Radio Intentional EMC Test Report: EDCS - 1393340

For

CP-8861

5725MHz -5850MHz WLAN Radio 802.11 a/n/ac

FCC ID: LDK88611057

IC ID : 2461B-88611057

Against the following Specifications :

47 CFR 15.247

RSS-210

RSS-102

Cisco Systems

EMC Laboratory

170 West Tasman Drive

San Jose, CA 95134

ACCREDITED

Testing - Certificate Number : 1178-01

Author: Jose Aguirre
Approved By: Dilip Patel
Title: Manager

This report replaces any previously entered test report under **EDCS-1393340**

This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

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Section 1: Overview

Test Summary

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

Emissions:
CFR47 Part 15.247
RSS-210
RSS102
RSS GEN

Notes:

1) Measurements were made in accordance with KDB Publication No. 558074 & ANSI C63.10

Section 2: Assessment Information

2.1 General

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal Government.

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 tolerances and measurement uncertainties.

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*%

e) All AC testing was performed at one or more of the following supply voltages:
110V (+/-10%) 60Hz

f) Cisco Systems, Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). The scope of accreditation, certificate number 1178-01 is referenced in appendix E, along with further details.

2.2 Start Date of Testing

Jan 16, 2014

2.3 Report Issue Date

Cisco Systems, Inc. uses an electronic system to issue, store and control the revision of test reports. This system is called the Engineering Document Control System (EDCS). The actual report issue date is embedded into the original file on EDCS. Any copies of this report, either electronic or paper, that are not on EDCS must be considered uncontrolled

2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

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

Registration Numbers for Industry Canada

Cisco System Site	Site Identifier
Building P, 10m Chamber	Company #: 2461N-2
Building P, 5m Chamber	Company #: 2461N-1
Building I, 5m Chamber	Company #: 2461M-1

Test Engineers

Jose Aguirre

2.5 Equipment Assessed (EUT)

The CP-8861 802.11AC IP Phone

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

2.7 Scope of Assessment

Tests have been performed in accordance with the relevant Test and Assessment Plan (TAP), a copy of which is contained in Appendix D of this report, and the relevant Cisco Systems, Inc. radio test procedures (EDCS-420238). This test report may not cover all of the tests highlighted in the test plan.

2.8 Units of Measurement

The units of measurements defined in the appendices are reported in specific terms, which are test dependent. Where radiated measurements are concerned these are defined at a particular distance. Basic voltage measurements are defined in units of [dBuV]

As an example, the basic calculation for all measurements is as follows:

Emission level [dBuV] = Indicated voltage level [dBuV] + Cable Loss [dB] + Other correction factors [dB]

The combinations of correction factors are dependent upon the exact test configurations [see test equipment lists for further details] and may include:-

Antenna Factors, Pre Amplifier Gain, LISN Loss, Pulse Limiter Loss and Filter Insertion Loss..

Note: to convert the results from dBuV/m to uV/m use the following formula:-

Level in uV/m = Common Antilogarithm [(X dBuV/m)/20] = Y uV/m

Average detection—Average detection with a spectrum analyzer is obtained by reducing the video bandwidth until no further smoothing of the displayed signal is observed. The sweep time must be increased with reductions in video bandwidth to maintain amplitude calibration. For measurements in accordance with CISPR 16-1-1:2006 the video bandwidth shall be set to a 10 Hz value to ensure that the proper integration time is realized. For such measurements, the instrument shall be used in the linear mode of the detector. After linear detection is made, the signal may be processed logarithmically for display, in which case the value is corrected even though it is the logarithm of the linearly detected signal.

2.9 Report Template Control No.

EDCS#: 703456

Section 3: Result Summary

3.1 Results Summary Table

Conducted emissions

Basic Standard	Test Procedure	Test Details / Comments	Result
Power Spectral Density	ANSI C63.10 KDB 558074	15.247: For digitally modulated systems, the peak 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. *(RSS-210 A8.2)*	Pass
Peak Output Power	ANSI C63.10 KDB 558074	15.247: The maximum conducted output power of the intentional radiator for systems using digital modulation in the 2400-2483.5MHz band shall not exceed 1 Watt (30dBm). 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. (*RSS-210 A8.4)*	Pass
6dB Bandwidth	ANSI C63.10 KDB 558074	15.247: Systems using digital modulation techniques may operate in the 5725-5850MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz. *(RSS-210 A8.2)*	Pass
Conducted Spurious Emissions	ANSI C63.10 KDB 558074	15.247: In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.(*RSS-210 A8.5)*	Pass
Band Edge Measurements	ANSI C63.10 KDB 558074	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 558074	**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
Receiver 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
Co-Location test	ANSI C63.10	**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

* 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

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	5GHz WLAN radio	S01, S02

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Continuous Transmitting	Continuous Transmitting

Section 5: Modifications

5.1 Sample Modifications Performed During Assessment

No modifications were performed during assessment.

Appendix A: Formal Test Results

Target Maximum Channel Power

The following Table details the maximum supported total channel power for all operating modes

Operating modes	Maximum Channel Power (dBm) Frequency (MHz)		
	5745	5785	5825
IEEE 802.11A (6-54Mbps)	15	15	15
IEEE 802.11N HT-20 (M0 – M7)	13	13	13

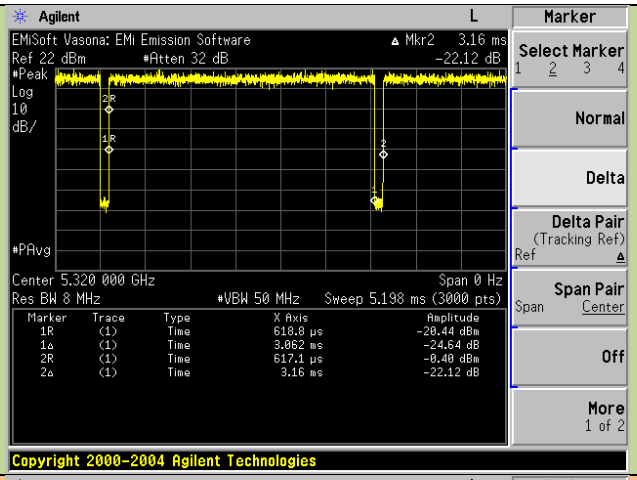
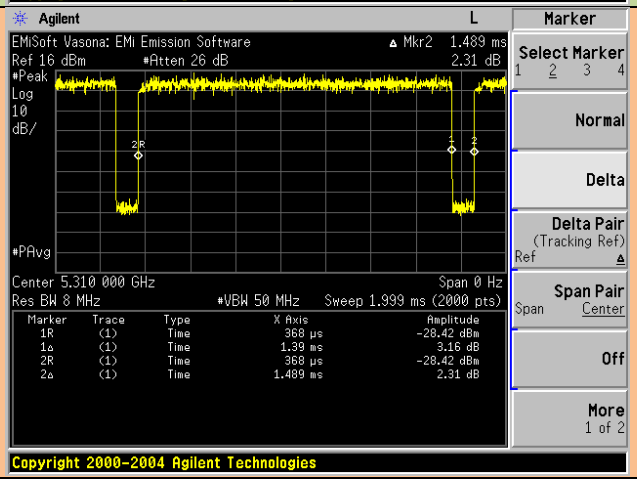
Operating modes	Maximum Channel Power (dBm) Frequency (MHz)	
	5755	5795
IEEE 802.11N HT-40 (M0 – M7)	13	13

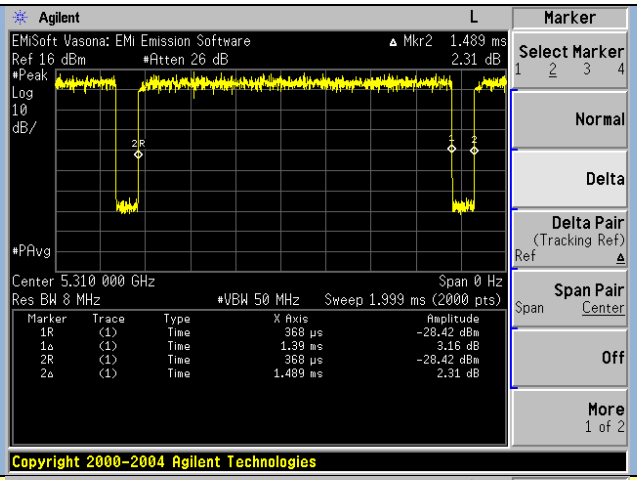
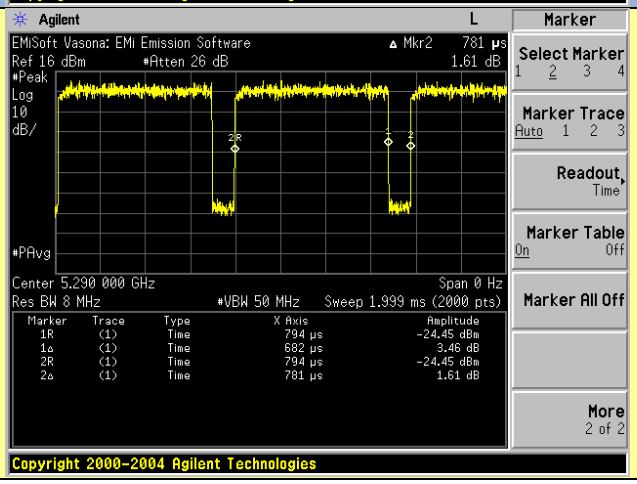
Operating modes	Maximum Channel Power (dBm) Frequency (MHz)
	5775
IEEE 802.11AC HT-80MHz (M0 – M9)	12

Worst case is determined as the modulation with Highest Output Power.
Worst cases emissions to be determined as 802.11A, 802.11N HT20, 802.11N HT40 & 802.11AC HT80

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 ≥ EBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ 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) =10Log(1/x) = **0.14 dB**	
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) =10Log(1/x) = **0.3dB**	

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) =10Log(1/x) = **0.3dB**	
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) =10Log(1/x) = **0.59dB**	

- Worst case data rate

6 dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

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). Place the radio in continuous transmit mode

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:	100 kHz
Video Bandwidth:	300 kHz
X dB Bandwidth:	6 dB
Detector:	Peak
Trace:	Max Hold

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (*i.e.*, RBW = 100 kHz, VBW ≥ 3´RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

Frequency (MHz)	Mode	Data Rate (Mbps)	6dB Bandwidth (MHz)	Limit (MHz)	Margin (kHz)
5745	802.11A	6	16.347	0.5	-15.847
5785	802.11A	6	16.348	0.5	-15.848
5825	802.11A	6	16.348	0.5	-15.848
5745	802.11N HT20	M0	17.582	0.5	-17.082
5785	802.11N HT20	M0	17.592	0.5	-17.092
5825	802.11N HT20	M0	17.589	0.5	-17.089
5755	802.11N HT40	M0	36.319	0.5	-35.819
5795	802.11N HT40	M0	36.330	0.5	-35.83
5775	802.11AC HT80	M0	75.960	0.5	-75.46

26dB Bandwidth & 99% 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).

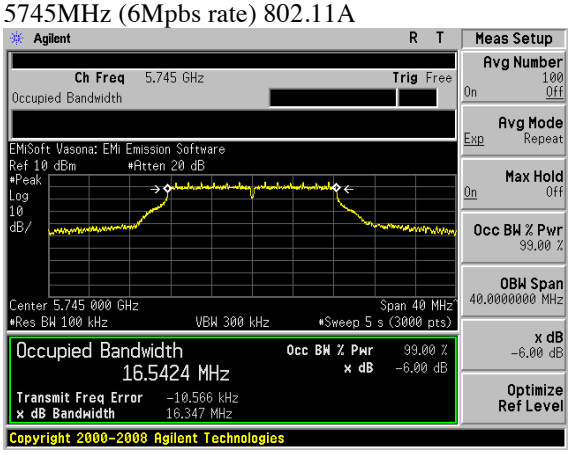
Center Frequency:	Frequency from table below
Span:	2 x Nominal Bandwidth (e.g. 40MHz for a 20MHz channel)
Reference Level:	10 dBm
Attenuation:	10 dB
Sweep Time:	5 s
Resolution Bandwidth:	1% - 3% of 26dB Bandwidth
Video Bandwidth:	≥ Resolution Bandwidth
X dB Bandwidth:	26 dB
Occ BW % :	99%
Detector:	Peak
Trace:	Single Max Hold

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

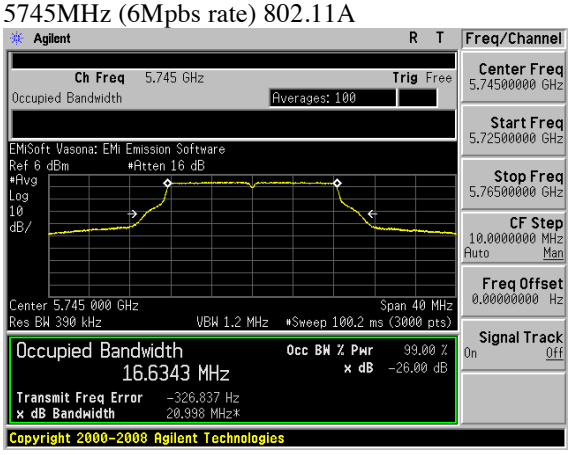
Frequency (MHz)	Mode	Data Rate (Mbps)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
5745	802.11A	6	20.998	16.634
5785	802.11A	6	21.051	16.635
5825	802.11A	6	21.008	16.636
5745	802.11N HT20	M0	21.214	17.808
5785	802.11N HT20	M0	21.186	17.808
5825	802.11N HT20	M0	21.197	17.816
5755	802.11N HT40	M0	39.101	36.275
5795	802.11N HT40	M0	39.120	36.281
5775	802.11AC HT80	M0	79.940	75.746

Graphical Results

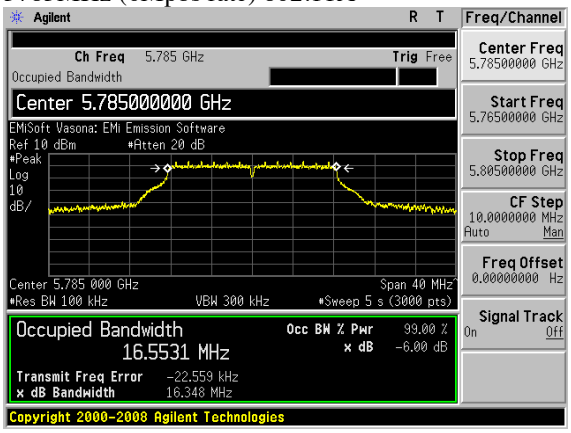
6dB Bandwidth
5745MHz (6Mpbs rate) 802.11A



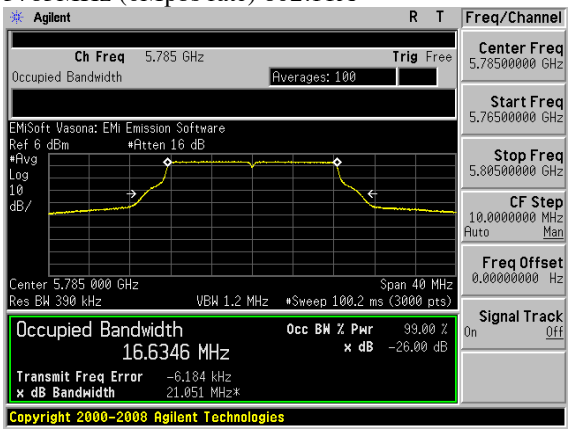
26dB & 99% Bandwidth
5745MHz (6Mpbs rate) 802.11A



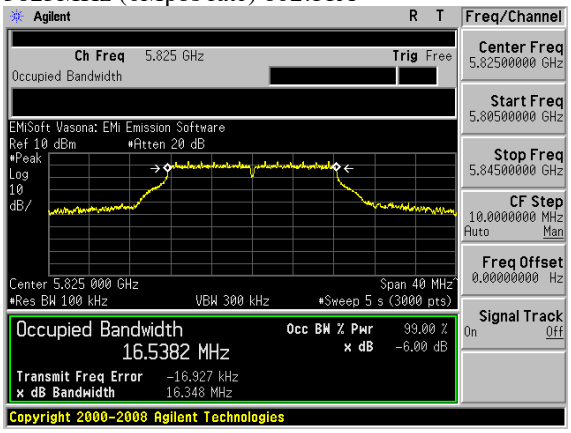
6dB Bandwidth
5785MHz (6Mpbs rate) 802.11A



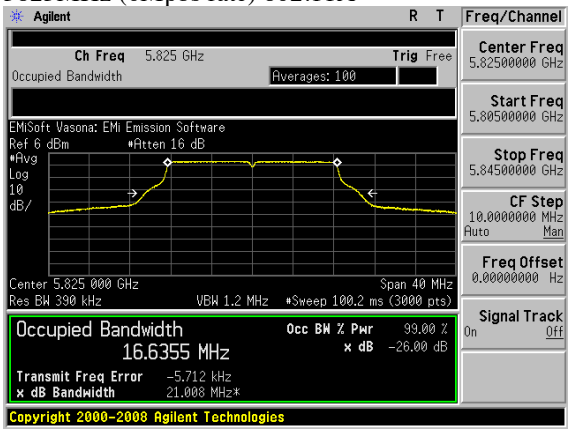
26dB & 99% Bandwidth
5785MHz (6Mpbs rate) 802.11A



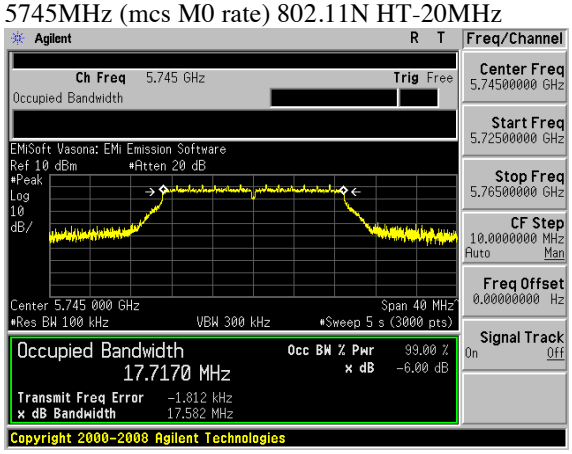
6dB Bandwidth
5825MHz (6Mpbs rate) 802.11A



