EMC Test Report
Application for Grant of Equipment Authorization
Class II Permissive Change/Reassessment
Industry Canada RSS-Gen Issue 3 / RSS 210 Issue 8
FCC Part 15, Subpart E

Model: WLAN AP8120

IC CERTIFICATION #:	3794G-AP8120
FCC ID:	X7CAP8120
APPLICANT:	Avaya 4655 Great America Parkway Santa Clara, CA 95054
TEST SITE(S):	Elliott Laboratories 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-3 & 2845B-7
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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	08-19-2011	First release	

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SCOPE

An electromagnetic emissions test has been performed on the Avaya model WLAN AP8120, pursuant to the following rules:

Industry Canada RSS-Gen Issue 3
RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15, Subpart E requirements for UNII Devices (using FCC DA 02-2138, August 30, 2002)

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003
FCC UNII test procedure 2002-08 DA-02-2138, August 2002

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of Avaya model WLAN AP8120 complied with the requirements of the following regulations:

RSS 210 Issue 8 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15, Subpart E requirements for UNII Devices

Maintenance of compliance is the responsibility of the manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of Avaya model WLAN AP8120 and therefore apply only to the tested sample. The sample was selected and prepared by Vipin Naik of Avaya.

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS SUMMARY

UNII / LELAN DEVICES

Operation in the 5.25 – 5.35 GHz Band

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.407(a) (2)		26dB Bandwidth	Change would not affect previous results		
15.407(a) (2)	A9.2(2)	Output Power	**802.11a** 17.4 dBm 55.0 mW EIRP = 0.404 W **802.11n 20MHz** 17.9 dBm 61.0 mW EIRP = 0.896 W **802.11n 40MHz** 18.2 dBm 0.066 mW EIRP = 0.975 W **802.11n 20MHz (STBC)** 18.7 dBm 0.074 mW EIRP = 0.544 W **802.11n n40MHz** (STBC) 18.9 dBm 0.077 mW EIRP = 0.568 W	17dBm (50mW)	Complies
15.407(a) (2)	-	Power Spectral Density	**802.11a** 6.8 dBm/MHz **802.11n 20MHz** 5.3 dBm/MHz **802.11n 40MHz** 2.6 dBm/MHz **802.11n 20MHz (STBC)** 6.3 dBm/MHz **802.11n 40MHz (STBC)** 3.3 dBm/MHz	8.2 dBm/MHz (Single Chain) 5.3 dBm/MHz (MIMO)	Complies
-	A9.2(2) / A9.5 (2)	Power Spectral Density		10.6 dBm / MHz[1] (Worse Case)	Complies

[1] Reduced from 11dBm because highest value exceeded the average value by more than 3dB

Operation in the 5.47 – 5.725 GHz Band

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.407(a) (2)		26dB Bandwidth	Change would not affect previous results		
15.407(a) (2)	A9.2(2)	Output Power	**802.11a** 16.9dBm 49.0 mW EIRP = 0.368 W **802.11n 20MHz** 17.6 dBm 0.057 mW EIRP = 0.860 W **802.11n 40MHz** 18.0 dBm 0.063 mW EIRP = 0.951 W	24 dBm / 250mW (eirp < 30dBm)	Complies
15.407(a) (2))		Power Spectral Density	**802.11a** 6.6 dBm/MHz **802.11n 20MHz** 5.2 dBm/MHz	8.2 dBm/MHz (Single Chain) 5.2 dBm/MHz (MIMO)	Complies
	A9.2(2) / A9.5 (2)	Power Spectral Density	**802.11n 40MHz** 4.9 dBm/MHz	11 dBm / MHz	Complies
KDB 443999	A9	Non-operation in 5600 – 5650 MHz sub band	Addition of external antenna did not change available channel options. Device cannot operate in the 5600 – 5650 MHz band.		Complies

Requirements for all U-NII/LELAN bands

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407	A9.5a	Modulation	Change would not affect previous results		
15.407(b) (5) / 15.209	A9.3	Spurious Emissions below 1GHz	No emissions detected	Refer to page 23	Complies
15.407(b) (5) / 15.209	A9.3	Spurious Emissions above 1GHz	53.9dBµV/m @ 5350.11MHz (-0.1dB)		Complies
15.407(a)(6)	-	Peak Excursion Ratio	Change would not affect previous results		
	A9.5 (3)	Channel Selection	Spurious emissions tested at outermost channels in each band	Device was tested on the top, bottom and center channels in each band	N/A
15			Measurements on three channels in each band		Complies
15.407 (c)	A9.5(4)	Operation in the absence of information to transmit	Change would not affect previous results		
15.407 (g)	A9.5 (5)	Frequency Stability	Change would not affect previous results		
15.407 (h1)	A9.4	Transmit Power Control	The EUT supports TPC per 802.11h	The U-NII device shall have the capability to operate with a mean EIRP value lower than 24dBm (250mW)	Complies
15.407 (h2)	A9.4	Dynamic frequency Selection (device with radar detection)	Refer to separate test report, reference R83183	Threshold -62dBm (-64dBm if eirp > 200mW) Channel Availability Check > 60s Channel closing transmission time < 260ms Channel move time < 10s Non occupancy period > 30minutes	Complies
	A9.9g	User Manual information	Change would not affect previous results		

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	System uses reverse SMA connectors	Unique or integral antenna required	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	Change would not affect previous results		
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	33.2dBµV/m @ 2124.8MHz (-20.8dB)	Refer to page 21	Complies
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding non-interference	Complies
-	RSP 100 RSS GEN 7.1.5	User Manual		Statement for products with detachable antenna	Complies
-	RSP 100 RSS GEN 4.4.1	99% Bandwidth	Change would not affect previous results		

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
RF power, conducted (power meter)	dBm	25 to 7000 MHz	± 0.52 dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	± 0.7 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	dBµV/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dBµV	0.15 to 30 MHz	± 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Avaya model WLAN AP8120 is a 802.11abgn wireless router/access point that is designed to wireless connectivity for enterprise network systems. The EUT can be table-top or wall mounted in normal operation. During testing, the EUT was treated as table-top, and rotated thru different orientation to simulate wall mounting, as noted. The EUT is powered via a POE connection.

