	-4.3	42.7	Pk	V	100	210	74	-31.3	Pass	
3600.412	39.9	6.7	-4.8	41.8	Pk	H	100	296	74	-32.2	Pass	
4000.622	37.2	7.1	-3.7	40.5	Pk	V	100	182	74	-33.5	Pass	
4451	39.3	7.5	-4.5	42.3	Pk	V	102	177	74	-31.7	Pass	
1799	50.6	4.6	-7.2	48	Pk	H	112	156	74	-26	Pass	



Subtest Number: 164061 - 7		Subtest Date: 17-Apr-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5260MHzHz WLAN radio with Bluetooth radio Peak	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	5260MHzHz WLAN radio with Bluetooth radio Peak	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Test Results Table

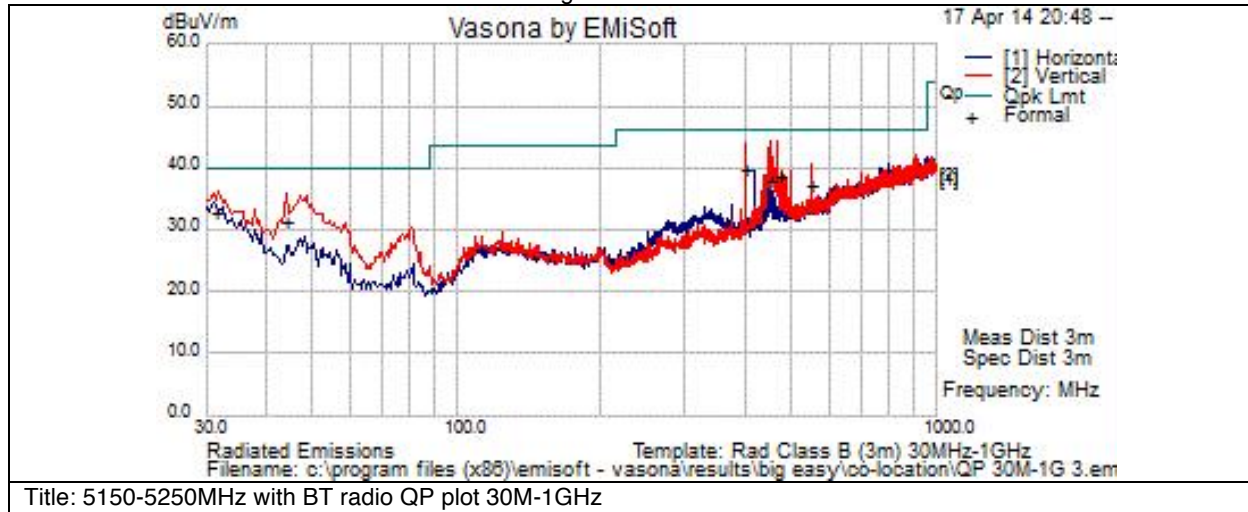
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1595	47	4.3	-8	43.3	Pk	V	100	0	74	-30.7	Pass	
4485	43.9	7.5	-4.2	47.2	Pk	V	100	240	74	-26.8	Pass	
3601.105	39.6	6.7	-4.8	41.5	Pk	H	102	230	74	-32.5	Pass	
3197.651	39.8	6.2	-4.3	41.7	Pk	V	100	180	74	-32.3	Pass	
1994.094	39	4.9	-5.3	38.6	Pk	V	100	180	74	-35.4	Pass	
1799	47.2	4.6	-7.2	44.6	Pk	H	100	177	74	-29.4	Pass	
1297.5	49.8	3.9	-8.8	44.9	Pk	V	110	182	74	-29.1	Pass	



Subtest Number: 164061 - 13		Subtest Date: 17-Apr-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 5m Anechoic	
Subtest Results		
Subtest Title	5150-5250MHz with BT radio QP plot 30M-1GHz	
Subtest Result	Pass	
Highest Frequency	1000.0	
Lowest Frequency	30.0	
Comments on the above Test Results	5150-5250MHz with BT radio QP plot 30M-1GHz	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
31.411	12.9	0.6	19.3	32.8	Qp	V	140	33	40	-7.2	Pass	
44.01	19.7	0.7	10.9	31.3	Qp	V	134	175	40	-8.7	Pass	
400.016	21.8	2.1	15.7	39.6	Qp	V	110	122	46	-6.4	Pass	
450.018	18.7	2.3	16.8	37.8	Qp	V	135	136	46	-8.2	Pass	
468.798	18.9	2.3	17.4	38.6	Qp	V	171	166	46	-7.4	Pass	
550.562	16.4	2.5	18.4	37.3	Qp	V	174	80	46	-8.7	Pass	

AC Mains Conducted emissions

15.207 & RSS GEN sec 7.2.4

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	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.