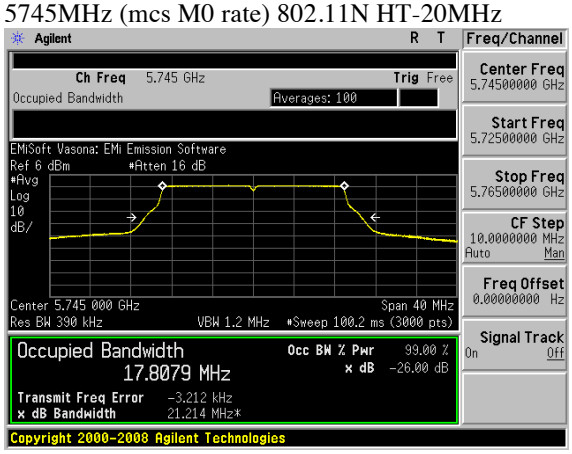
26dB & 99% Bandwidth
5825MHz (6Mpbs rate) 802.11A



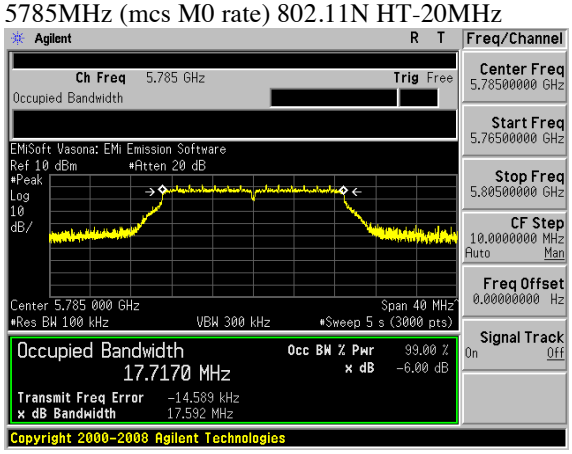
6dB Bandwidth
5745MHz (mcs M0 rate) 802.11N HT-20MHz



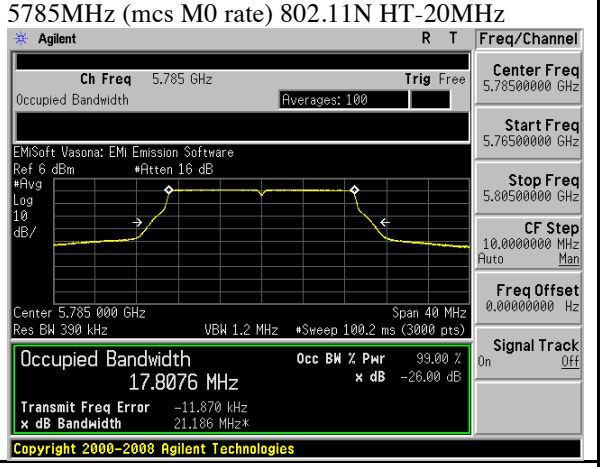
26dB & 99% Bandwidth
5745MHz (mcs M0 rate) 802.11N HT-20MHz



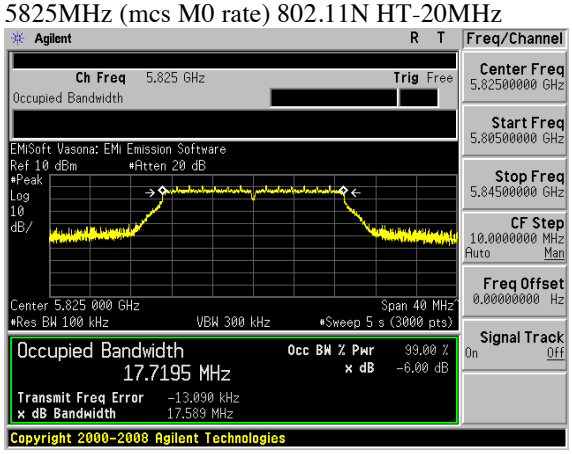
6dB Bandwidth
5785MHz (mcs M0 rate) 802.11N HT-20MHz



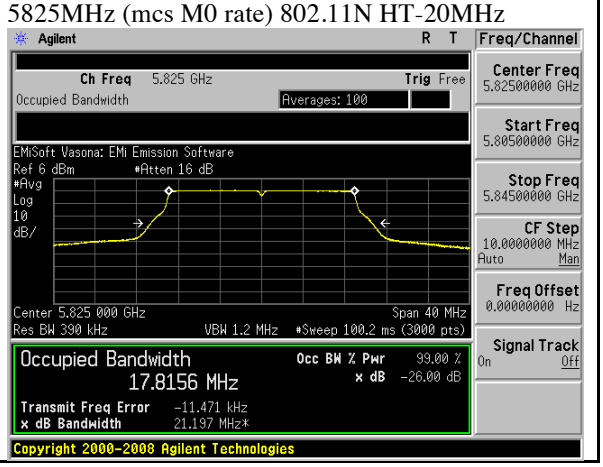
26dB & 99% Bandwidth
5785MHz (mcs M0 rate) 802.11N HT-20MHz



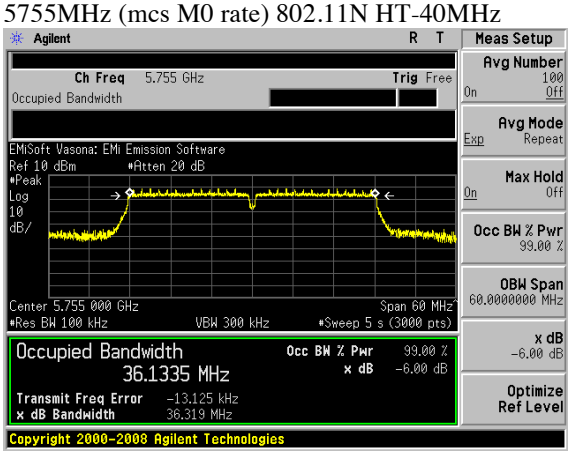
6dB Bandwidth
5825MHz (mcs M0 rate) 802.11N HT-20MHz



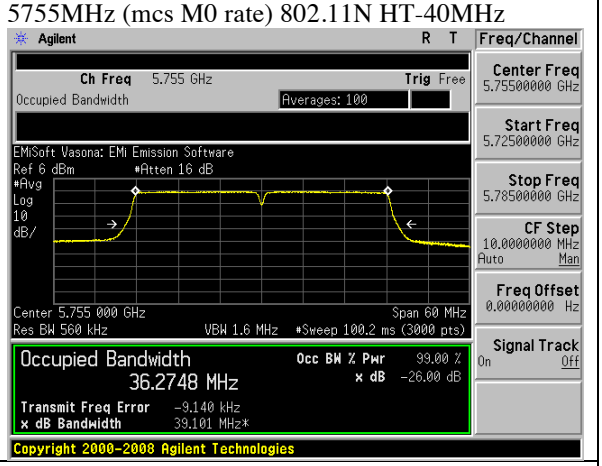
26dB & 99% Bandwidth
5825MHz (mcs M0 rate) 802.11N HT-20MHz



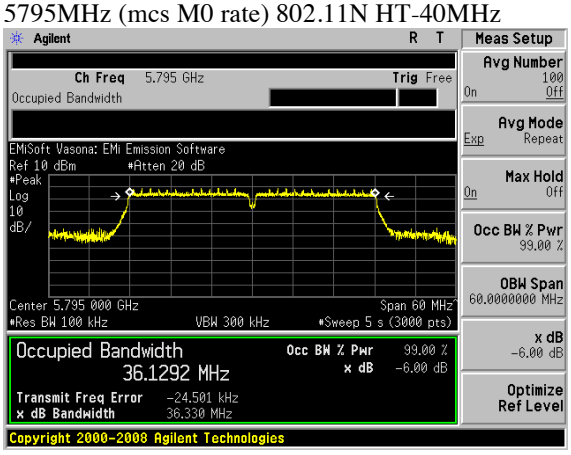
6dB Bandwidth
5755MHz (mcs M0 rate) 802.11N HT-40MHz



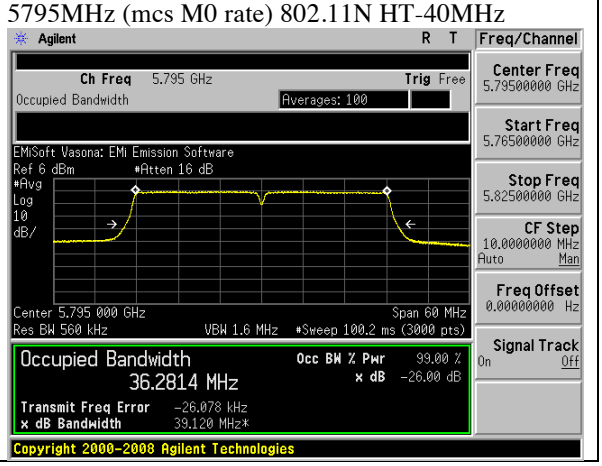
26dB & 99% Bandwidth
5755MHz (mcs M0 rate) 802.11N HT-40MHz

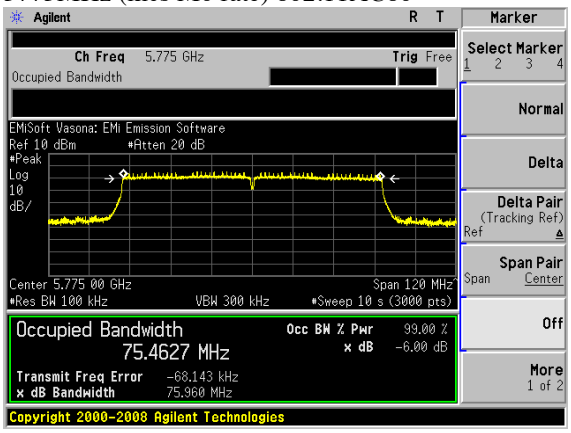
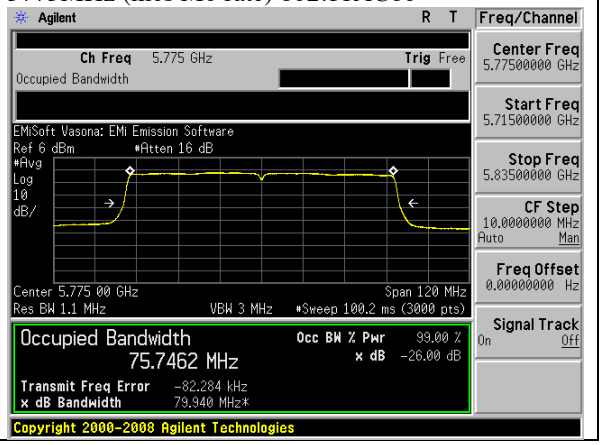


6dB Bandwidth
5795MHz (mcs M0 rate) 802.11N HT-40MHz



26dB & 99% Bandwidth
5795MHz (mcs M0 rate) 802.11N HT-40MHz



6dB Bandwidth 5775MHz (mcs M0 rate) 802.11AC80	26dB & 99% Bandwidth 5775MHz (mcs M0 rate) 802.11AC80
	

Maximum Conducted (average) Output Power

15.247 & RSS-210 A8.4:

The maximum conducted output power of the intentional radiator for systems using digital modulation in the 5725-5850MHz band shall not exceed 1 Watt (30dBm). 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 maximum supported antenna gain is 3.8dBi.

Procedures KDB 558074 sec 9.2.2.4 Method AVGSA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction)

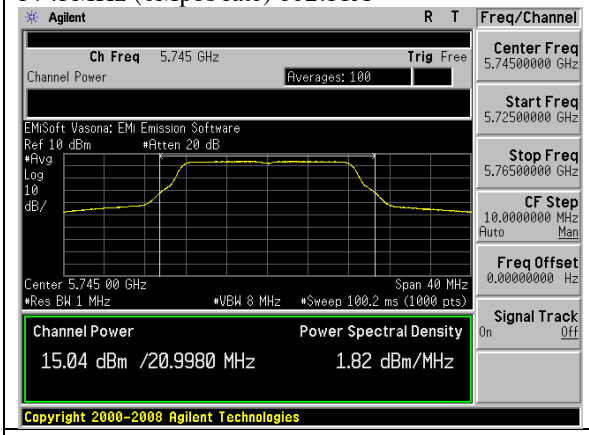
Connect the antenna port(s) to the spectrum analyzer input. Place the radio in continuous transmit mode. Configure the spectrum analyzer as shown below.

Enable "Channel Power" function of analyzer
Center Frequency: Channel under test
Span: At least 1.5 x OBW
Reference Level: 10 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

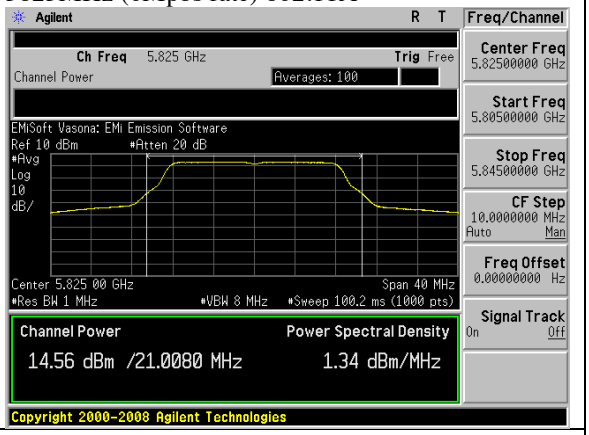
. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times

Frequency (MHz)	Mode	Data Rate (Mbps)	Output Power (dBm)	DCCF (dB)	Corr. output Power (dBm)	Limit (dBm)	Margin (dB)
5745	802.11A	6	15.04	0.14	15.18	30	-14.82
5785	802.11A	6	14.8	0.14	14.94	30	-15.06
5825	802.11A	6	14.56	0.14	14.7	30	-15.3
5745	802.11N HT20	M0	12.79	0.3	13.09	30	-16.91
5785	802.11N HT20	M0	12.61	0.3	12.91	30	-17.09
5825	802.11N HT20	M0	12.3	0.3	12.6	30	-17.4
5755	802.11N HT40	M0	12.56	0.3	12.86	30	-17.14
5795	802.11N HT40	M0	12.49	0.3	12.79	30	-17.21
5775	802.11AC HT80	M0	12.19	0.59	12.78	30	-17.22

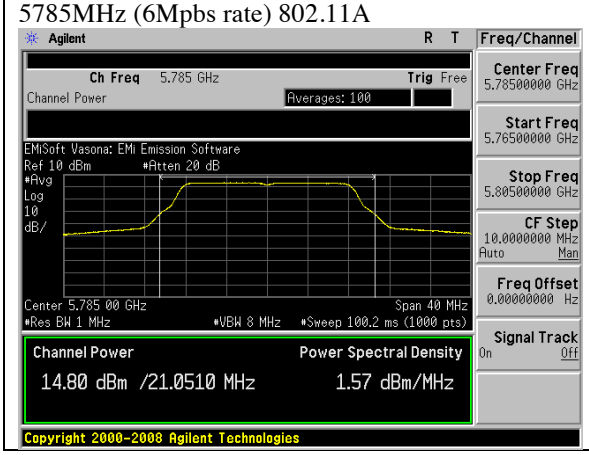
Output Power
5745MHz (6Mpbs rate) 802.11A



Output Power
5825MHz (6Mpbs rate) 802.11A

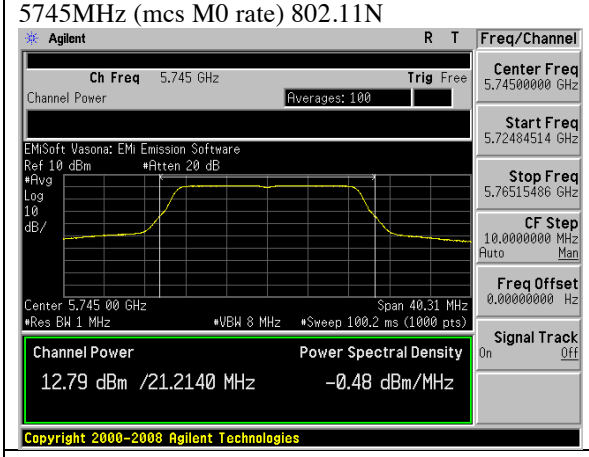


Output Power
5785MHz (6Mpbs rate) 802.11A

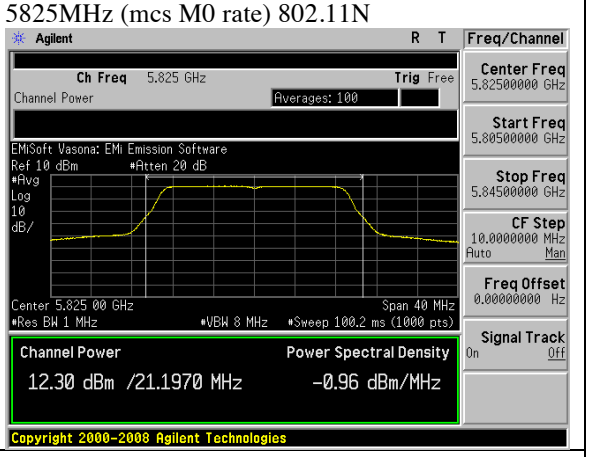


Note: Worst case data rate 6Mbps

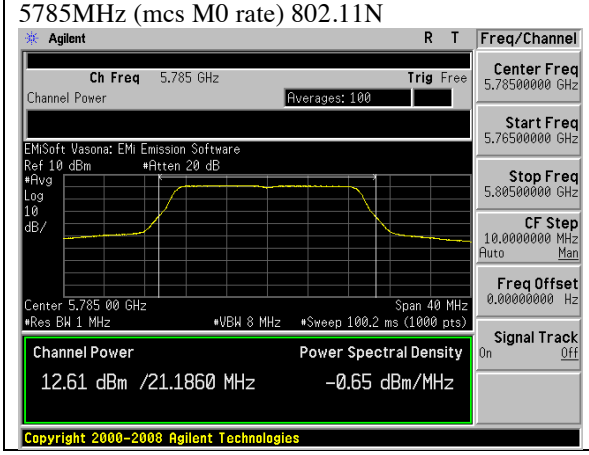
Output power
5745MHz (mcs M0 rate) 802.11N