The sample was received on February 4, 2011 and tested on February 9, May 31, July 14, July 18 and July 19, 2011. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Avaya	WLAN AP 8120	802.11abgn AP	Prototype	X7CAP8120

OTHER EUT DETAILS

The following EUT details should be noted: The EUT contains 2 abgn radio modules. One module is used for 2.4GHz operation and one module is used for 5GHz operation. Simultaneous transmission is possible, but never in the same band at the same time. The device supports 2x3 MIMO operation.

The WLAN AP8120 is a modified version of the WLAN AP 8120, approved under the same FCC ID. The internal antenna was removed and 6 reverse SMA connectors were mounted on the enclosure to allow for connection of external antennas.

ANTENNA SYSTEM

There are two external antennas to be included in this permissive change.

1) Laird, S24517PT, 3x3 Dual-Band Panel Antenna:

Peak Gain (dBi)	P1 (V-Pol)	P2 (H-Pol)	P3 (V-Pol)
2.4 - 2.5 GHz	6.65	6.75	7.13
5.15 - 5.35 GHz	8.66	7.68	8.66
5.5 GHz	8.76	7.54	8.76
5.9 GHz	8.84	7.65	8.76

2) Tyco, 1513461-1, 6 Element MIMO Antenna, 5.41dBi @ 2..4GHz, 5.91dBi @ 5.15GHz, 4.53dBi @ 5.35GHz, 5.55dBi @ 5.5GHz, 5.09dBi @ 5.725GHz.

The Tyco antenna is the same antenna that was originally mounted in the WLAN AP 8120. It has been repackaged as an external antenna. DFS testing was performed using the Tyco antenna. All RF testing (radiated spurious, power, psd, etc) was performed using the Laird antenna.

ENCLOSURE

The EUT outer enclosure is primarily constructed of metal. It measures approximately 23.5 cm wide by 15 cm deep by 5.5 cm high.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at Elliott.

SUPPORT EQUIPMENT

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Dell	Inspiron 1501	Laptop	-	-
-	-	USB to Serial Adapter	-	-

The following equipment was used as remote support equipment for emissions testing:

Company	Model	Description	Serial Number	FCC ID
PowerDsine	PowerDsine 9001G	POE Injector	D094565000005 8BA00	-

EUT INTERFACE PORTS

The I/O cabling configuration during testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
POE	POE Injector	CAT-5	Unshielded	5
Serial Port	USB-to-Serial Adapter to Laptop	CAT-5 to Serial	Unshielded	6

EUT OPERATION

During testing, the EUT was configured to transmit continuously on the noted channel. Data rate was set to 1Mbs for 802.11b mode and 6Mbs for 802.11g. For MIMO mode testing, please refer to the actual data for the MCS setting.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission and with industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
Chamber 3	769238	2845B-3	41039 Boyce Road Fremont, CA 94538-2435
Chamber 4	211948	2845B-4	
Chamber 5	211948	2845B-5	
Chamber 7	A2LA accreditation	2845B-7	