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span:	150kHz – 30Hz
Reference Level:	70 dBuV
Attenuation:	10 dB
Sweep Time:	Auto
Resolution Bandwidth:	9Hz
Video Bandwidth:	30kHz
Detector:	Quasi-Peak

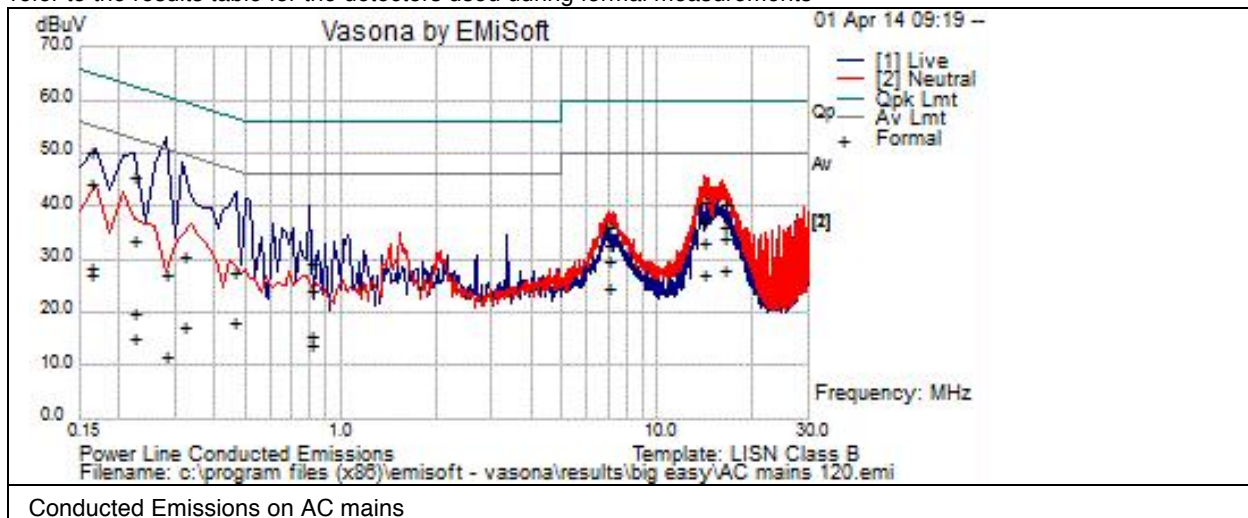
This report represents the worst case data for all supported operating modes and antennas.



Subtest Number: 162052 - 1		Subtest Date: 01-Apr-2014
Engineer	Jose Aguirre	
Lab Information	Building P, 10m Anechoic	
Subtest Results		
Line Under Test	[A] AC mains	
Transducer	LISN	
Subtest Result	Pass	
Highest Frequency	30.0	
Lowest Frequency	0.15	
Comments on the above Test Results	Conducted Emissions on AC mains	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.164	23	21.3	0	44.4	Qp	N	65.3	-20.9	Pass	
0.164	7	21.3	0	28.3	Av	L	55.3	-26.9	Pass	
0.164	5.9	21.3	0	27.2	Av	N	55.3	-28.1	Pass	
0.164	28.8	21.3	0	50.2	Qp	L	65.3	-15.1	Pass	
0.224	-1.4	20.9	0	19.6	Av	L	52.7	-33.1	Pass	
0.224	-6	20.9	0	15	Av	N	52.7	-37.7	Pass	
0.224	24.5	20.9	0	45.5	Qp	L	62.7	-17.2	Pass	
0.224	12.4	20.9	0	33.4	Qp	N	62.7	-29.3	Pass	
0.280594	6.1	20.6	0.1	26.8	Qp	N	60.8	-34	Pass	



Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.280594	-9.1	20.6	0.1	11.6	Av	N	50.8	-39.2	Pass	
0.321	-3.2	20.5	0.1	17.3	Av	N	49.7	-32.4	Pass	
0.321	9.8	20.5	0.1	30.4	Qp	N	59.7	-29.3	Pass	
0.464	-2	20.1	0.1	18.2	Av	N	46.6	-28.4	Pass	
0.464	7.1	20.1	0.1	27.3	Qp	N	56.6	-29.4	Pass	
0.801	8.9	20.1	0.1	29.1	Qp	L	56	-26.9	Pass	
0.801	-4.7	20.1	0.1	15.5	Av	N	46	-30.5	Pass	
0.801	3.8	20.1	0.1	24	Qp	N	56	-32	Pass	
0.801	-6.3	20.1	0.1	13.9	Av	L	46	-32.1	Pass	
7.027	12.6	20.1	0	32.7	Qp	L	60	-27.3	Pass	
7.027	15.9	20.1	0	36	Qp	N	60	-24	Pass	
7.027	9.6	20.1	0	29.8	Av	N	50	-20.2	Pass	
7.027	4.4	20.1	0	24.6	Av	L	50	-25.4	Pass	
14.045	12.5	20.3	0.1	32.9	Av	N	50	-17.1	Pass	
14.045	6.5	20.3	0.1	26.9	Av	L	50	-23.1	Pass	
14.045	20.3	20.3	0.1	40.6	Qp	N	60	-19.4	Pass	
14.045	16.4	20.3	0.1	36.7	Qp	L	60	-23.3	Pass	
16.138	7.4	20.4	0.2	28	Av	L	50	-22	Pass	
16.138	15.5	20.4	0.2	36.1	Qp	L	60	-23.9	Pass	
16.138	13.1	20.4	0.2	33.7	Av	N	50	-16.3	Pass	
16.138	20	20.4	0.2	40.5	Qp	N	60	-19.5	Pass	