Output power
5825MHz (mcs M0 rate) 802.11N

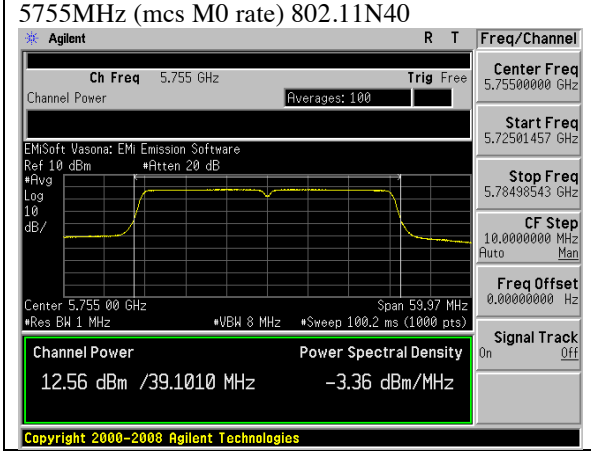


Output power
5785MHz (mcs M0 rate) 802.11N

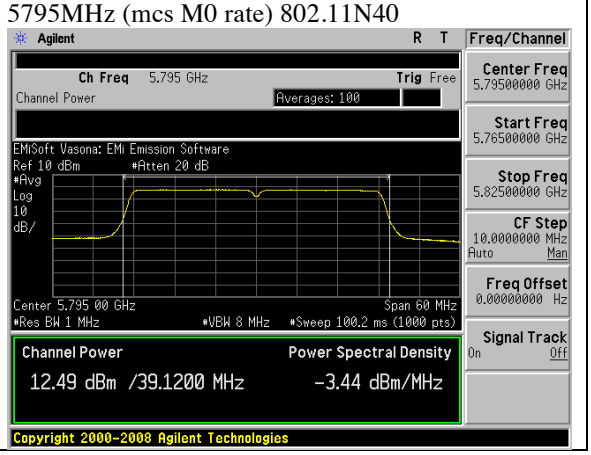


Note: Worst case data rate mcs M0

Output power
5755MHz (mcs M0 rate) 802.11N40

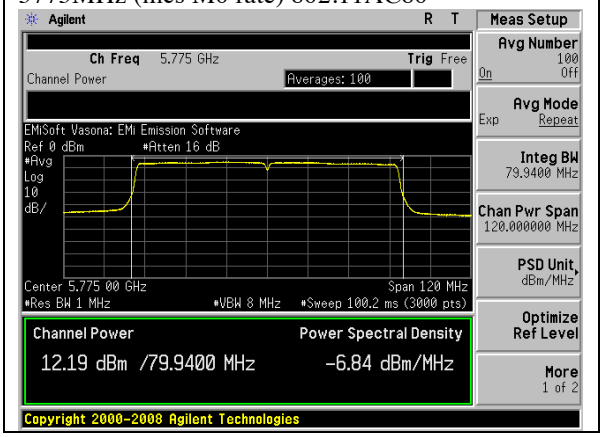


Output power
5795MHz (mcs M0 rate) 802.11N40



Note : Worst case data rate mcs M0

Output power
5775MHz (mcs M0 rate) 802.11AC80



Note : Worst case data rate mcs M0

Power Spectral Density

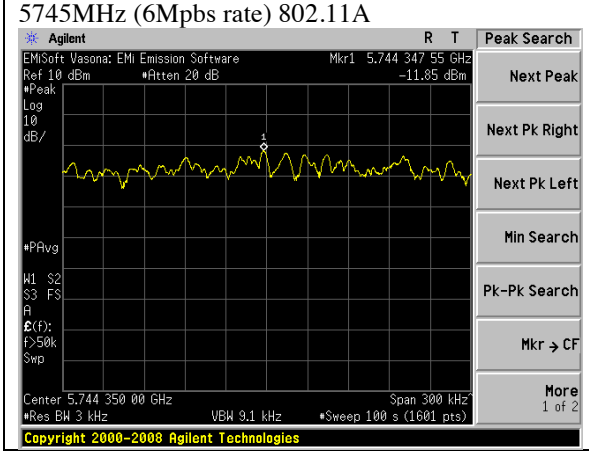
15.247 & RSS-210 A8.2:

For digitally modulated systems, the peak 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

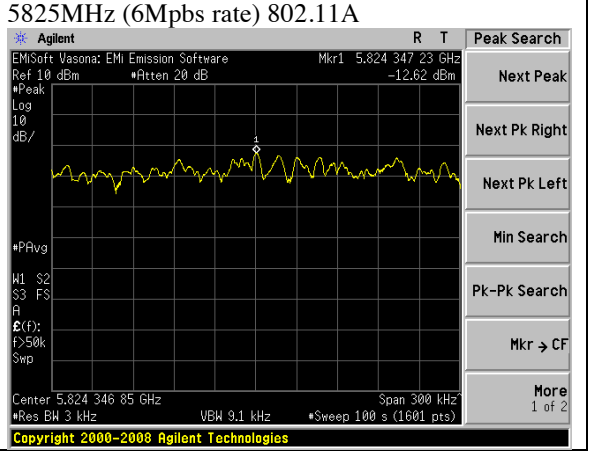
Frequency (MHz)	Mode	Data Rate (Mbps)	PSD Measured (dBm)	DCCF (dB)	Corr. PSD (dBm)	PSD Limit (dBm)	Margin (dB)
5745	802.11A	6	-11.85	0.14	-11.71	8	-19.71
5785	802.11A	6	-11.87	0.14	-11.73	8	-19.73
5825	802.11A	6	-12.62	0.14	-12.48	8	-20.48
5745	802.11N HT20	M0	-12.94	0.3	-12.64	8	-20.64
5785	802.11N HT20	M0	-11.84	0.3	-11.54	8	-19.54
5825	802.11N HT20	M0	-13	0.3	-12.7	8	-20.7
5755	802.11N HT40	M0	-13.85	0.3	-13.55	8	-21.55
5795	802.11N HT40	M0	-15.19	0.3	-14.89	8	-22.89
5775	802.11AC HT80	M0	-18.58	0.59	-17.99	8	-25.99

Graphical Test Results

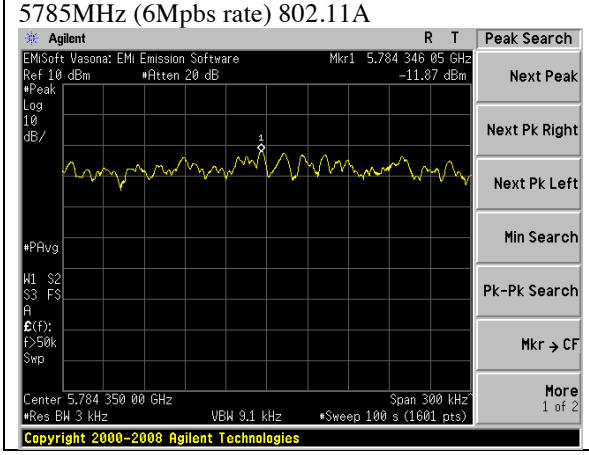
Power Spectral Density
5745MHz (6Mpbs rate) 802.11A



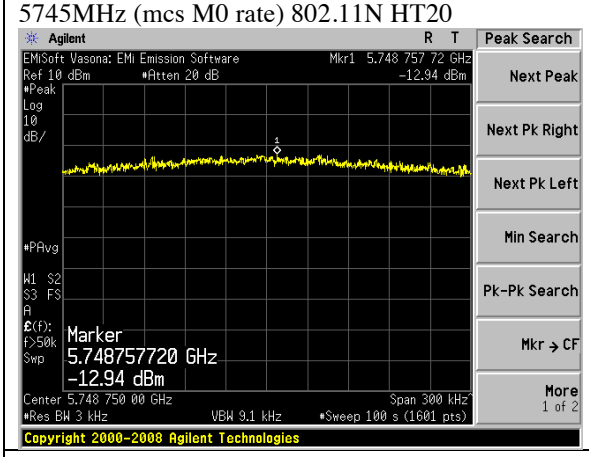
Power Spectral Density
5825MHz (6Mpbs rate) 802.11A



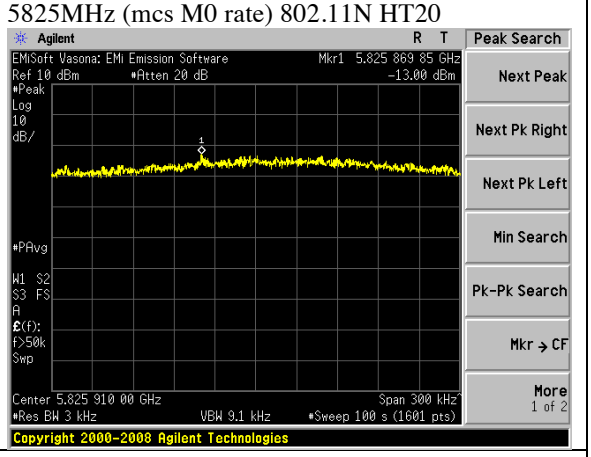
Power Spectral Density
5785MHz (6Mpbs rate) 802.11A



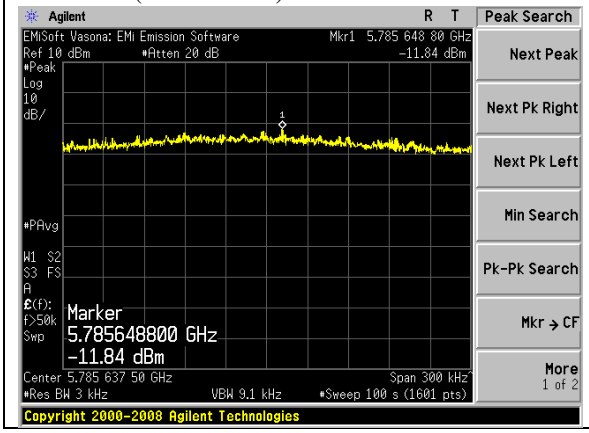
Power Spectral Density
5745MHz (mcs M0 rate) 802.11N HT20



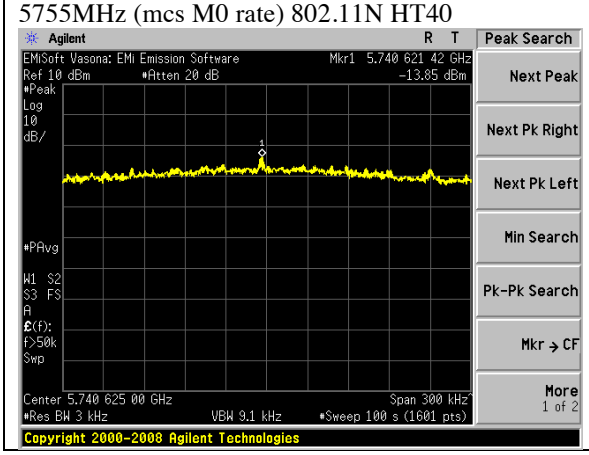
Power Spectral Density
5825MHz (mcs M0 rate) 802.11N HT20



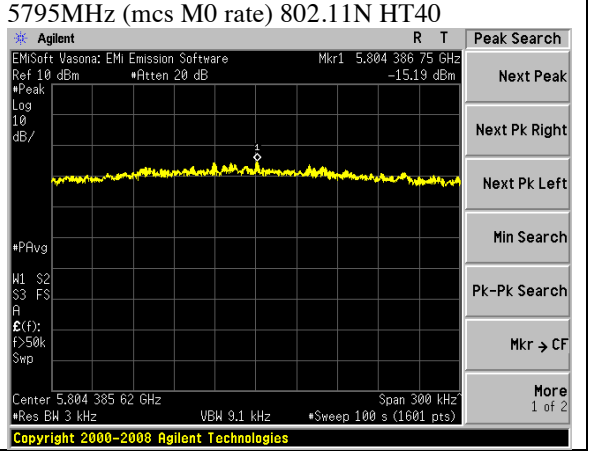
Power Spectral Density
5785MHz (mcs M0 rate) 802.11N HT20



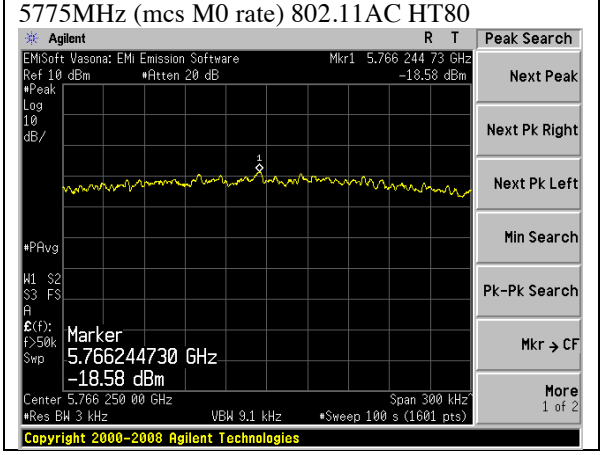
Power Spectral Density
5755MHz (mcs M0 rate) 802.11N HT40



Power Spectral Density
5795MHz (mcs M0 rate) 802.11N HT40



Power Spectral Density
5775MHz (mcs M0 rate) 802.11AC HT80



Band Edge

15.247 & RSS-210 A8.5:

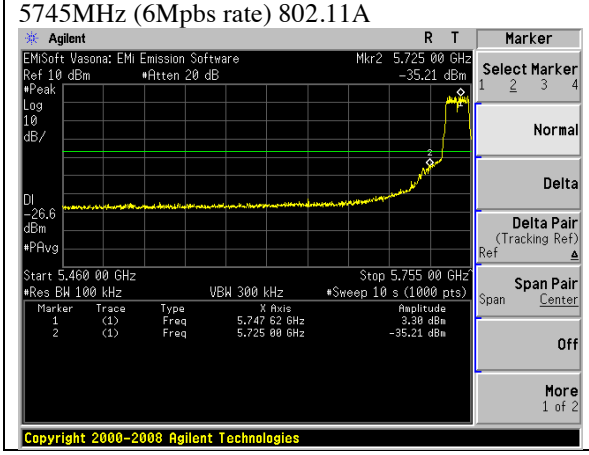
In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dBc below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The maximum supported antenna gain is 3.8dBi.

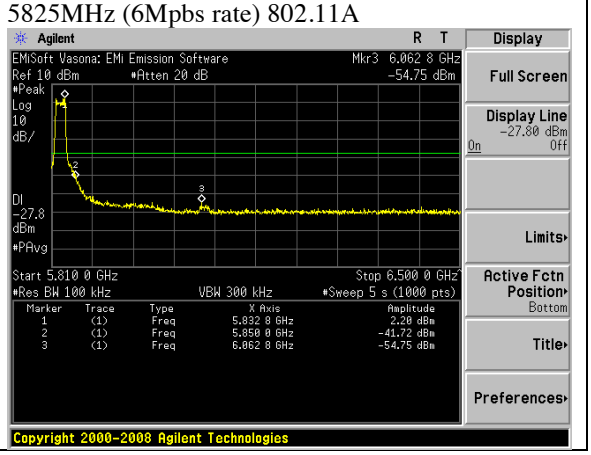
All measurements are greater than -30dBc below the limit. By visual inspection, transmitter complies

Test Results

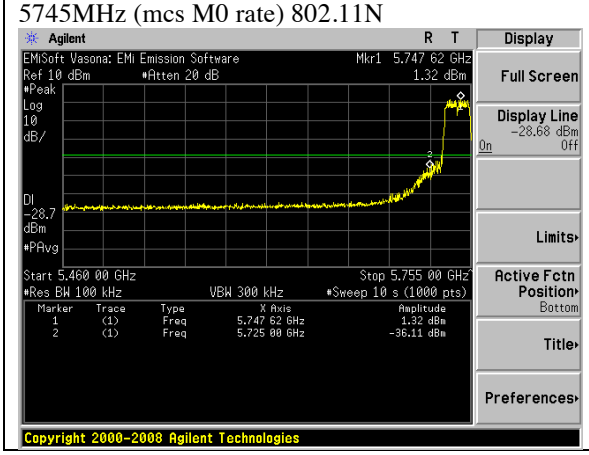
CSE at authorized Bandedge (30dBc in any 100kHz) 5745MHz (6Mpbs rate) 802.11A



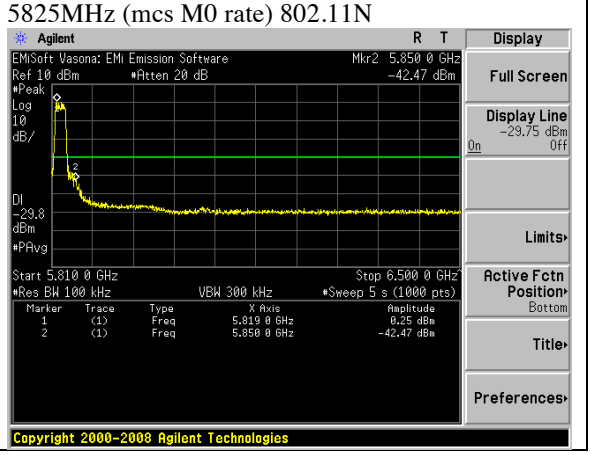
CSE at authorized bandedge (30dBc in any 100kHz) 5825MHz (6Mpbs rate) 802.11A



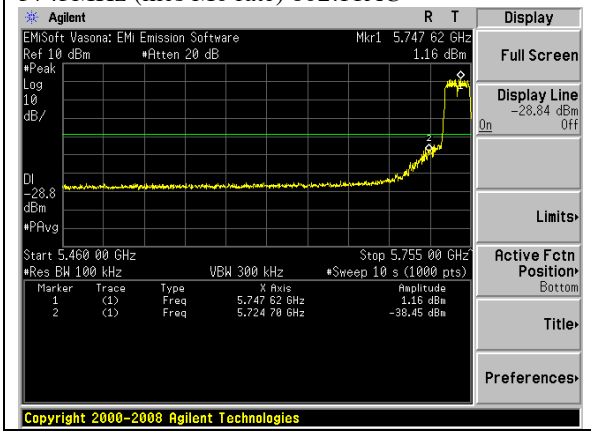
CSE at authorized bandedge (30dBc in any 100kHz) 5745MHz (mcs M0 rate) 802.11N



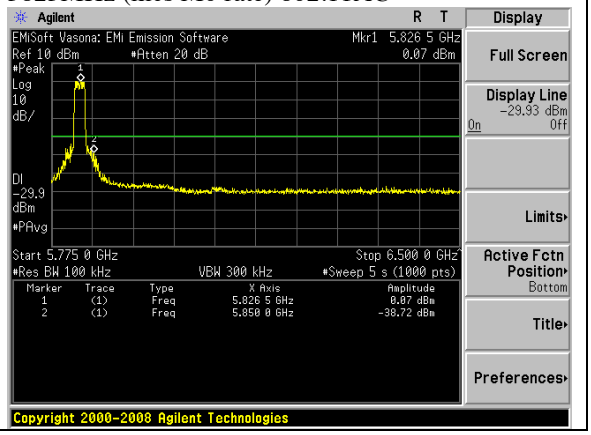
CSE at authorized bandedge (30dBc in any 100kHz) 5825MHz (mcs M0 rate) 802.11N