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

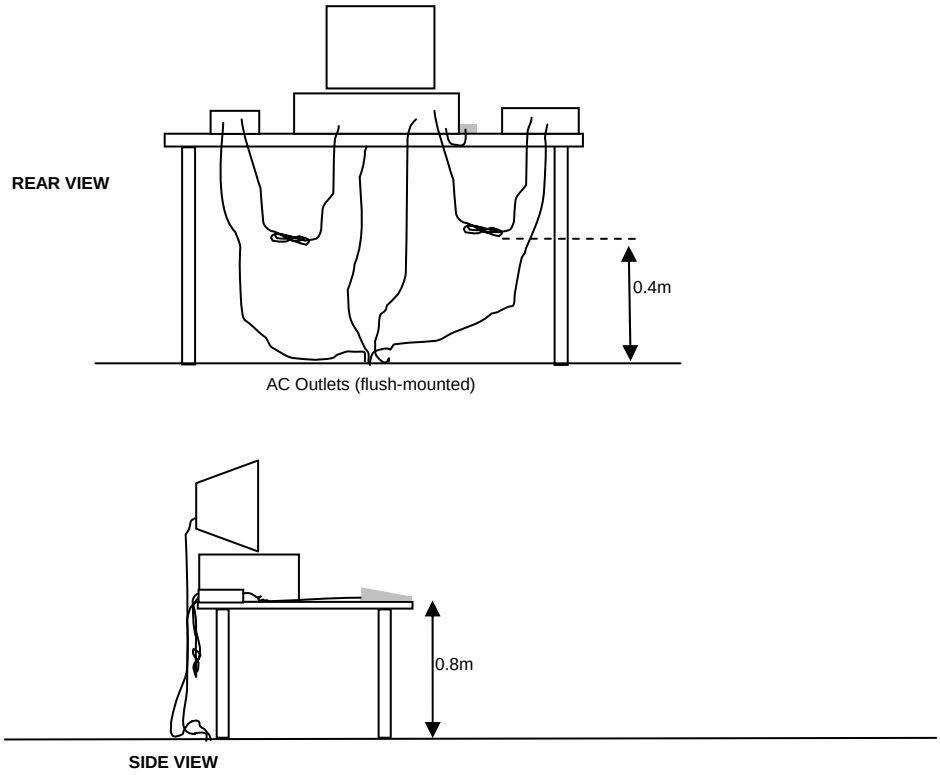
RADIATED EMISSIONS

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

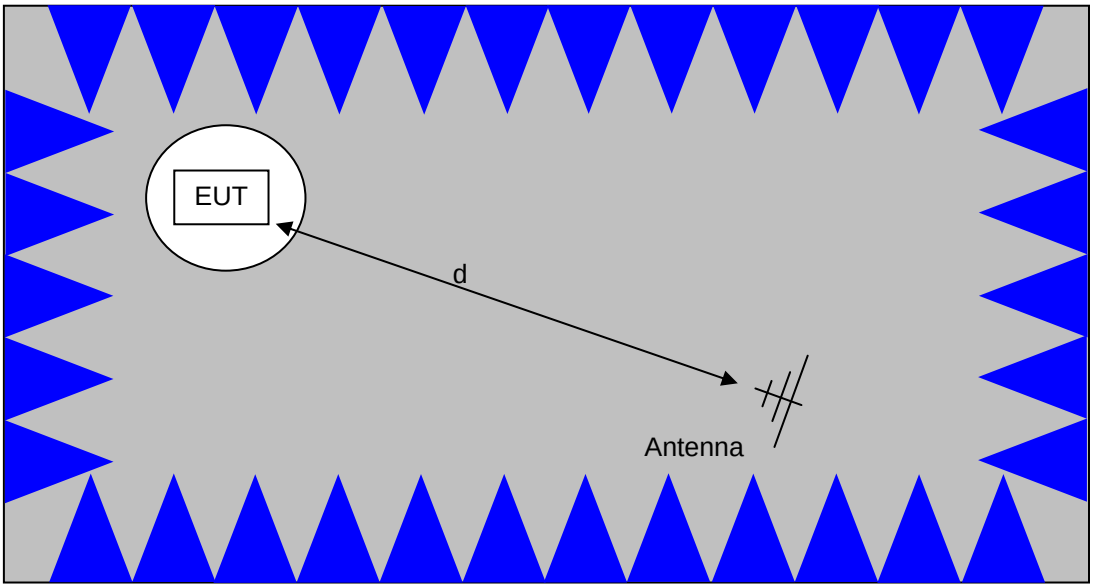
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.

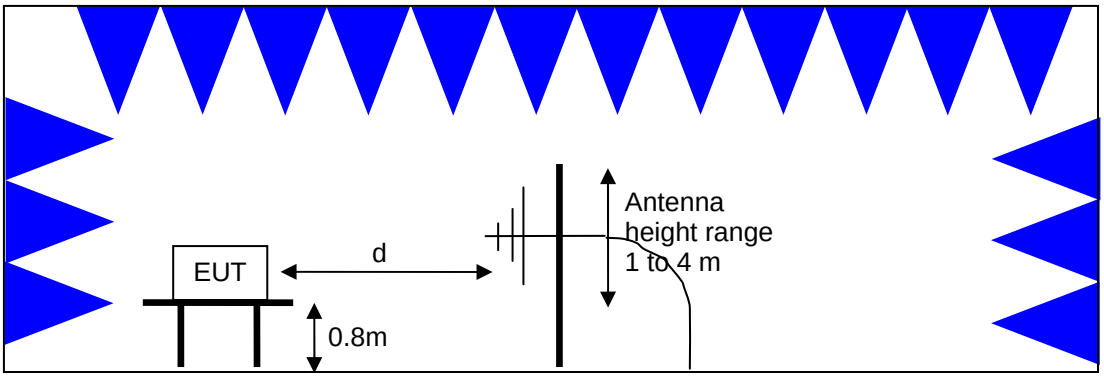


Typical Test Configuration for Radiated Field Strength Measurements



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

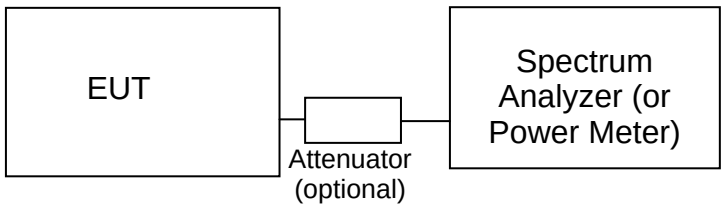
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements of power, bandwidth and power spectral density are performed, where possible, with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.



Test Configuration for Antenna Port Measurements

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and Elliott's test procedures for the type of radio being tested. When power measurements are made using a resolution bandwidth less than the signal bandwidth the power is calculated by summing the power across the signal bandwidth using either the analyzer channel power function or by capturing the trace data and calculating the power using software. In both cases the summed power is corrected to account for the equivalent noise bandwidth (ENBW) of the resolution bandwidth used.