Appendix B: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	RMS	Root mean square
EDCS	Engineering Document Control System	Qp	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Pk	Peak
Cal	Calibration	kHz	Kilohertz (1×10^3)
EN	European Norm	MHz	MegaHertz (1×10^6)
IEC	International Electro technical Commission	GHz	Gigahertz (1×10^9)
CISPR	International Special Committee on Radio Interference	H	Horizontal
CDN	Coupling/Decoupling Network	V	Vertical
LISN	Line Impedance Stabilization Network	dB	decibel
PE	Protective Earth	V	Volt
GND	Ground	kV	Kilovolt (1×10^3)
L1	Line 1	μV	Microvolt (1×10^{-6})
L2	Line2	A	Amp
L3	Line 3	μA	Micro Amp (1×10^{-6})
DC	Direct Current	mS	Milli Second (1×10^{-3})
RAW	Uncorrected measurement value, as indicated by the measuring device	μS	Micro Second (1×10^{-6})
RF	Radio Frequency	μS	Micro Second (1×10^{-6})
SLCE	Signal Line Conducted Emissions	m	Meter
Meas dist	Measurement distance	Spec dist	Specification distance
N/A or NA	Not Applicable	SL	Signal Line (or Telecom Line)
P	Power Line	L	Live Line
N	Neutral Line	R	Return
S	Supply	AC	Alternating Current

**Appendix C: Test Equipment/Software Used to perform the test**

Equipment No	Manufacturer	Model	Description	Last Cal	Next Cal Due Date
CIS004882	EMC Test Systems	3115	Double Ridged Guide Horn Antenna	28-JUN-13	28-JUN-14
CIS005691	Miteq	NSP1800-25-S1	Broadband Preamplifier (1-18GHz)	27-JAN-14	27-JAN-15
CIS008448	Cisco	NSA 5m Chamber	NSA 5m Chamber	03-OCT-13	03-OCT-14
CIS021117	Micro-Coax	UFB311A-0-2484-520520	RF Coaxial Cable, to 18GHz, 248.4 in	23-AUG-13	23-AUG-14
CIS024998	Micro-Coax	UFB197C-1-0240-504504	RF Coaxial Cable, to 18GHz, 24 in	27-FEB-14	27-FEB-15
CIS027245	Stanley	33-158	Measuring tape	29-JUN-13	29-JUN-14
CIS025658	Micro-Coax	UFB311A-1-0840-504504	RF Coaxial Cable, to 18GHz, 84 in	14-FEB-14	14-FEB-15
CIS040597	Cisco	Above 1GHz Site Cal	Above 1GHz Cspr Site Verification	30-MAY-13	30-MAY-14
CIS040641	Rohde & Schwarz	ESU26	EMI Test Receiver	24-JUN-13	24-JUN-14
CIS041935	Newport	iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	25-MAR-13	25-MAR-14
CIS049563	Huber + Suhner	Sucoflex 106A	N Type Cable 18GHz	23-AUG-13	23-AUG-14
CIS008375	Andrew	F4A-PNMNM	49 ft Helix Cable	16-APR-13	16-APR-14
CIS005707	Fischer Custom Communications	FCC-LISN-50-50	LISN	16-APR-13	16-APR-14
CIS019206	TTE	H785-150K-50-21378	High Pas Filter, Fo=150kHz	12-SEP-13	12-SEP-14
CIS008591	Fischer Custom Communications	FCC-RFM2F-520R	LISN AC Adaptor - Std 120V outlet	16-APR-13	16-APR-14
CIS030562	Micro-Coax	UFB311A-1-0950-504504	RF Coaxial Cable, to 18GHz, 95 in	26-JUN-13	26-JUN-14
CIS033649	Midwest Microwave	CSY-NMNM-14-010-FS	RF Coaxial Cable, RG-214, 10ft	16-APR-13	16-APR-14
CIS041929	Newport	iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	16-DEC-13	16-DEC-14
CIS047300	Agilent Technologies	N9038A	MXE EMI Receiver 20Hz to 26.5 Ghz	17-DEC-13	17-DEC-14



Appendix D: Test Procedures

Measurements were made in accordance with

- KDB Publication No. 789033
- measurement method of spurious emission tolerance to the International Telecommunication Union (ITU) Recommendation SM329.
- ANSI C63.10
- ANSI C63.4

Test procedures are summarized below

Document Reference	Scope of Document
EDCS #: 420238	Internal Radio Test Procedures
ERAT Job Number: 5965	Test Plan