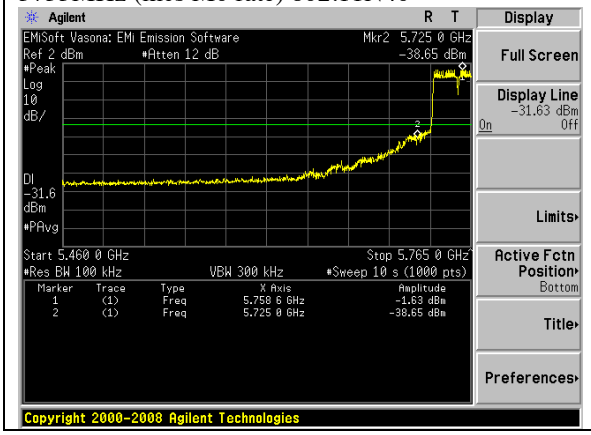
CSE at authorized bandedge (30dBc in any 100kHz) 5745MHz (mcs M0 rate) 802.11AC



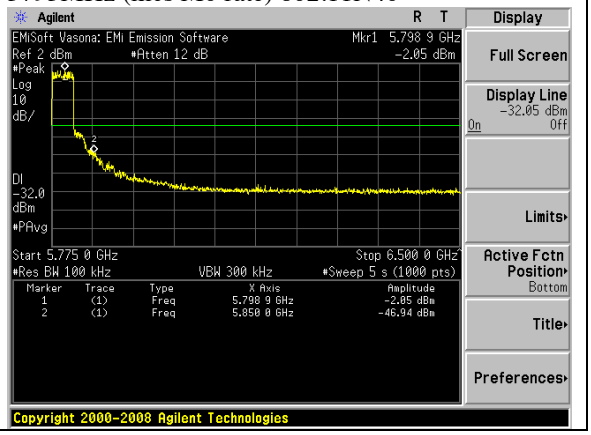
CSE at authorized bandedge (30dBc in any 100kHz) 5825MHz (mcs M0 rate) 802.11AC



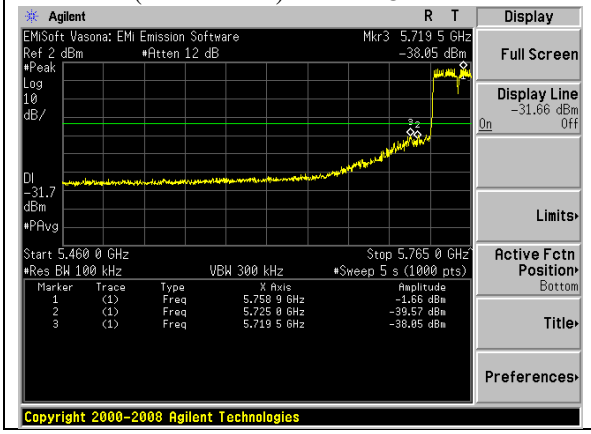
CSE at authorized bandedge (30dBc in any 100kHz) 5755MHz (mcs M0 rate) 802.11N40



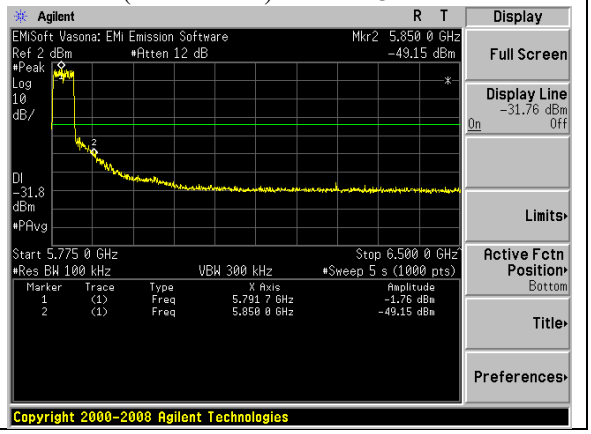
CSE at authorized bandedge (30dBc in any 100kHz) 5795MHz (mcs M0 rate) 802.11N40



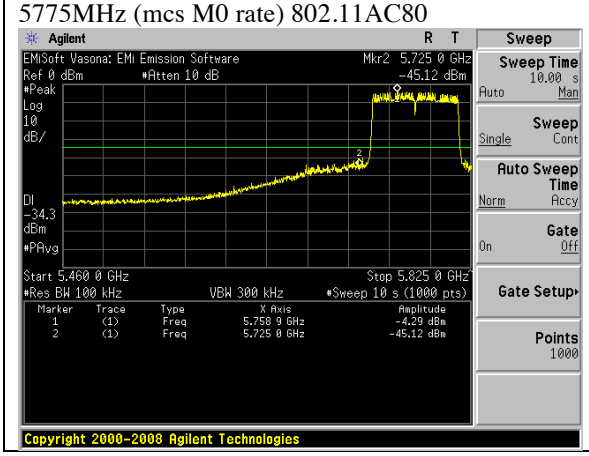
CSE at authorized bandedge (30dBc in any 100kHz) 5755MHz (mcs M0 rate) 802.11AC40

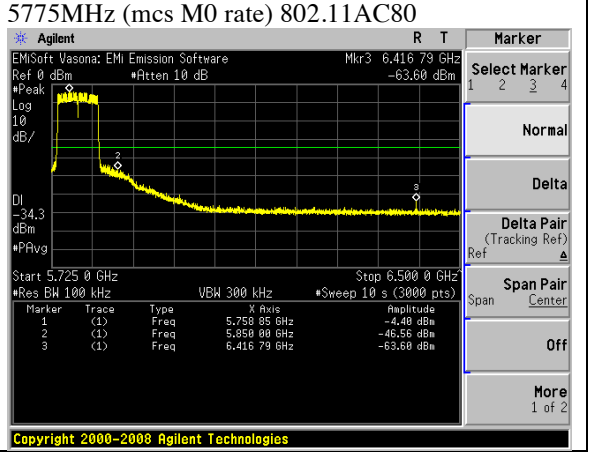


CSE at authorized bandedge (30dBc in any 100kHz) 5795MHz (mcs M0 rate) 802.11AC40



CSE at authorized bandedge (30dBc in any 100kHz) 5775MHz (mcs M0 rate) 802.11AC80	CSE at authorized bandedge (30dBc in any 100kHz) 5775MHz (mcs M0 rate) 802.11AC80





Conducted Spuious Emissions

15.247 & RSS-210 A8.5:

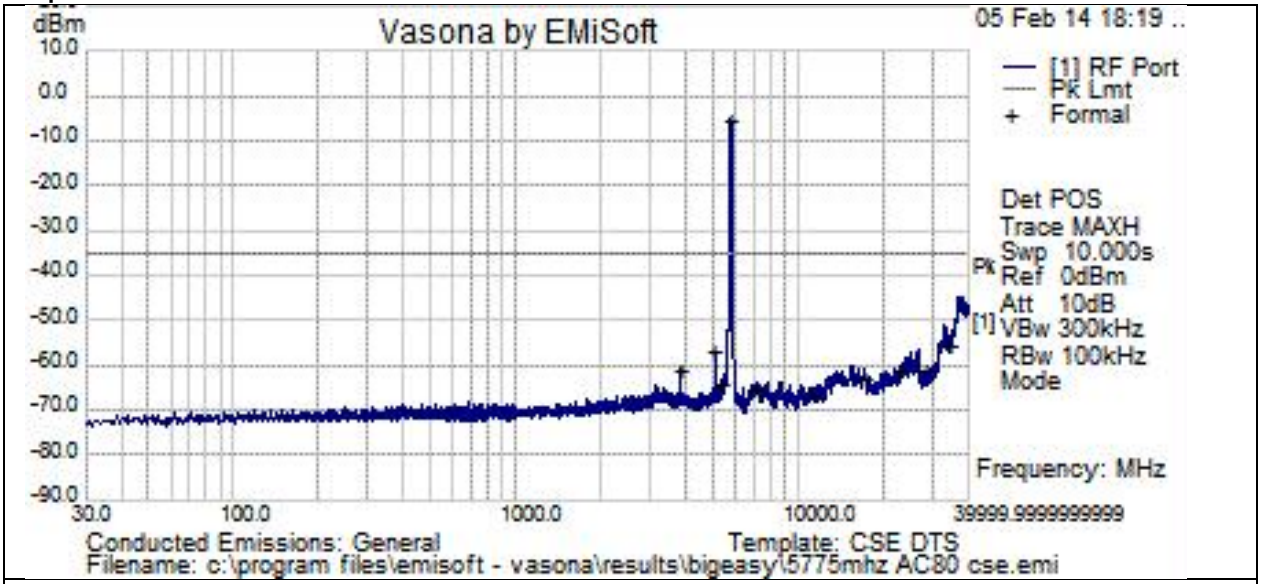
In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dBc below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The maximum supported antenna gain is 3.8dBi.

All measurements are greater than -30dBc below the limit. transmitter complies

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	5775MHz 802.11AC (80MHz BW) mcs M0 rate

Graphical Test Results



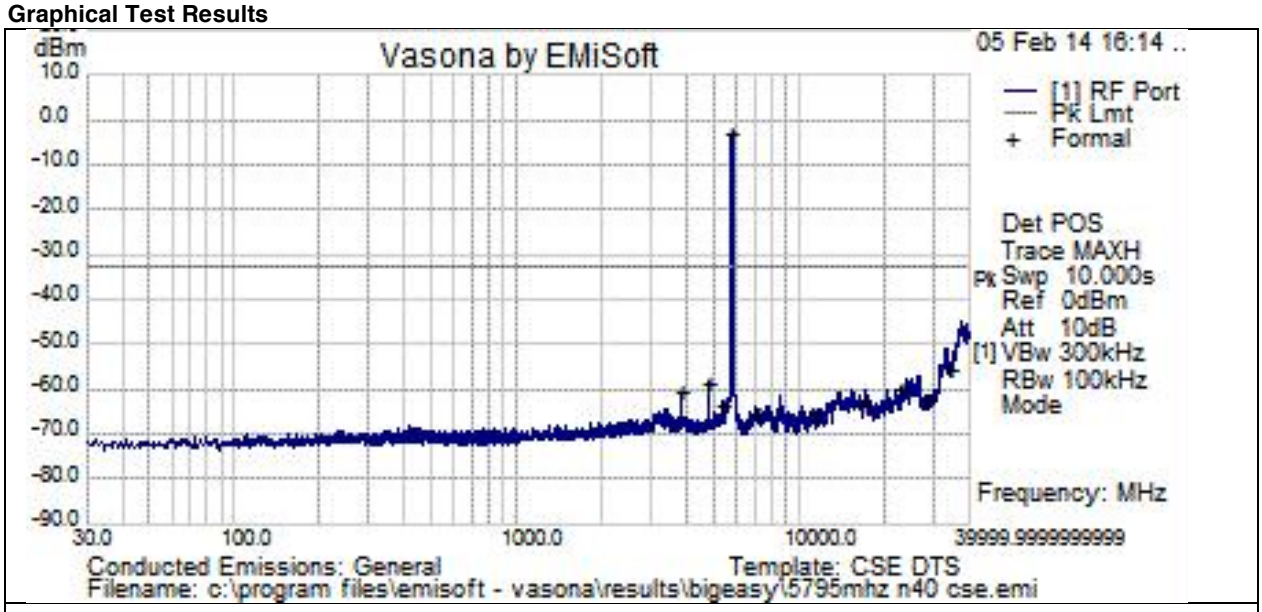
5775MHz 802.11AC (80MHz BW) mcs M0 rate

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
3849.124	-75.4	14	0	-61.4	Peak	RF	-35.4	-26.1	Pass	
5133.035	-71.5	14.4	0	-57.1	Peak	RF	-35.4	-21.8	Pass	
5460	-78.9	14.5	0	-64.4	Peak	RF	-35.4	-29	Pass	
5758.731	-20.1	14.7	0	-5.4	Peak	RF	-35.4	30	N/A	Tx 5775 AC80
7250	-78.4	12.7	0	-65.7	Peak	RF	-35.4	-30.4	Pass	
11550	-79.9	13	0	-66.9	Peak	RF	-35.4	-31.6	Pass	
17325	-75.9	13.2	0	-62.7	Peak	RF	-35.4	-27.4	Pass	
23100	-74.9	13.6	0	-61.3	Peak	RF	-35.4	-25.9	Pass	
28875	-75.5	14	0	-61.4	Peak	RF	-35.4	-26.1	Pass	
34650	-69.7	14.2	0	-55.5	Peak	RF	-35.4	-20.2	Pass	

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	5795MHz 802.11N (40MHz BW) mcs M0 rate

Graphical Test Results



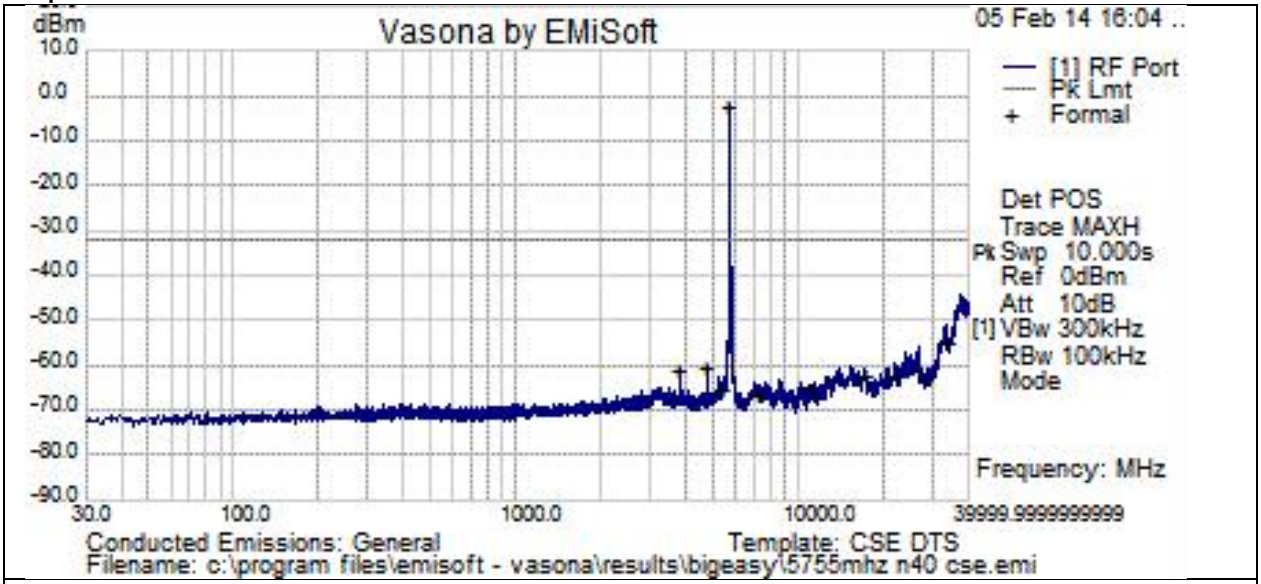
5795MHz 802.11N (40MHz BW) mcs M0 rate

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
3863.617	-74.7	14	0	-60.8	Peak	RF	-32.9	-27.8	Pass	
4828.759	-73	14.3	0	-58.7	Peak	RF	-32.9	-25.7	Pass	
5460	-78.4	14.5	0	-63.9	Peak	RF	-32.9	-30.9	Pass	
5798.788	-17.6	14.7	0	-2.9	Peak	RF	-32.9	30	N/A	Tx 5795MHz
7250	-78.4	12.7	0	-65.7	Peak	RF	-32.9	-32.8	Pass	
11590	-78.3	13	0	-65.3	Peak	RF	-32.9	-32.4	Pass	
17385	-77.1	13.2	0	-63.9	Peak	RF	-32.9	-31	Pass	
23180	-73.6	13.6	0	-59.9	Peak	RF	-32.9	-27	Pass	
28975	-76.7	14.1	0	-62.6	Peak	RF	-32.9	-29.7	Pass	
34770	-69.8	14.2	0	-55.7	Peak	RF	-32.9	-22.7	Pass	

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	5755MHz 802.11N (40MHz BW) mcs M0 rate

Graphical Test Results



5755MHz 802.11N (40MHz BW) mcs M0 rate

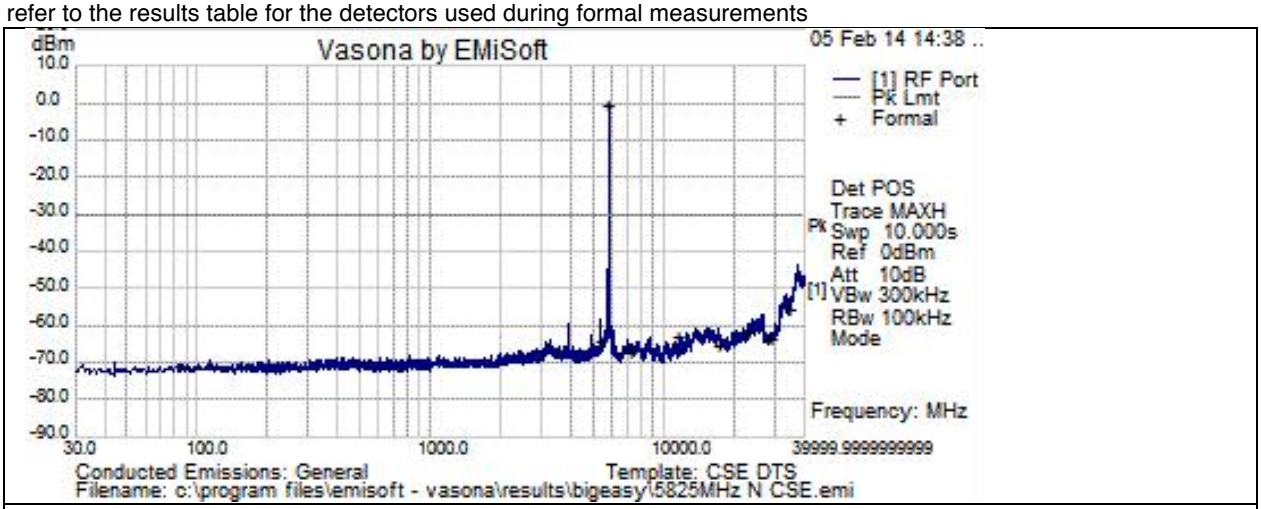
Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5752.462	-16.9	14.7	0	-2.2	Peak	RF	-32.2	30	N/A	Tx 5755MHz
4796.718	-74.6	14.3	0	-60.4	Peak	RF	-32.2	-28.2	Pass	
3837.414	-75.1	14	0	-61.2	Peak	RF	-32.2	-29	Pass	
11510	-78.5	13	0	-65.5	Peak	RF	-32.2	-33.3	Pass	
17265	-75.4	13.2	0	-62.2	Peak	RF	-32.2	-30	Pass	
23020	-76.3	13.7	0	-62.6	Peak	RF	-32.2	-30.4	Pass	
28775	-77	14	0	-63	Peak	RF	-32.2	-30.8	Pass	
34530	-69.4	14.2	0	-55.2	Peak	RF	-32.2	-23	Pass	
5460	-79.8	14.5	0	-65.3	Peak	RF	-32.2	-33.1	Pass	
7250	-79.1	12.7	0	-66.4	Peak	RF	-32.2	-34.2	Pass	