If power averaging is used (typically for certain digital modulation techniques), the EUT is configured to transmit continuously. Power averaging is performed using either the built-in function of the analyzer or, if the analyzer does not feature power averaging, using external software. In both cases the average power is calculated over a number of sweeps (typically 100). When the EUT cannot be configured to continuously transmit then either the analyzer is configured to perform a gated sweep to ensure that the power is averaged over periods that the device is transmitting or power averaging is disabled and a max-hold feature is used.

If a power meter is used to make output power measurements the sensor head type (peak or average) is stated in the test data table.

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[2] (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109, RSS 210 Table 2, RSS GEN Table 1 and RSS 310 Table 3. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

[2] The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

FCC 15.407 (a) OUTPUT POWER LIMITS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
5150 – 5250	50mW (17 dBm)	4 dBm/MHz
5250 – 5350	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

The peak excursion envelope is limited to 13dB.

OUTPUT POWER LIMITS –LELAN DEVICES

The table below shows the limits for output power and output power density defined by RSS 210. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
5150 – 5250	200mW (23 dBm) eirp	10 dBm/MHz eirp
5250 – 5350	250 mW (24 dBm)[3] 1W (30dBm) eirp	11 dBm/MHz
5470 – 5725	250 mW (24 dBm)[4] 1W (30dBm) eirp	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm) 4W eirp	17 dBm/MHz

In addition, the power spectral density limit shall be reduced by 1dB for every dB the highest power spectral density exceeds the "average" power spectral density) by more than 3dB. The "average" power spectral density is determined by dividing the output power by 10log(EBW) where EBW is the 99% power bandwidth.

Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

[3] If EIRP exceeds 500mW the device must employ TPC
[4] If EIRP exceeds 500mW the device must employ TPC

SPURIOUS EMISSIONS LIMITS –UNII and LELAN DEVICES

The spurious emissions limits for signals below 1GHz are the FCC/RSS-GEN general limits. For emissions above 1GHz, signals in restricted bands are subject to the FCC/RSS GEN general limits. All other signals have a limit of –27dBm/MHz, which is a field strength of 68.3dBuV/m/MHz at a distance of 3m. This is an average limit so the peak value of the emission may not exceed –7dBm/MHz (88.3dBuV/m/MHz at a distance of 3m). For devices operating in the 5725-5850Mhz bands under the LELAN/UNII rules, the limit within 10Mhz of the allocated band is increased to –17dBm/MHz.

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of d (meters) from the equipment under test:

$$E = \frac{1000000 \sqrt{30 P}}{d} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

For a measurement at 3m the conversion from a logarithmic value for field strength (dBuV/m) to an eirp power (dBm) is -95.3dB.

Appendix A Test Equipment Calibration Data

Radiated Emissions, 1000 - 18,000 MHz, 09-Feb-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/8/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	4/14/2011
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	11/2/2011

Radiated Emissions, 1000-18,000 MHz, 09-Feb-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/11/2011
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	4/14/2011

Radiated Emissions, 1000 - 18,000 MHz, 9-Feb-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	High Pass filter, 8.2 GHz (Red System)	P/N 84300-80039 (84125C)	1152	9/3/2011
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/21/2012
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	11/2/2011
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	1681	5/25/2011
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	1729	9/3/2011
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	1771	8/26/2011
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/11/2011

Radiated Emissions, 30 - 18,000 MHz, 01-Jun-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	7/12/2011
Hewlett Packard	High Pass filter, 8.2 GHz	P/N 84300-80039	1156	6/25/2011
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	1682	3/23/2012
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	1729	9/3/2011

Radio Antenna Port (Power and PSD), 18-Jul-11

Manufacturer	Description	Model	Asset #	Cal Due
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	1/26/2012

Radiated Emissions, 1,000 - 18,000 MHz, 18-Jul-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12/8/2011
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/6/2012
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	8/12/2011
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	11/2/2011
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	1729	9/3/2011

TX Spurious and RF Power/PSD, 20-Jul-11

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	5/18/2012
Hewlett Packard	High Pass filter, 8.2 GHz (Red System)	P/N 84300-80039 (84125C)	1152	9/3/2011
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	9/21/2012
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	8/14/2011
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	1729	9/3/2011
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	1/26/2012

Appendix B Test Data

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Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		-
Emissions Standard(s):	FCC 15.E	Class:	B
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Avaya

Model

AP 8120 with 2 external Antenna (Class II Permissive change)

Date of Last Test: 7/25/2011

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	B

Radiated Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 2/9/2011
Test Engineer: John Caizzi
Test Location: Fremont Chamber #5
Config. Used: 1
Config Change: External Laird antenna, laptop was remote support.
EUT Voltage: PoE

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment where routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 19 °C
Rel. Humidity: 24 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 1 - 18 GHz Maximized	RSS-210	Pass	32.7dBµV/m @ 1062.5MHz (-21.3dB)
2			Pass	33.2dBµV/m @ 2124.8MHz (-20.8dB)
3			Pass	32.9dBµV/m @ 1062.4MHz (-21.1dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

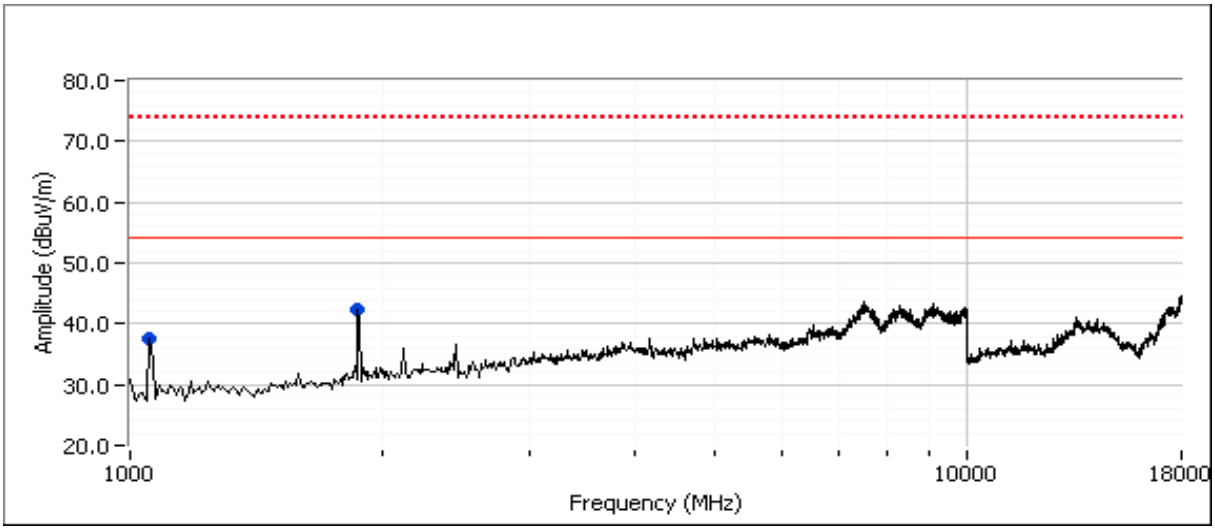
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	B

Run #1: Maximized Readings, 1000 - 18,000 MHz. Rx mode, CH40.

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
1000 - 18000 MHz	3	3	0.0



Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	Pol	RSS-210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1870.830	*42.2*	*V*	*54.0*	*-11.8*	*Peak*	*250*	*2.5*	
1055.000	*37.7*	*V*	*54.0*	*-16.3*	*Peak*	*94*	*1.0*	

Final peak and average readings

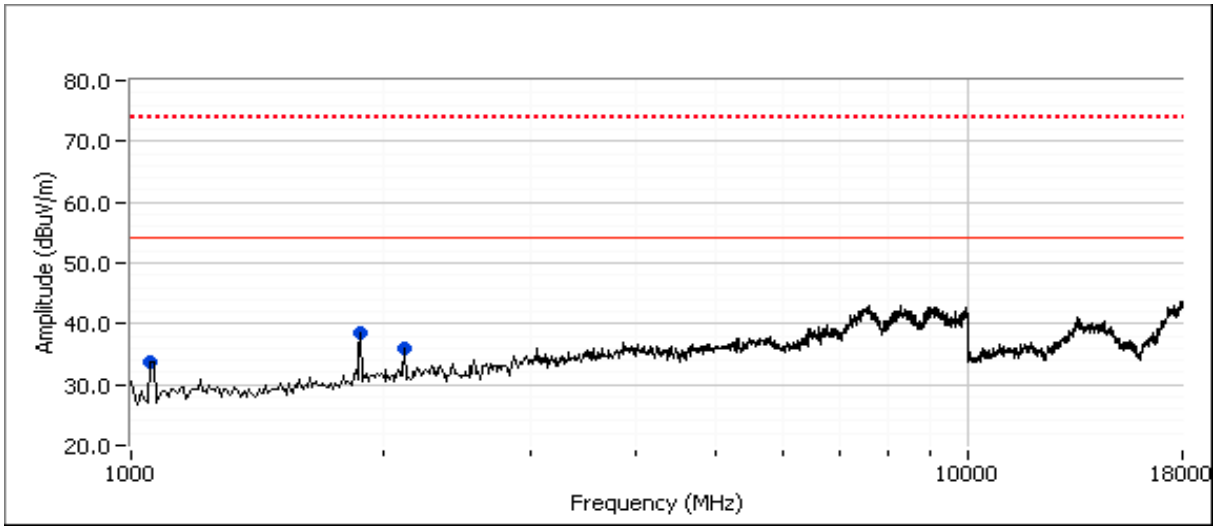
Frequency	Level	Pol	RSS-210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1062.450	32.7	V	54.0	-21.3	AVG	40	1.07	
1859.100	29.5	V	54.0	-24.5	AVG	240	1.14	
1859.350	38.1	V	74.0	-35.9	PK	240	1.14	
1062.450	38.0	V	74.0	-36.0	PK	40	1.07	

Note 1:	Above 1 GHz, the limit is based on an average measurement. In addition, the peak reading of any emission above 1 GHz can not exceed the average limit by more than 20 dB.
Note 2:	As there were no emissions observed above 14 GHz during the preliminary scan, or the size of the EUT did not exceed 1.6m above the ground plane, additional measures were not required to ensure that the emissions from the EUT were maintained within the beam-width of the antenna during antenna height maximization.

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	B

Run #2: Maximized Readings, 1000 - 18,000 MHz. Rx mode, CH60.