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	Ch 5825 802.11N mcs M0 rate

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



Ch 5825 802.11N mcs M0 rate

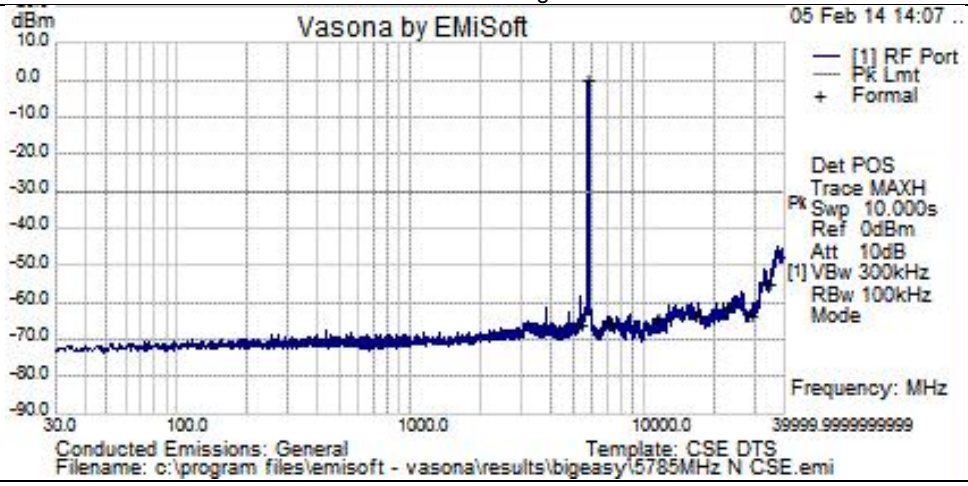
Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5827.475	-15	14.7	0	-0.3	Peak	RF	-30.3	30	N/A	Tx
11650	-76	13	0	-63.1	Peak	RF	-30.3	-32.7	Pass	
17475	-78.3	13.2	0	-65.2	Peak	RF	-30.3	-34.8	Pass	
23300	-75.3	13.7	0	-61.6	Peak	RF	-30.3	-31.3	Pass	
29125	-77.6	14	0	-63.5	Peak	RF	-30.3	-33.2	Pass	
34950	-69.7	14.2	0	-55.5	Peak	RF	-30.3	-25.2	Pass	
5460	-79	14.5	0	-64.4	Peak	RF	-30.3	-34.1	Pass	
7250	-79.8	12.7	0	-67.1	Peak	RF	-30.3	-36.8	Pass	

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	Ch 5785 802.11N mcs M0 rate

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



Ch 5785 802.11N mcs M0 rate

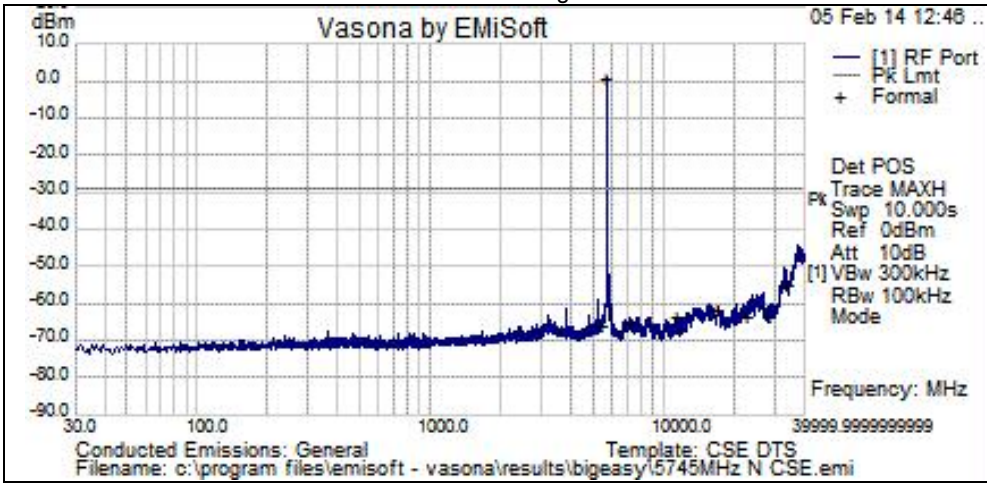
Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5778.706	-14.7	14.7	0	0	Peak	RF	-30	30	N/A	Tx
11570	-77.5	13	0	-64.5	Peak	RF	-30	-34.5	Pass	
17355	-76.6	13.2	0	-63.4	Peak	RF	-30	-33.4	Pass	
23140	-74.6	13.7	0	-60.9	Peak	RF	-30	-30.9	Pass	
28925	-77.5	14	0	-63.4	Peak	RF	-30	-33.4	Pass	
34710	-69.4	14.2	0	-55.2	Peak	RF	-30	-25.3	Pass	
5460	-80.3	14.5	0	-65.8	Peak	RF	-30	-35.8	Pass	
7250	-78.4	12.7	0	-65.8	Peak	RF	-30	-35.8	Pass	

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	Ch 5745 802.11N mcs M0 rate

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



Ch 5745 802.11N mcs M0 rate

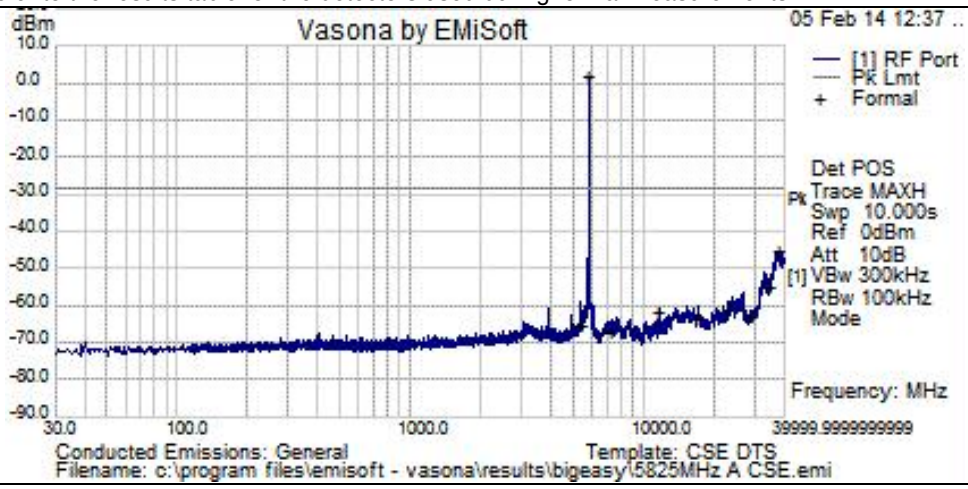
Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5738.756	-13.9	14.8	0	0.8	Peak	RF	-29.2	30	N/A	Tx
11490	-76.7	13	0	-63.7	Peak	RF	-29.2	-34.5	Pass	
17235	-74.8	13.2	0	-61.7	Peak	RF	-29.2	-32.5	Pass	
22980	-77.3	13.6	0	-63.7	Peak	RF	-29.2	-34.5	Pass	
28725	-77.7	14	0	-63.7	Peak	RF	-29.2	-34.5	Pass	
34470	-69.1	14.2	0	-54.9	Peak	RF	-29.2	-25.8	Pass	
5460	-80.6	14.5	0	-66.1	Peak	RF	-29.2	-36.9	Pass	
7250	-77.9	12.7	0	-65.2	Peak	RF	-29.2	-36	Pass	

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	Ch 5825 802.11A 6Mbps rate

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



Ch 5825 802.11A 6Mbps rate

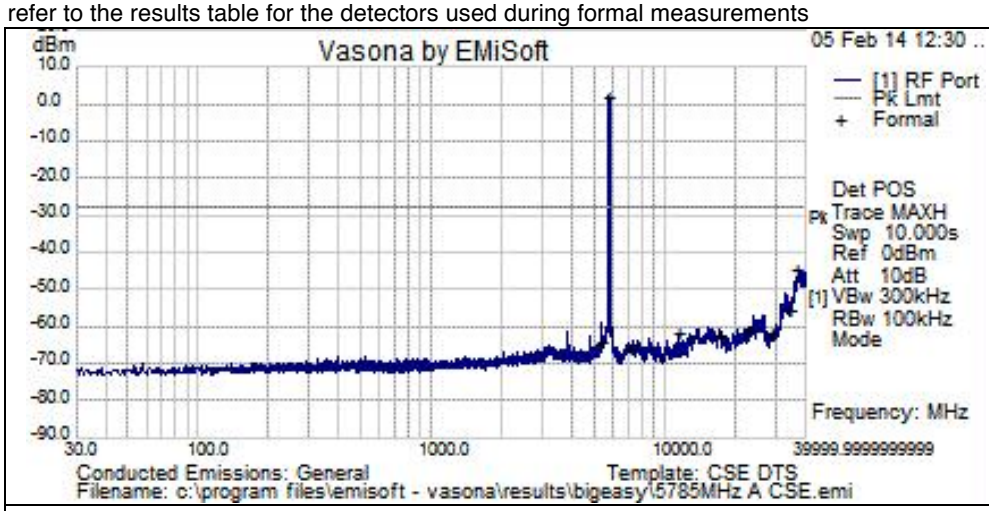
Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5460	-80	14.5	0	-65.5	Peak	RF	-28.2	-37.3	Pass	
5818.762	-12.8	14.7	0	1.8	Peak	RF	-28.2	30	N/A	Tx
7250	-79.9	12.7	0	-67.2	Peak	RF	-28.2	-39	Pass	
11650	-74.9	13	0	-61.9	Peak	RF	-28.2	-33.8	Pass	
17475	-76.8	13.2	0	-63.6	Peak	RF	-28.2	-35.4	Pass	
23300	-75	13.7	0	-61.4	Peak	RF	-28.2	-33.2	Pass	
29125	-77.1	14	0	-63.1	Peak	RF	-28.2	-34.9	Pass	
34950	-69.5	14.2	0	-55.3	Peak	RF	-28.2	-27.2	Pass	
38024.375	-59.5	14.3	0	-45.2	Peak	RF	-28.2	-17.1	Pass	noise floor

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	Ch 5785 802.11A 6Mbps rate

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



Ch 5785 802.11A 6Mbps rate

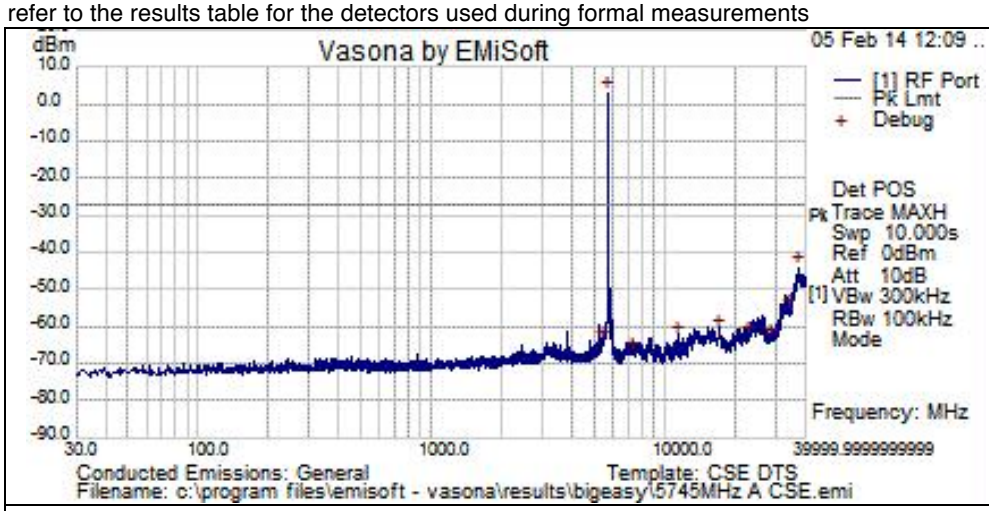
Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5778.706	-12.7	14.7	0	2	Peak	RF	-28	30	N/A	Tx
37598.594	-59.1	14.2	0	-44.9	Peak(Scan)	RF	-28	-16.9	N/A	noise floor
11570	-74.6	13	0	-61.6	Peak	RF	-28	-33.6	Pass	
17355	-75.4	13.2	0	-62.2	Peak	RF	-28	-34.2	Pass	
23140	-74.7	13.7	0	-61	Peak	RF	-28	-33.1	Pass	
28925	-75.7	14	0	-61.7	Peak	RF	-28	-33.7	Pass	
34710	-69.6	14.2	0	-55.4	Peak	RF	-28	-27.4	Pass	
5460	-78.4	14.5	0	-63.9	Peak	RF	-28	-36	Pass	
7250	-78.8	12.7	0	-66.1	Peak	RF	-28	-38.1	Pass	

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	Ch 5745 802.11A 6Mbps rate

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



Ch 5745 802.11A 6Mbps rate

Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
5460	-78.8	14.5	0	-64.2	Peak	RF	-26.9	-37.3	Pass	
5738.756	-11.7	14.8	0	3.1	Peak	RF	-26.9	30	N/A	
7250	-80.2	12.7	0	-67.5	Peak	RF	-26.9	-40.6	Pass	
11490	-75.7	13	0	-62.7	Peak	RF	-26.9	-35.8	Pass	
17235	-74.4	13.2	0	-61.3	Peak	RF	-26.9	-34.4	Pass	
22980	-76.6	13.6	0	-63	Peak	RF	-26.9	-36.1	Pass	
28725	-77.7	14	0	-63.6	Peak	RF	-26.9	-36.7	Pass	
34470	-69.8	14.2	0	-55.6	Peak	RF	-26.9	-28.6	Pass	
37445.313	-58.3	14.2	0	-44.1	Peak	RF	-26.9	-17.1	Pass	

Radiated Spurious and Harmonics Emissions

15.205 & RSS-210 sec2.7:

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).

Note 1: All 3-axis (X,Y, Z) were evaluated during preliminary testing and the worst case orientation was for all formal testing shown below.

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, 10Hz 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/m @3m
2) Peak plot (Vertical and Horizontal), Limit = 74dBuV/m @3m

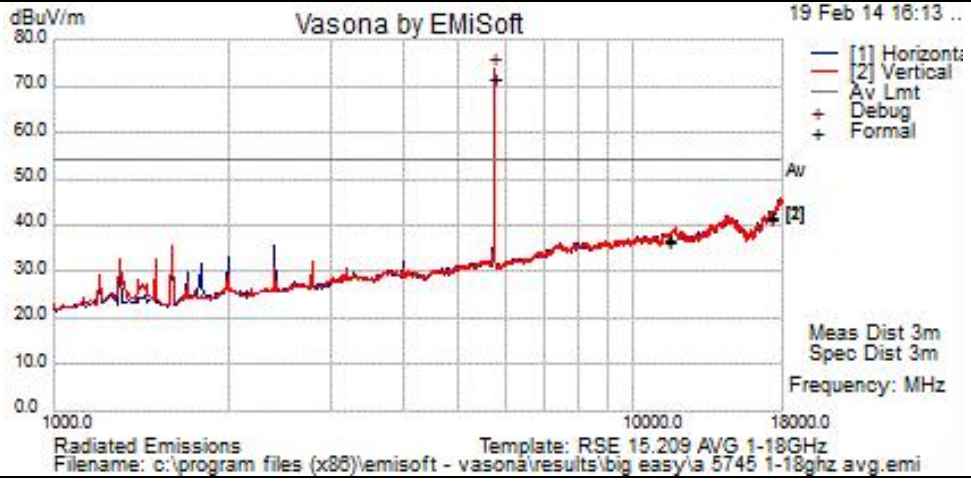
This report represents the worst case data for all supported operating modes and antennas. System was evaluated up to 40GHz but there were no measurable emissions above 15 GHz.