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
1000 - 18000 MHz	3	3	0.0



Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	Pol	RSS-210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1880.000	38.4	H	54.0	-15.6	Peak	305	1.3	
2118.330	36.0	V	54.0	-18.0	Peak	245	1.0	
1055.000	33.7	V	54.0	-20.3	Peak	41	1.0	

Final peak and average readings

Frequency	Level	Pol	RSS-210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2124.750	33.2	V	54.0	-20.8	AVG	247	1.00	
1062.400	33.0	V	54.0	-21.0	AVG	34	1.10	
1859.230	28.3	H	54.0	-25.7	AVG	347	1.06	
2125.100	40.9	V	74.0	-33.1	PK	247	1.00	
1062.530	38.8	V	74.0	-35.2	PK	34	1.10	
1859.520	37.3	H	74.0	-36.7	PK	347	1.06	

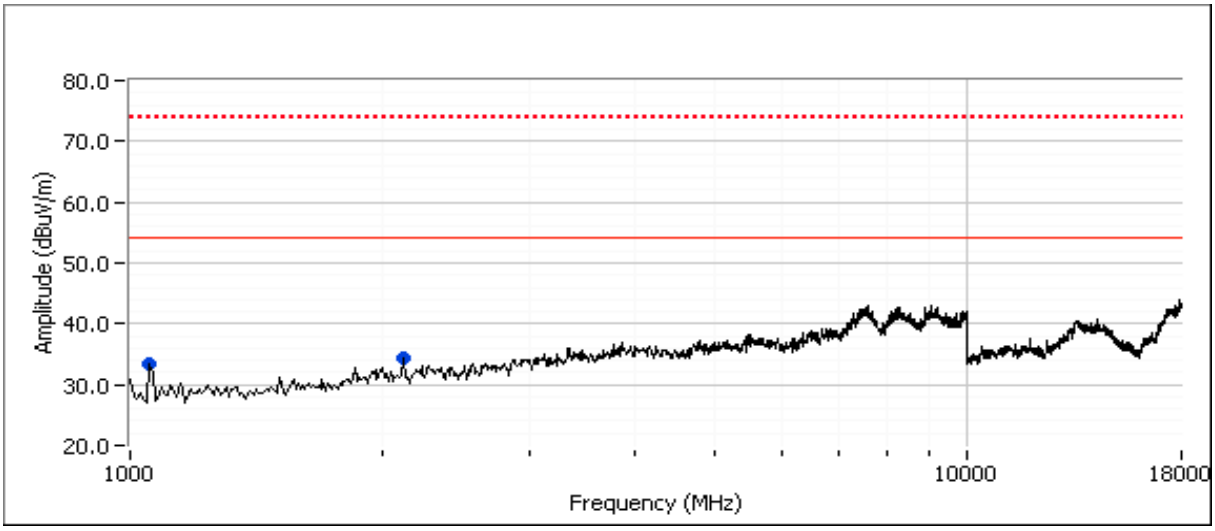
Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	B

Note 1:	Above 1 GHz, the limit is based on an average measurement. In addition, the peak reading of any emission above 1 GHz can not exceed the average limit by more than 20 dB.
Note 2:	As there were no emissions observed above 14 GHz during the preliminary scan, or the size of the EUT did not exceed 1.6m above the ground plane, additional measures were not required to ensure that the emissions from the EUT were maintained within the beam-width of the antenna during antenna height maximization.

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	B

Run #3: Maximized Readings, 1000 - 18,000 MHz. Rx mode, CH116.

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
1000 - 18000 MHz	3	3	0.0



Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	Pol	RSS-210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2118.330	*34.3*	*V*	*54.0*	*-19.7*	*Peak*	*125*	*1.6*	
1055.000	*33.5*	*V*	*54.0*	*-20.5*	*Peak*	*280*	*1.3*	

Final peak and average readings

Frequency	Level	Pol	RSS-210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1062.370	32.9	V	54.0	-21.1	AVG	286	1.34	
2124.880	31.5	V	54.0	-22.5	AVG	79	1.57	
2125.000	38.9	V	74.0	-35.1	PK	79	1.57	
1062.370	38.8	V	74.0	-35.2	PK	286	1.34	

Note 1:	Above 1 GHz, the limit is based on an average measurement. In addition, the peak reading of any emission above 1 GHz can not exceed the average limit by more than 20 dB.
Note 2:	As there were no emissions observed above 14 GHz during the preliminary scan, or the size of the EUT did not exceed 1.6m above the ground plane, additional measures were not required to ensure that the emissions from the EUT were maintained within the beam-width of the antenna during antenna height maximization.

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

RSS-210 (LELAN) and FCC 15.407(UNII)
Antenna Port Measurements
Power, PSD, Peak Excursion, Bandwidth and Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators and cables used.

Ambient Conditions:

Temperature: 18-23 °C
Rel. Humidity: 30-40 %

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Notes

Highlighted line items indicate power was reduced from the original filing. Non-highlighted items represent data from the original filing with the EIRP calculated using the new antenenna gain.
Power measurements were performed using the same method as the original filing.
Any measurements for MIMO are for CDD operation

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power, 5250 - 5350MHz	15.407(a) (1), (2)	Pass	802.11a: 17.4dBm (0.055W) 802.11n20: 17.9dBm (0.061W) 802.11n40: 18.2dBm (0.066W)
1	PSD, 5250 - 5350MHz	15.407(a) (1), (2)	Pass	802.11a: 6.8dBm/MHz 802.11n20: 5.3dBm/MHz 802.11n40: 2.6dBm/MHz
1	Power, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	802.11a: 16.9dBm (0.049W) 802.11n20: 17.6dBm (0.057W) 802.11n40: 18.0dBm (0.063W)
1	PSD, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	802.11a: 5.9dBm/MHz 802.11n20: 5.2dBm/MHz 802.11n40: 4.9dBm/MHz

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Date of Test: 7/14/2011
Test Engineer: Mark Hill
Test Location: FT Lab #4