Transmitter Spurious 1GHz to 18GHz, Ch 149 , 802.11 A (6Mbps) Average Measurement

Subtest Number: 157434 - 2	**Subtest Date:** 19-Feb-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	802.11A 5745MHz 1-18GHz Average
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	802.11A 5745MHz 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



Title: 802.11A 5745MHz 1-18GHz Average

Test Results Table

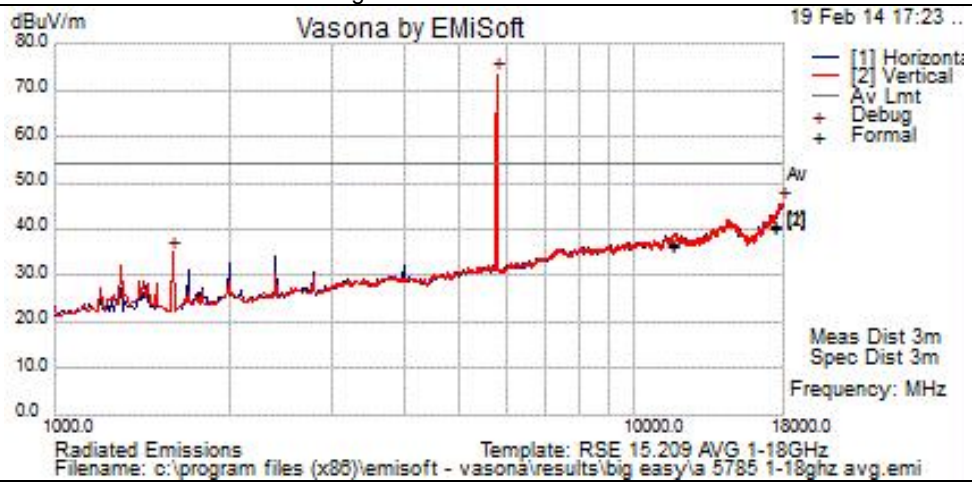
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11490	27.9	4.4	4.4	36.7	Av	V	121	223	54	-17.3	Pass	
17235	29	5.6	7.3	41.8	Av	V	121	223	54	-12.2	Pass	
11490	27.5	4.4	4.4	36.3	Av	H	114	124	54	-17.7	Pass	
17235	28.5	5.6	7.3	41.4	Av	H	114	124	54	-12.6	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 157 , 802.11 A (6Mbps) Average Measurement

Subtest Number: 157434 - 3	**Subtest Date:** 19-Feb-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	802.11A 5785MHz 1-18GHz Average
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	802.11A 5785MHz 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



Title: 802.11A 5785MHz 1-18GHz Average

Test Results Table

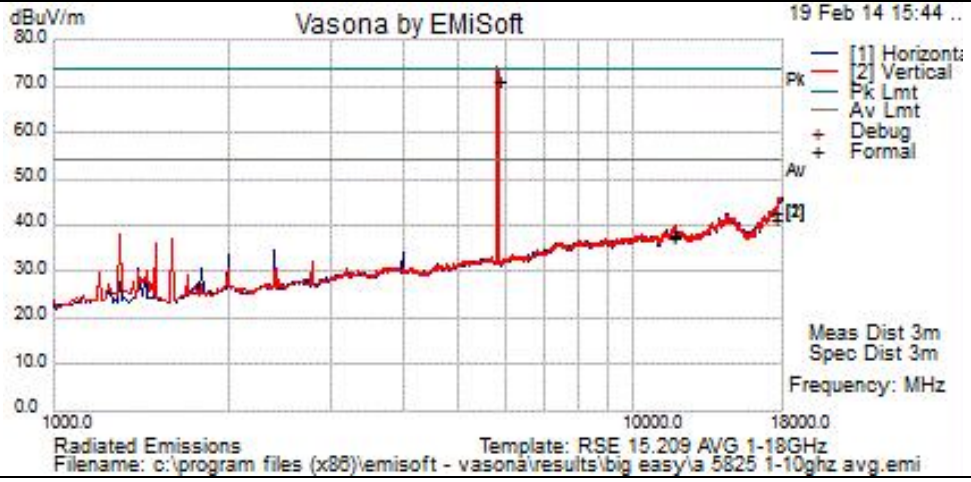
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11570	27.2	4.5	4.8	36.4	Av	V	130	227	54	-17.6	Pass	
17355	28.1	5.5	6.6	40.2	Av	V	130	227	54	-13.8	Pass	
11570	27.5	4.5	4.8	36.7	Av	H	116	124	54	-17.3	Pass	
17355	28.4	5.5	6.6	40.5	Av	H	116	124	54	-13.5	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 165, 802.11 A (6Mbps) Average Measurement

Subtest Number: 157434 - 1	**Subtest Date:** 19-Feb-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	802.11A 5825MHz 1-18GHz Average
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	802.11A 5825MHz 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



Title: 802.11A 5825MHz 1-18GHz Average

Test Results Table

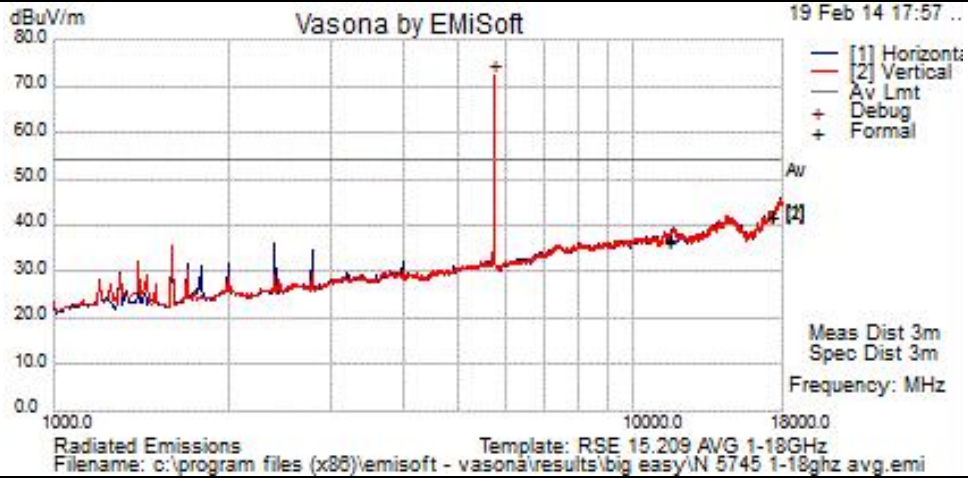
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11650	27.8	4.3	5.7	37.8	Peak(Scan)	V	101	207	54	-16.2	Pass	
17475	29.5	5.7	7.3	42.5	Peak(Scan)	V	101	207	54	-11.5	Pass	
11650	27.1	4.3	5.7	37.1	Peak(Scan)	H	125	129	54	-16.9	Pass	
17475	28.4	5.7	7.3	41.4	Peak(Scan)	H	125	129	54	-12.6	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 149 , 802.11 N HT20 (mcs M0) Average Measurement

Subtest Number: 157434 - 4	**Subtest Date:** 19-Feb-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	802.11N 5745MHz 1-18GHz Average
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	802.11N HT20 5745MHz 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



Title: 802.11N 5745MHz 1-18GHz Average

Test Results Table

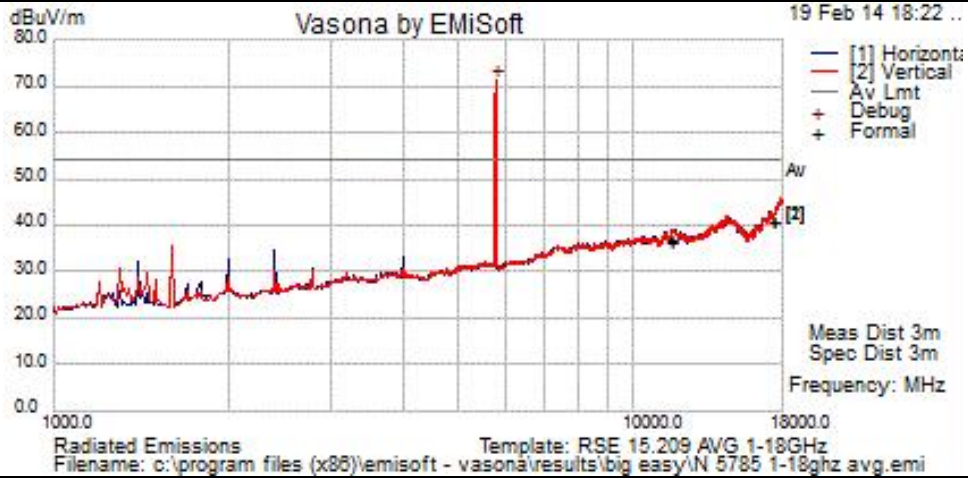
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11490	27.4	4.4	4.4	36.2	Av	V	146	222	54	-17.8	Pass	
17235	28.6	5.6	7.3	41.4	Av	V	146	222	54	-12.6	Pass	
11490	27.9	4.4	4.4	36.7	Av	H	104	192	54	-17.3	Pass	
17235	28.6	5.6	7.3	41.5	Av	H	104	192	54	-12.5	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 157, 802.11 N HT20 (mcs M0) Average Measurement

Subtest Number: 157434 - 5	**Subtest Date:** 19-Feb-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	802.11N 5785MHz 1-18GHz Average
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	802.11N 5785MHz 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



Title: 802.11N 5785MHz 1-18GHz Average

Test Results Table

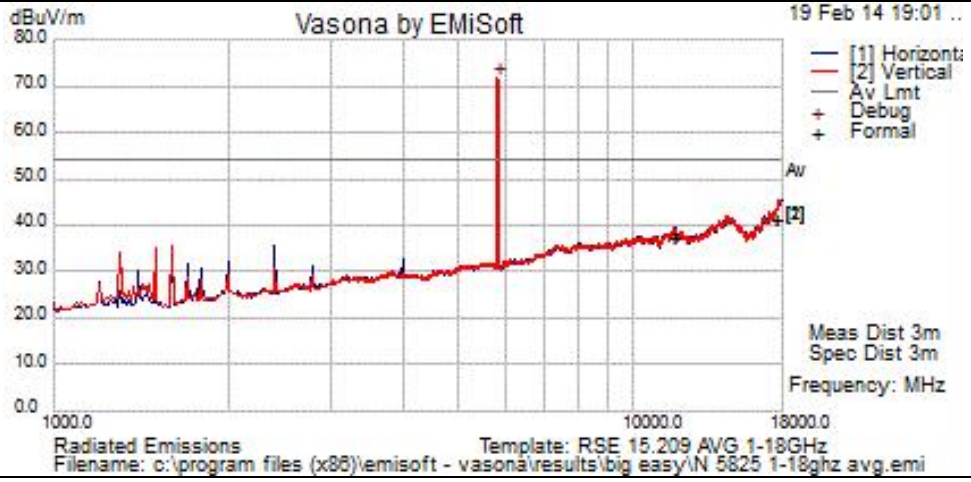
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11570	27.2	4.5	4.8	36.4	Av	H	107	120	54	-17.6	Pass	
17355	28.4	5.5	6.6	40.5	Av	H	107	120	54	-13.5	Pass	
11570	27.3	4.5	4.8	36.6	Av	V	107	191	54	-17.4	Pass	
17355	28.4	5.5	6.6	40.5	Av	V	107	191	54	-13.5	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 165, 802.11 N HT20 (mcs M0) Average Measurement

Subtest Number: 157434 - 6	**Subtest Date:** 19-Feb-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	802.11N 5825MHz 1-18GHz Average
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	802.11N 5825MHz 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



Title: N802.11N 5825MHz 1-18GHz Average

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
11650	27.4	4.3	5.7	37.5	Av	H	114	125	54	-16.5	Pass	
17475	28.4	5.7	7.3	41.4	Av	H	114	125	54	-12.6	Pass	
11650	27.2	4.3	5.7	37.2	Av	V	125	183	54	-16.8	Pass	
17475	28.2	5.7	7.3	41.2	Av	V	125	183	54	-12.8	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 149U/40 (5755MHz), 802.11N HT40 (mcs M0) Average Measurement

Subtest Number: 157434 - 8	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5755 802.11 N HT40MHz BW 1-18GHz Average
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5755 802.11 N HT40MHz BW 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

Title: 5755 802.11 N HT40MHz BW 1-18GHz Average

Test Results Table

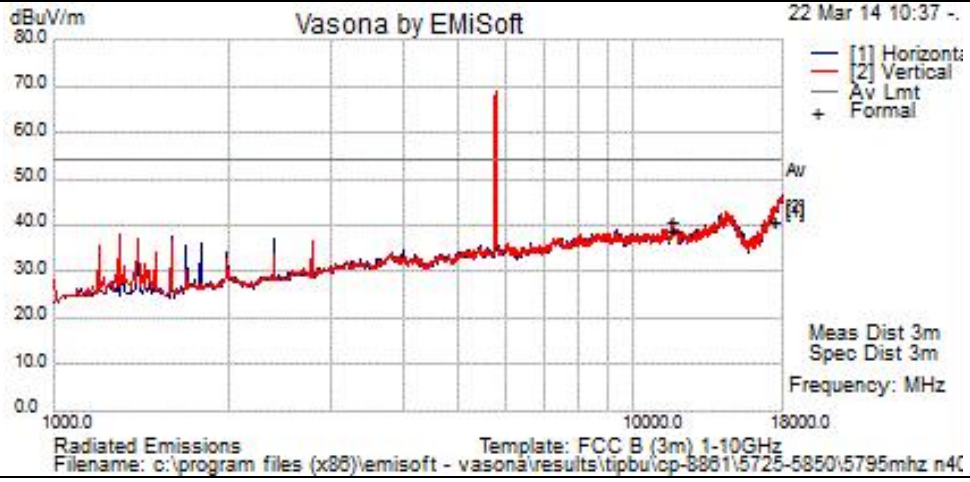
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11510.039	21.8	12.7	4.4	38.9	Av	V	107	218	54	-15.1	Pass	
17265.34	20	15.8	6.9	42.6	Av	V	107	218	54	-11.4	Pass	
11510.039	20.3	12.7	4.4	37.4	Av	H	132	220	54	-16.6	Pass	
17265.34	19.5	15.8	6.9	42.1	Av	H	132	220	54	-11.9	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 157U/40 (5795MHz), 802.11N HT40 (mcs M0) Average Measurement

Subtest Number: 157434 - 7	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5795 802.11 N HT40MHz BW 1-18GHz Average
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5795MHz 802.11 N HT40MHz BW 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



Title: 5795 802.11 N 40MHz BW 1-18GHz Average

Test Results Table

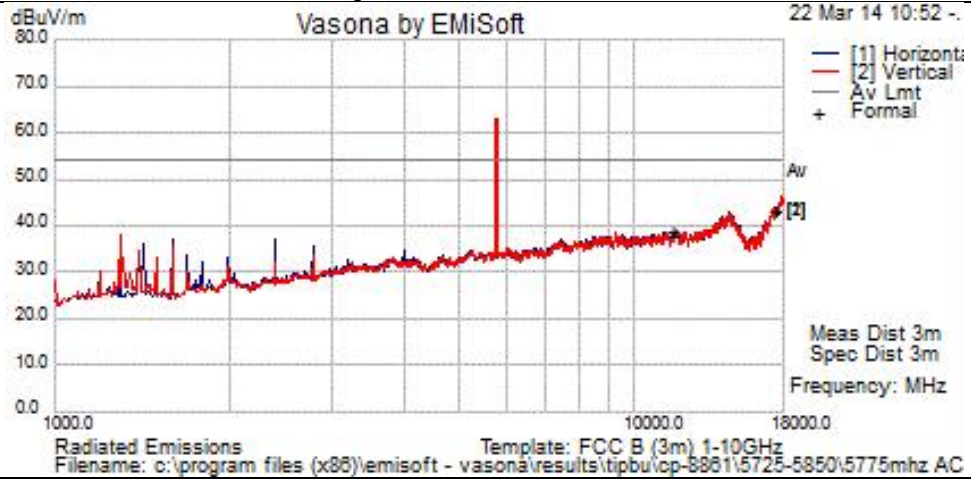
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17385	18.5	15.8	6.5	40.8	Av	V	102	167	54	-13.2	Pass	
11590.64	23	12.8	4.8	40.6	Av	V	102	167	54	-13.4	Pass	
17385	18.5	15.8	6.5	40.8	Av	H	132	220	54	-13.2	Pass	
11590.64	21	12.8	4.8	38.6	Av	H	132	220	54	-15.4	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 157U/80 (5775MHz), 802.11AC HT80 (mcs M0) Average Measurement

Subtest Number: 157434 - 9	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5775MHz 802.11 AC HT80MHz BW 1-18GHz Average
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5775MHz 802.11 AC HT80MHz BW 1-18GHz AverageChannels 149,153,157,161

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



Title: 5775 802.11 AC 80MHz BW 1-18GHz Average

Test Results Table

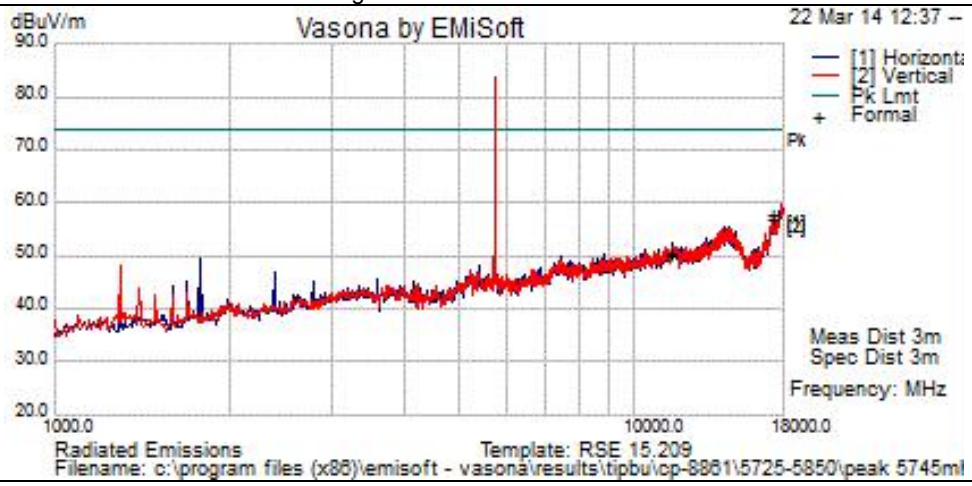
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11550	21.5	12.8	4.6	38.9	Av	V	110	220	54	-15.1	Pass	
17325	20.5	15.9	6.8	43.2	Av	V	110	220	54	-10.8	Pass	
11550	20.5	12.8	4.6	37.9	Av	H	142	215	54	-16.1	Pass	
17325	20.4	15.9	6.8	43.1	Av	H	142	215	54	-10.9	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 149 , 802.11 A (6Mbps) Peak Measurement

Subtest Number: 160992 - 1	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5745MHz 802.11A 1-18GHz Peak
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5745MHz 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



Title: 5745MHz 802.11A 1-18GHz Peak

Test Results Table

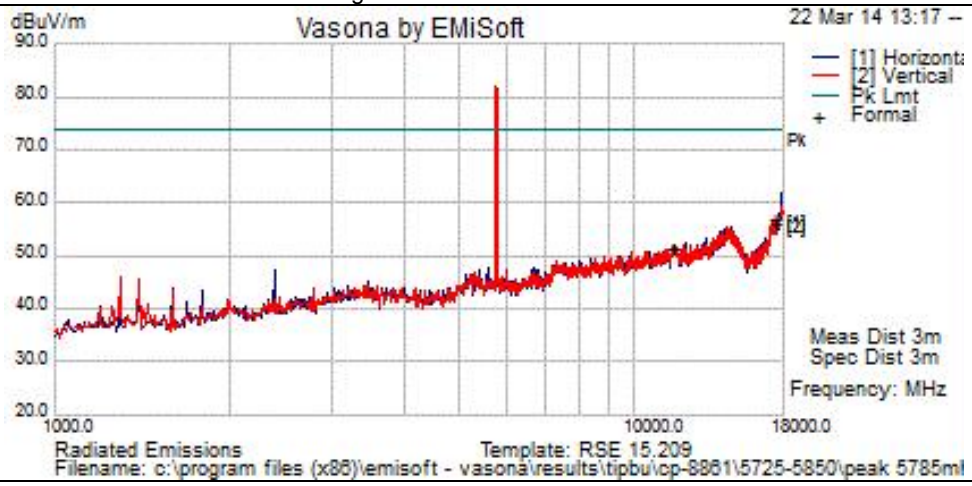
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11490.408	27.1	18.7	4.4	50.2	Pk	V	100	220	74	-23.8	Pass	
17235.476	28.4	21.9	7.3	57.6	Pk	V	100	220	74	-16.4	Pass	
11490.606	27.2	18.7	4.4	50.3	Pk	H	130	180	74	-23.7	Pass	
17234.489	27.9	21.9	7.3	57	Pk	H	130	180	74	-17	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 157 , 802.11 A (6Mbps) Peak Measurement