Config. Used: 1
Config Change: None
EUT Voltage: POE

Run #1: Bandwidth, Output Power and Power Spectral Density - Single Chain Systems - 802.11a

Antenna Gain[5] (dBi): 8.66 EIRP: 403.6 mW 26.1 dBm

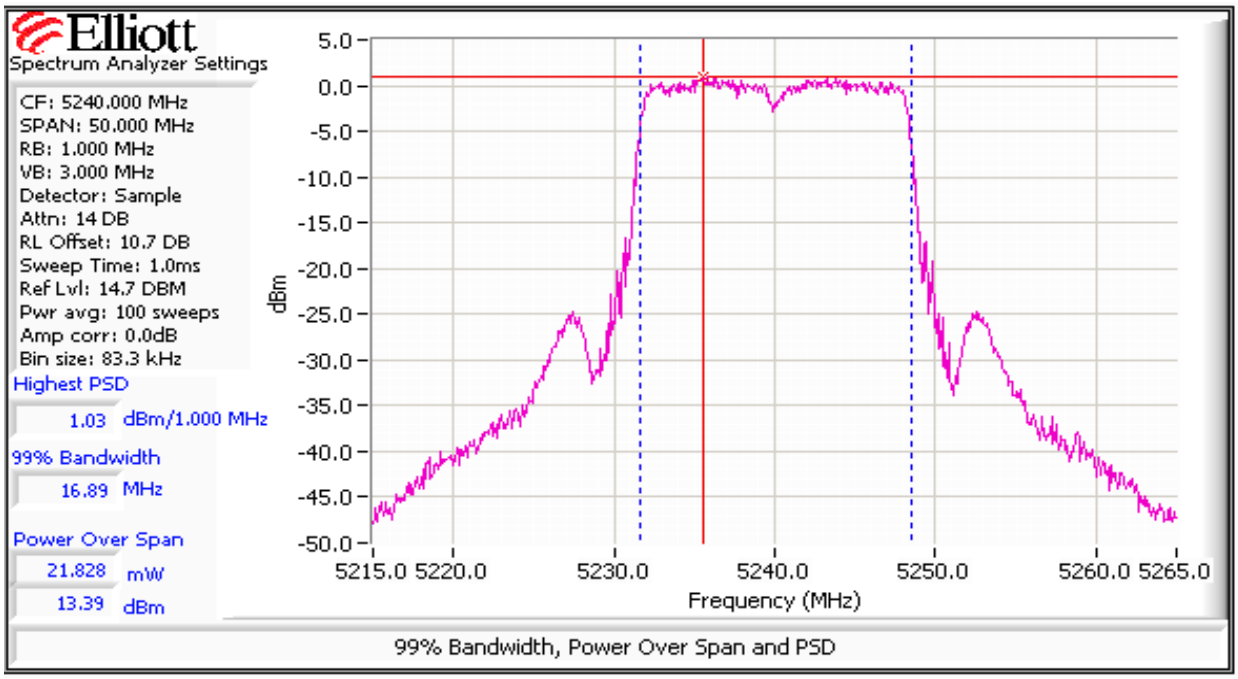
Frequency (MHz)	Software Setting	Bandwidth		Output Power[1,5] dBm		Power (Watts)	PSD[2,5] dBm/MHz			Result
		26dB	99%[4]	Measured	Limit		Measured	FCC Limit	RSS Limit[3]	
5260	-	36.0	17.5	17.3	21.3	0.054	6.8	8.3	11.0	Pass
5300	-	43.9	17.5	17.4	21.3	0.055	6.6	8.3	11.0	Pass
5320	-	38.3	17.4	16.7	21.3	0.047	4.3	8.3	11.0	Pass

Antenna Gain[5] (dBi): 8.76 EIRP: 368.1 mW 25.7 dBm

Frequency (MHz)	Software Setting	Bandwidth		Output Power[1,5] dBm		Power (Watts)	PSD[2,5] dBm/MHz			Result
		26dB	99%[4]	Measured	Limit		Measured	FCC Limit	RSS Limit[3]	
5500	-	42.0	17.4	16.4	21.2	0.044	5.9	8.2	11.0	Pass
5580	-	38.0	17.4	16.5	21.2	0.045	5.9	8.2	11.0	Pass
5700	-	42.9	17.4	16.9	21.2	0.049	6.6	8.2	11.0	Pass

Note:	Highlighed items indicate power was reduced from the integral antenna configuration for use with the new antennas. Non highlighted measurements were taken from original testing (J78065).
Note 1:	RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 50 MHz
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #2: Bandwidth, Output Power and Power Spectral Density - Multi-Chain Systems - 802.11n20

	Chain 1	Chain 2	Chain 3	Coherent	Effective[5]	EIRP (mW)	EIRP (dBm)
Antenna Gain[6] (dBi):	8.66	8.66		Yes	11.7	895.8	29.5

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power[1,5] dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 1	Chain 2	Chain 3	mW	dBm			
5260	-	30.3	13.8	15.1		56.3	17.5	18.3	0.061	PASS
5300	-	30.0	14.2	15.4		61.0	17.9	18.3		PASS
5320	-	26.5	14.1	15.3		59.6	17.8	18.3		PASS