Subtest Number: 160992 - 6	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5785MHz 802.11A 1-18GHz Peak
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5785MHz 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



Title: 5785MHz 802.11A 1-18GHz Peak

Test Results Table

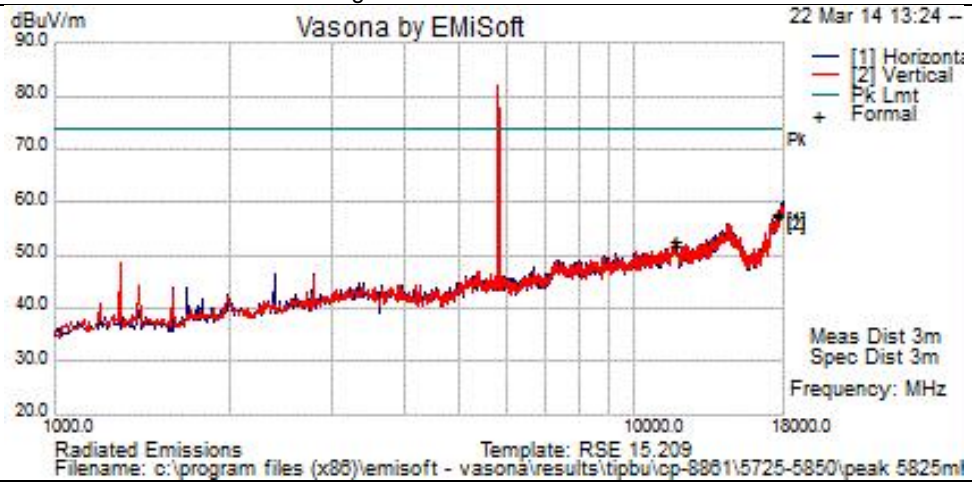
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11569.838	27.9	18.8	4.7	51.5	Pk	V	100	220	74	-22.5	Pass	
17353.785	28.5	21.8	6.6	56.8	Pk	V	110	220	74	-17.2	Pass	
11570.275	27.7	18.8	4.7	51.2	Pk	H	130	180	74	-22.8	Pass	
17353.617	27.8	21.8	6.6	56.1	Pk	H	130	180	74	-17.9	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 165, 802.11 A (6Mbps) Peak Measurement

Subtest Number: 160992 - 7	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5825MHz 802.11A 1-18GHz Peak
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5825MHz 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



Title: 5825MHz 802.11A 1-18GHz Peak

Test Results Table

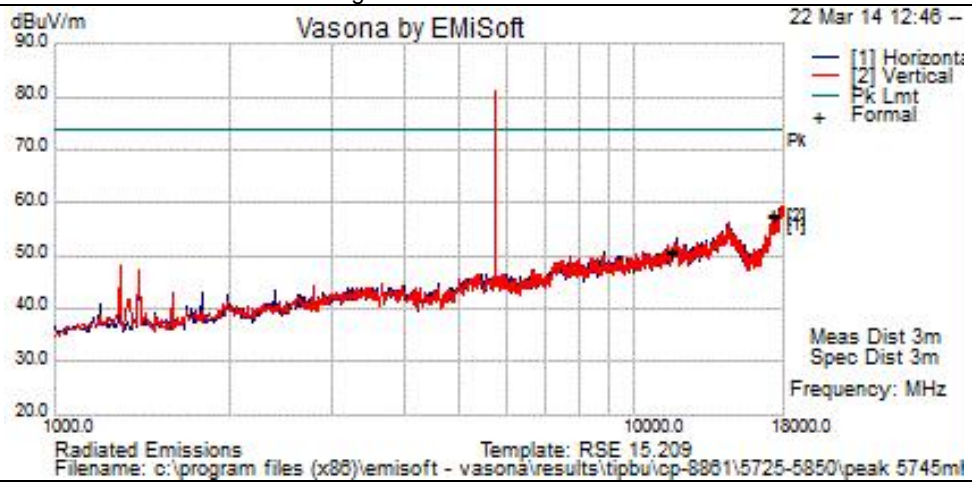
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11650.752	27.3	18.8	5.7	51.8	Pk	V	100	220	74	-22.2	Pass	
17475.901	28.4	21.9	7.3	57.7	Pk	V	100	220	74	-16.3	Pass	
11650.095	28.2	18.8	5.7	52.7	Pk	H	130	180	74	-21.3	Pass	
17474.382	28	21.9	7.3	57.3	Pk	H	130	180	74	-16.7	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 149 , 802.11 N HT20(mcs M0) Peak Measurement

Subtest Number: 160992 - 2	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5745MHz 802.11n HT20MHzBW 1-18GHz Peak
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5745MHz 802.11n HT20MHzBW 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



Title: 5745MHz 802.11n 20MHzBW 1-18GHz Peak

Test Results Table

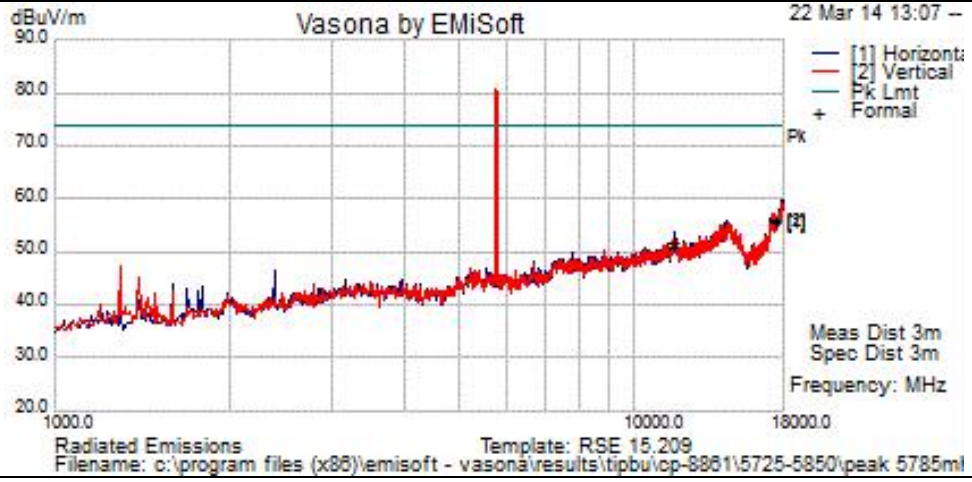
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11490.8	27.8	18.7	4.4	50.9	Pk	V	100	220	74	-23.1	Pass	
17236.027	28.4	21.9	7.3	57.6	Pk	H	100	220	74	-16.4	Pass	
11489.522	27.5	18.7	4.4	50.6	Pk	H	130	180	74	-23.4	Pass	
17235.214	28.2	21.9	7.3	57.4	Pk	H	130	180	74	-16.6	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 157, 802.11 N HT20(mcs M0) Peak Measurement

Subtest Number: 160992 - 5	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5785MHz 802.11N HT20MHzBW 1-18GHz Peak
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5785MHz 802.11N HT20MHzBW 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



Title: 5785MHz 802.11N 20MHzBW 1-18GHz Peak

Test Results Table

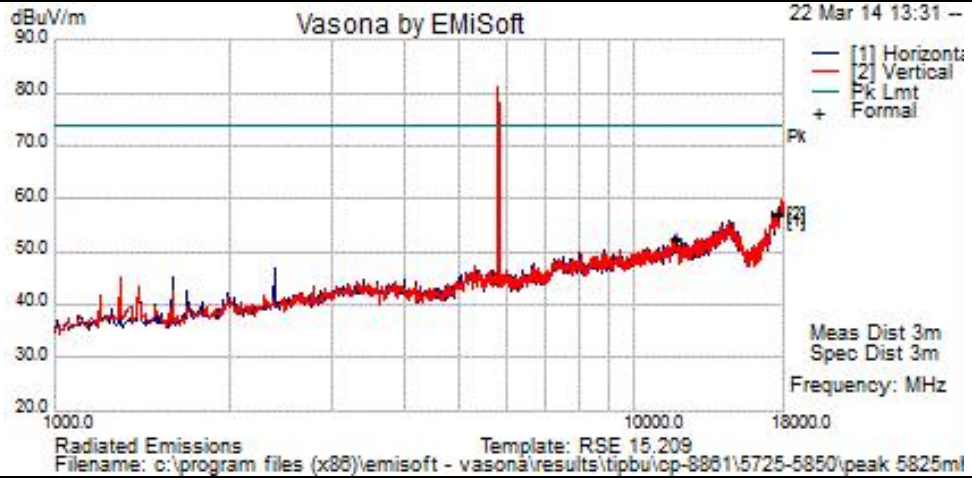
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11570.61	27.4	18.8	4.7	50.9	Pk	V	100	220	74	-23.1	Pass	
17355.604	27.7	21.8	6.6	56.1	Pk	V	100	220	74	-17.9	Pass	
11569.87	28.1	18.8	4.7	51.6	Pk	H	130	180	74	-22.4	Pass	
17354.236	27.4	21.8	6.6	55.8	Pk	H	130	180	74	-18.2	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 165, 802.11 N HT20(mcs M0) Peak Measurement

Subtest Number: 160992 - 8	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5825MHz 802.11N HT20MHzBW 1-18GHz Peak
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5825MHz 802.11N HT20MHzBW 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



Title: 5825MHz 802.11N 20MHzBW 1-18GHz Peak

Test Results Table

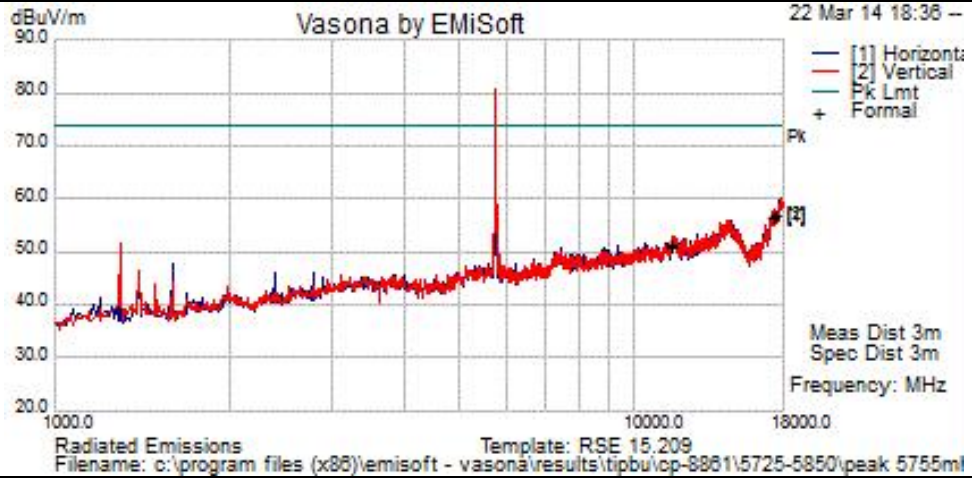
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11650.003	28.2	18.8	5.7	52.7	Pk	V	100	220	74	-21.3	Pass	
17476.834	27.9	21.9	7.4	57.1	Pk	V	100	220	74	-16.9	Pass	
11651.091	27.7	18.8	5.7	52.2	Pk	H	130	180	74	-21.8	Pass	
17474.631	27.4	21.9	7.3	56.7	Pk	H	130	180	74	-17.3	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 149U/40 (5755MHz), 802.11N HT40 (mcs M0) Peak Measurement

Subtest Number: 160992 - 10	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5755MHz 802.11N HT40MHzBW 1-18GHz Peak
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5755MHz 802.11N HT40MHzBW 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



Title: 5755MHz 802.11N 40MHzBW 1-18GHz Peak

Test Results Table

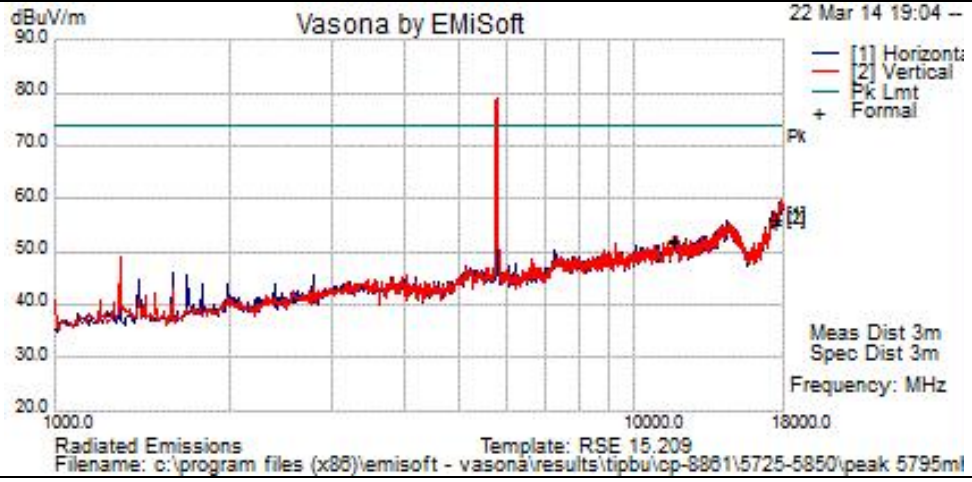
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11510.376	28.2	18.7	4.4	51.4	Pk	V	100	220	74	-22.6	Pass	
17265.556	28.1	21.8	6.9	56.8	Pk	V	100	220	74	-17.2	Pass	
11510.286	27.9	18.7	4.4	51	Pk	H	130	180	74	-23	Pass	
17264.758	27.7	21.8	6.9	56.4	Pk	H	130	180	74	-17.6	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 157U/40 (5795MHz), 802.11N HT40 (mcs M0) Peak Measurement

Subtest Number: 160992 - 13	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5795MHz 802.11N HT40MHzBW 1-18GHz Peak
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5795MHz 802.11N HT40MHzBW 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



Title: 5795MHz 802.11N 40MHzBW 1-18GHz Peak

Test Results Table

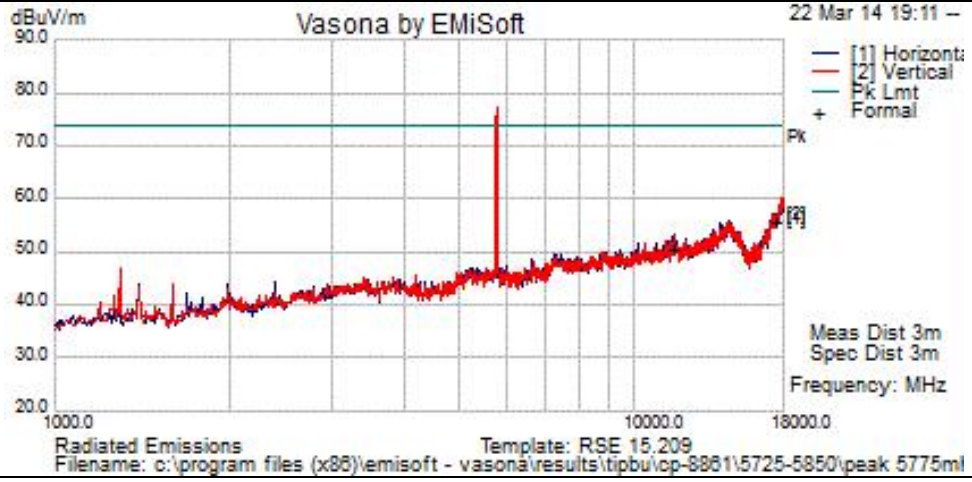
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11589.206	28.1	18.8	4.8	51.7	Pk	V	100	220	74	-22.3	Pass	
17385.712	27.6	21.8	6.5	55.9	Pk	V	100	220	74	-18.1	Pass	
11588.309	28.4	18.8	4.8	52	Pk	H	130	180	74	-22	Pass	
17385.202	27.1	21.8	6.5	55.4	Pk	H	130	180	74	-18.6	Pass	

Transmitter Spurious 1GHz to 18GHz, Ch 157U/80 (5775MHz), 802.11AC HT80 (mcs M0) Peak Measurement

Subtest Number: 160992 - 14	**Subtest Date:** 22-Mar-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5775MHz 802.11AC HT80MHzBW 1-18GHz Peak
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5775MHz 802.11AC HT80MHzBW 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



Title: 5775MHz 802.11AC 80MHzBW 1-18GHz Peak

Test Results Table

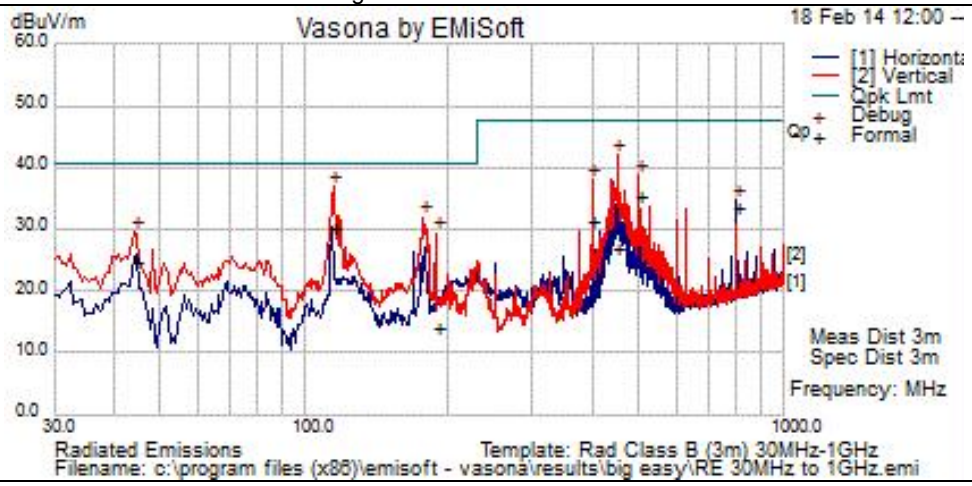
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
11551.59	26.9	18.8	4.6	50.3	Pk	V	100	220	74	-23.7	Pass	
17324.297	27.1	21.9	6.8	55.8	Pk	V	100	220	74	-18.2	Pass	
11549.99	27.2	18.8	4.6	50.6	Pk	H	130	180	74	-23.4	Pass	
17324.779	27	21.9	6.8	55.6	Pk	H	130	180	74	-18.4	Pass	

Transmitter Spurious 30MHz to 1GHz,

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



Title: Radiated Emissions 30Mhz to 1GHz

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 (Worst case mode)

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 tunable 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.

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 Recieve 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

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

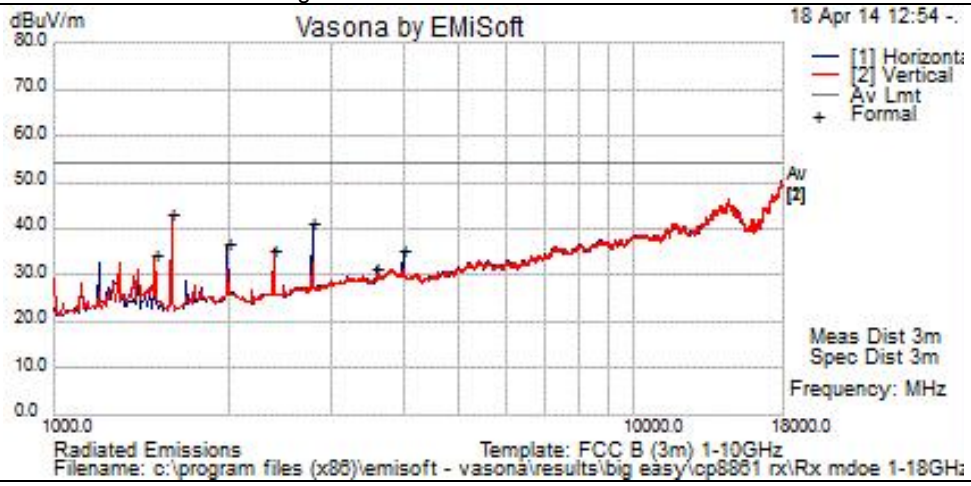
Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= 54dBuV @3m
2) Peak plot (Vertical and Horizontal), Limit = 74dBuV @3m

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

Subtest Number: 164252 - 6	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	Rx mode 5GHz WLAN 5725-5850MHz Average Plot Worst case mode
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	Rx mode 5GHz WLAN 5725-5850MHz Average Plot Worst case mode

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



Title: Rx mode 5GHz WLAN 5725-5850MHz

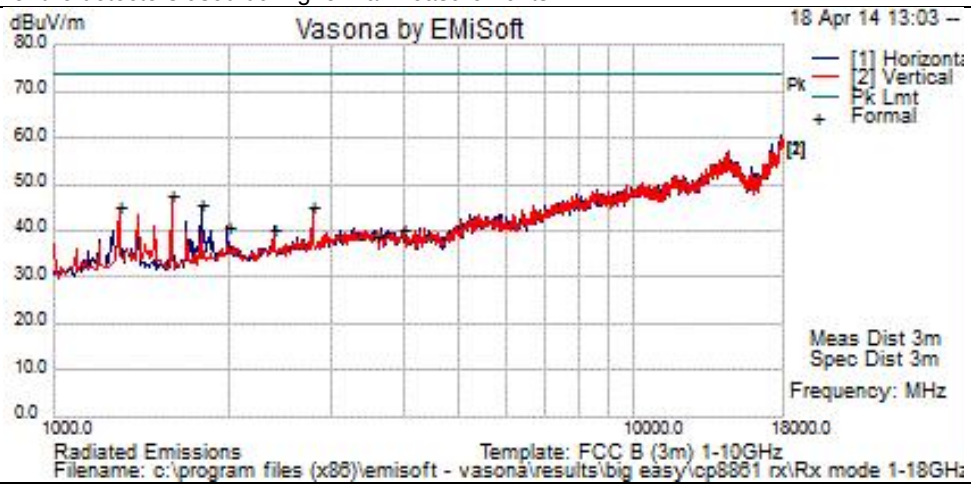
Test Results Table

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
1493	37.7	4.2	-7.7	34.1	Av	H	105	0	54	-19.9	Pass	
1595	46.7	4.4	-8	43	Av	V	105	90	54	-11	Pass	
1994.5	37.2	4.9	-5.3	36.8	Av	H	105	270	54	-17.2	Pass	
2394	36.2	5.4	-6.1	35.4	Av	H	105	180	54	-18.6	Pass	
2793.5	41.1	5.8	-5.8	41.1	Av	H	105	90	54	-12.9	Pass	
4000.5	31.9	7.1	-3.7	35.2	Av	H	105	270	54	-18.8	Pass	
3600.067	29.5	6.7	-4.8	31.4	Av	H	103	360	54	-22.6	Pass	

Subtest Number: 164252 - 7	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	Rx mode 5GHz WLAN 5725-5850MHz Peak plot Worst case mode
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	Rx mode 5GHz WLAN 5725-5850MHz Peak plot Worst case mode

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



Title: Rx mode 5GHz WLAN 5725-5850MHz Peak plot

Test Results Table

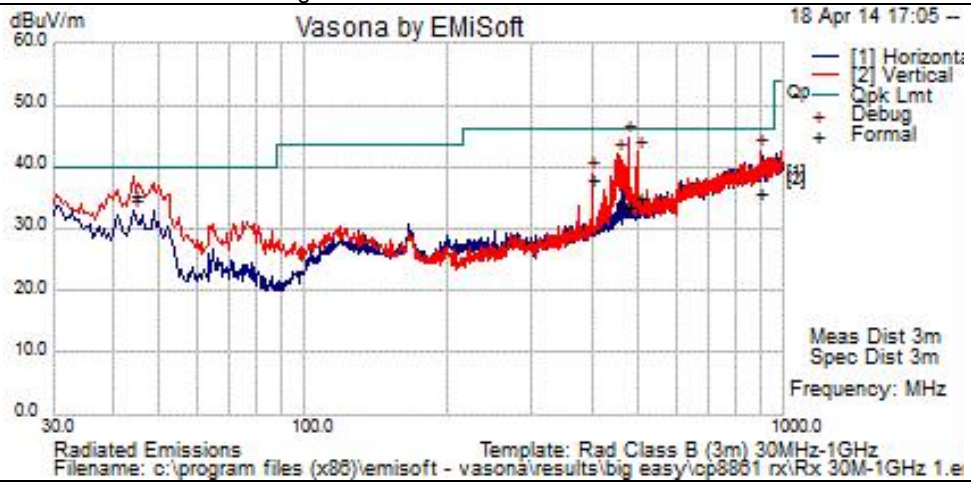
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1595	51.1	4.4	-8	47.4	Pk	V	100	0	74	-26.6	Pass	
1799	48.2	4.6	-7.2	45.6	Pk	H	100	0	74	-28.4	Pass	
2793.5	45.1	5.8	-5.8	45.1	Pk	H	100	0	74	-28.9	Pass	
1297.5	49.7	3.9	-8.8	44.9	Pk	V	100	0	74	-29.1	Pass	
1994.5	41.2	4.9	-5.3	40.8	Pk	H	100	0	74	-33.2	Pass	
2395.126	41.1	5.4	-6.1	40.3	Pk	H	100	360	74	-33.7	Pass	
3600.067	36.8	6.7	-4.8	38.7	Pk	H	103	360	74	-35.3	Pass	
4000.5	37	7.1	-3.7	40.3	Pk	H	105	270	74	-33.7	Pass	

Receiver Spurious Emissions 30MHz to 1GHz Worst case mode

Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Emissions 30MHz to 1GHz worst case mode
Subtest Result	Pass
Highest Frequency	1000.0
Lowest Frequency	30.0
Comments on the above Test Results	Radiated Emissions 30MHz to 1GHz Worst case mode

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



Title: Radiated Emissions 30MHz to 1GHz

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 Radiated Spurious Emissions

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 Tx mode for Co-located radios.

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

Notch Filter used for both Radios

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

Case scenario 1 :
5GHz radio (5725-5850MHz band) & 2.4GHz Bluetooth radio (2400MHz – 2483.5MHz)

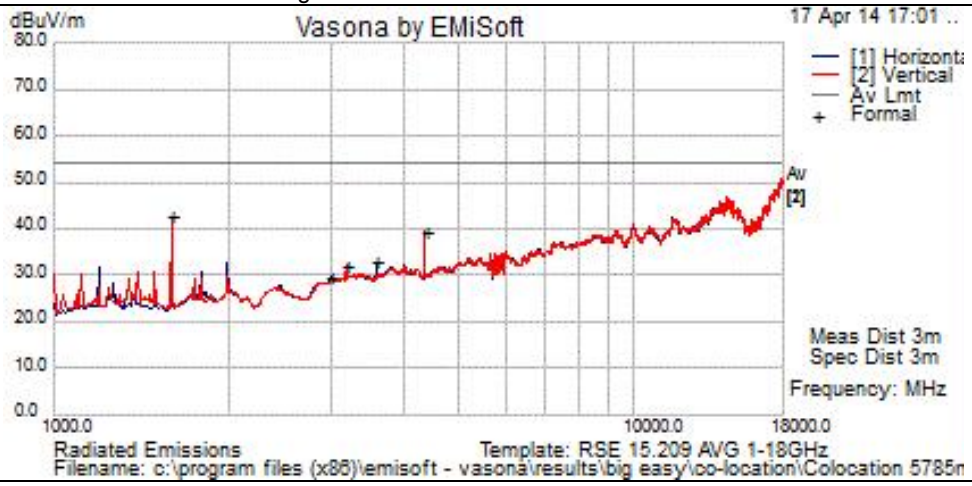
This report represents the worst case data for all supported operating modes and antennas. There were no measurable emissions above 15 GHz.

Radiated Spurious Emissions 1GHz to 18GHz Worst case modes between 5GHz radio and Bluetooth radio.

Subtest Number: 164061 - 5	**Subtest Date:** 17-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5725-5850Mhz with 2.4GHz Bluetooth radio Average plot
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	5725-5850Mhz with 2.4GHz Bluetooth radio Average 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



Title: 5725-5850Mhz with 2.4GHz Bluetooth radio Average plot

Test Results Table

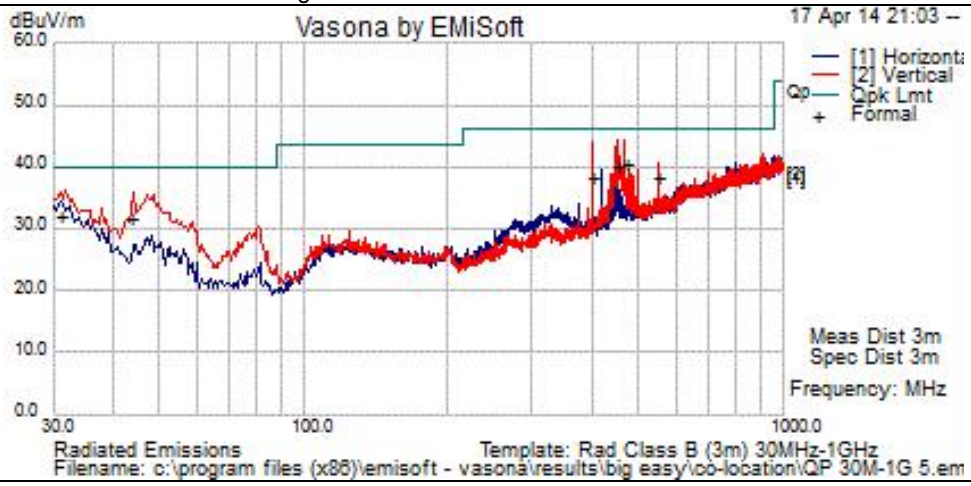
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1595	46.2	4.4	-8	42.5	Av	V	100	0	54	-11.5	Pass	
4357.5	36.6	7.4	-4.7	39.3	Av	V	100	264	54	-14.7	Pass	
3196.816	29.8	6.2	-4.3	31.7	Av	V	101	261	54	-22.3	Pass	
3601.04	30.9	6.7	-4.8	32.8	Av	H	101	165	54	-21.2	Pass	
2997.013	28.6	6	-5	29.6	Av	H	101	233	54	-24.4	Pass	

Co-Location Radiated Spurious Emissions 30MHz to 1GHz Worst case modes between 5GHz radio and Bluetooth radio.

Subtest Number: 164061 - 15	**Subtest Date:** 17-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	5725-5850Mhz with 2.4GHz Bluetooth radio QP 30M-1GHz
Subtest Result	Pass
Highest Frequency	1000.0
Lowest Frequency	30.0
Comments on the above Test Results	5725-5850Mhz with 2.4GHz Bluetooth radio QP 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



Title: 5725-5850Mhz with 2.4GHz Bluetooth radio QP 30M-1GHz

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
30.815	11.8	0.6	19.7	32.1	Qp	V	102	164	40	-7.9	Pass	
43.563	19.7	0.7	11.2	31.6	Qp	V	141	322	40	-8.4	Pass	
399.887	20.3	2.1	15.7	38.1	Qp	V	122	195	46	-7.9	Pass	
448.046	21.1	2.3	16.8	40.2	Qp	V	155	132	46	-5.8	Pass	
468.611	20.8	2.3	17.3	40.5	Qp	V	152	345	46	-5.5	Pass	
550.434	17.3	2.5	18.4	38.2	Qp	V	125	145	46	-7.8	Pass	

AC Mains Conducted Spurious 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 μH/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 (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.

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.

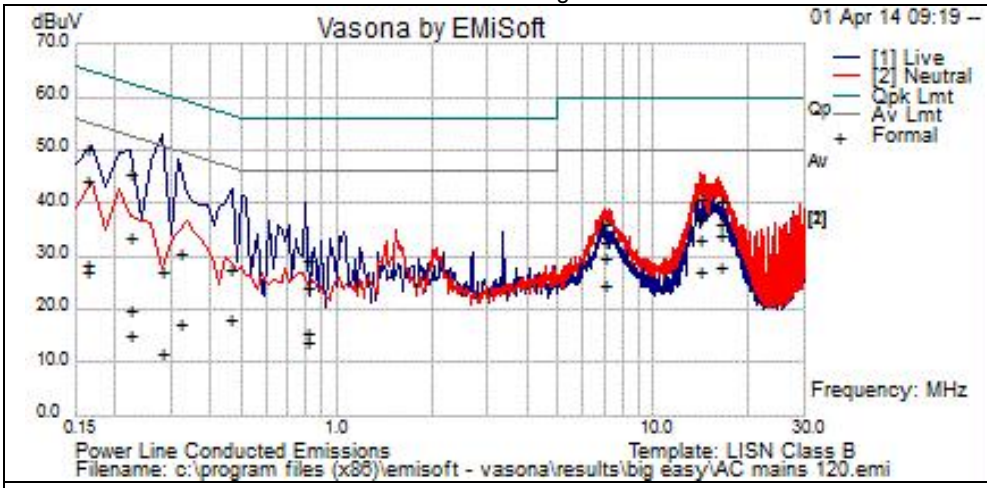
Span:	150kHz – 30Hz
Reference Level:	70 dBuV
Attenuation:	10 dB
Sweep Time:	Auto
Resolution Bandwidth:	9Hz
Video Bandwidth:	30kHz
Detector:	Quasi-Peak

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



Conducted Emissions on AC mains

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 ($1x10^3$)
EN	European Norm	MHz	MegaHertz ($1x10^6$)
IEC	International Electro technical Commission	GHz	Gigahertz ($1x10^9$)
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 ($1x10^3$)
L1	Line 1	µV	Microvolt ($1x10^{-6}$)
L2	Line2	A	Amp
L3	Line 3	µA	Micro Amp ($1x10^{-6}$)
DC	Direct Current	mS	Milli Second ($1x10^{-3}$)
RAW	Uncorrected measurement value, as indicated by the measuring device	µS	Micro Second ($1x10^{-6}$)
RF	Radio Frequency	µS	Micro Second ($1x10^{-6}$)
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 Used to perform the test

Equipment No	Manufacturer	Model	Description	Last Cal	Next Cal Due Date
CIS047300	Agilent Technologies	N9038A	MXE EMI Receiver 20Hz to 26.5 Ghz	17-DEC-13	17-DEC-14
CIS047285	Huber + Suhner	Sucoflex 102E	40GHz Cable K Connector	30-MAY-13	30-MAY-14
CIS041929	Newport	iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	16-DEC-13	16-DEC-14
CIS033649	Midwest Microwave	CSY-NMNM-14-010-FS	RF Coaxial Cable, RG-214, 10ft	16-APR-13	16-APR-14
CIS030652	Sunol Sciences	JB1	Combination Antenna, 30MHz-2GHz	16-OCT-13	16-OCT-14
CIS030562	Micro-Coax	UFB311A-1-0950-504504	RF Coaxial Cable, to 18GHz, 95 in	26-JUN-13	26-JUN-14
CIS027236	York	CNE V	Comparison Noise Emitter	Cal Not Required	N/A
CIS021116	Micro-Coax	UFB311A-0-3540-520520	RF Coaxial Cable, to 18GHz, 354 in	17-FEB-14	17-FEB-15
CIS020975	Micro-Coax	UFB311A-0-1344-520520	RF Coaxial Cable, to 18GHz, 134.4 in	17-FEB-14	17-FEB-15
CIS019206	TTE	H785-150K-50-21378	High Pas Filter,Fo=150kHz	12-SEP-13	12-SEP-14
CIS018313	HP	8447D	RF Preamplifier	31-OCT-13	31-OCT-14
CIS008591	Fischer Custom Communications	FCC-RFM2F-520R	LISN AC Adaptor - Std 120V outlet	16-APR-13	16-APR-14
CIS008447	Cisco	NSA 10m Chamber	NSA 10m Chamber	09-OCT-13	09-OCT-14
CIS008375	Andrew	F4A-PNMNM	49 ft Heliax Cable	16-APR-13	16-APR-14
CIS008320	Times Microwave Systems	RG-214	3 ft RG-214 Cable	19-NOV-13	19-NOV-14
CIS005707	Fischer Custom Communications	FCC-LISN-50-50	LISN	16-APR-13	16-APR-14
CIS005691	Miteq	NSP1800-25-S1	Broadband Preamplifier (1-18GHz)	27-JAN-14	27-JAN-15
CIS004882	EMC Test Systems	3115	Double Ridged Guide Horn Antenna	28-JUN-13	28-JUN-14

Appendix D: Test Procedures

Measurements were made in accordance with

- KDB Publication No. 558074
- ANSI C63.10
- ANSI C63.4

Test procedures are summarized below

Document Reference	Scope of Document
EDCS - 420238	Internal Radio Test Procedures
EDCS-1396183	Internal Test Plan

Appendix E: Scope of Accreditation: A2LA certificate number 1178-01

The scope of accreditation of Cisco Systems, Inc. can be found on the A2LA web page at:

http://www.a2la.org/scopepdf/1178-01.pdf

Previous versions of the scope of accreditation are archived under EDCS 1010411. The actual scope of accreditation that was current at the time of testing performed under this report can be obtained upon request.