Frequency (MHz)	99%[4] BW	Total Power	PSD[2,5] dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 1	Chain 2	Chain 3	mW/MHz	dBm/MHz	FCC	RSS 210[3]	
5260	18.5	17.5	1.4	2.7		3.2	5.1	5.3	11.0	PASS
5300	18.1	17.9	1.5	2.7		3.3	5.2	5.3	11.0	PASS
5320	18.1	17.8	1.8	2.7		3.4	5.3	5.3	11.0	PASS

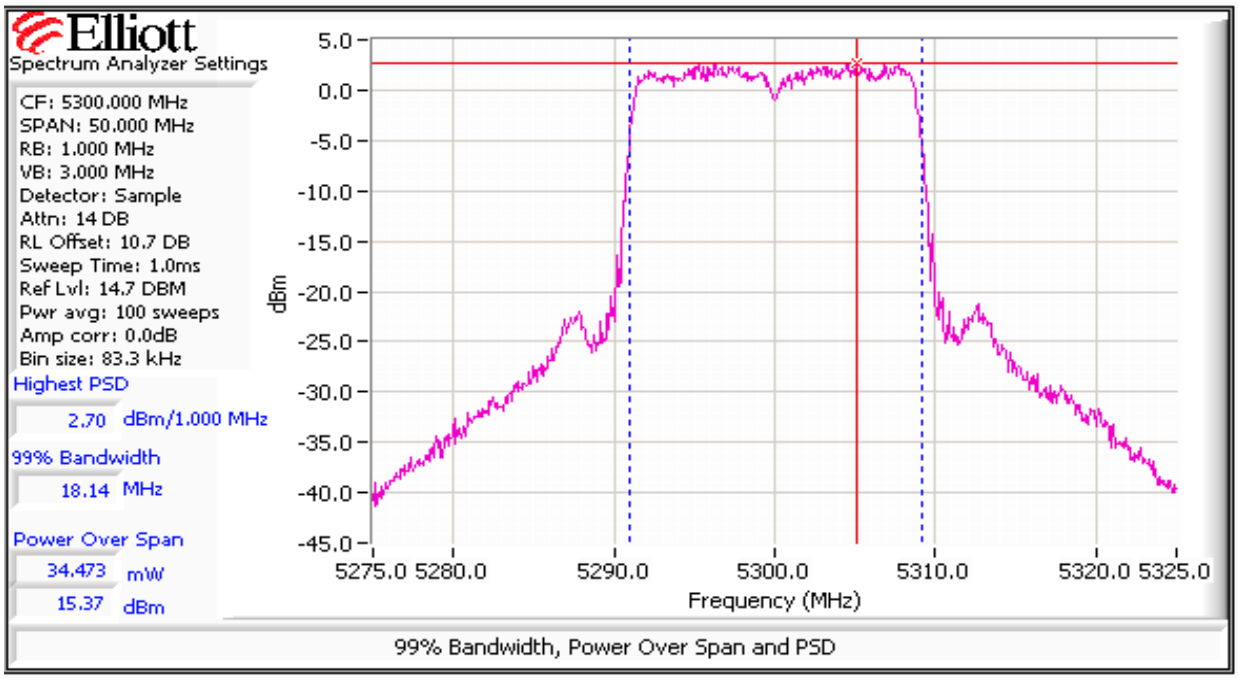
	Chain 1	Chain 2	Chain 3	Coherent	Effective[5]	EIRP (mW)	EIRP (dBm)
Antenna Gain[6] (dBi):	8.76	8.76		Yes	11.8	859.9	29.3

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power[1] dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 1	Chain 2	Chain 3	mW	dBm			
5500	-	26.6	13.9	14.9		55.5	17.4	18.2	0.057	PASS
5580	-	33.8	14.2	14.9		57.2	17.6	18.2		PASS
5700	-	30.8	12.4	11.8		32.4	15.1	18.2		PASS

Frequency (MHz)	99%[4] BW	Total Power	PSD[2] dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 1	Chain 2	Chain 3	mW/MHz	dBm/MHz	FCC	RSS 210[3]	
5500	18.1	17.4	1.8	2.3		3.2	5.1	5.2	11.0	PASS
5580	18.1	17.6	1.7	2.6		3.3	5.2	5.2	11.0	PASS
5700	18.1	15.1	-0.1	-1.0		1.8	2.5	5.2	11.0	PASS

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Note:	Highlighed items indicate power was reduced from the integral antenna configuration for use with the new antennas. Non highlighted measurements were taken from original testing (J78065).
Note 1:	Output power measured using a spectrum analyzer (see plots below): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 50 MHz
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB
Note 5:	For MIMO systems the total output power and total PSD are calculated form the sum of the powers of the individual chains (in linear terms). The antenna gain used to determine the EIRP and limits for PSD/Output power depends on the operating mode of the MIMO device. If the signals on the non-coherent between the transmit chains then the gain used to determine the limits is the highest gain of the individual chains and the EIRP is the sum of the products of gain and power on each chain. If the signals are coherent then the effective antenna gain is the sum (in linear terms) of the gains for each chain and the EIRP is the product of the effective gain and total power.



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #3: Bandwidth, Output Power and Power Spectral Density - Multi-Chain Systems - 802.11n40

	Chain 1	Chain 2	Chain 3	Coherent	Effective[5]	EIRP (mW)	EIRP (dBm)
Antenna Gain[6] (dBi):	8.66	8.66		Yes	11.7	975.2	29.9

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power[1,5] dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 1	Chain 2	Chain 3	mW	dBm			
5270	-	61.3	14.9	15.5		66.4	18.2	18.3	0.066	PASS
5310	-	41.3	10.6	10.8		23.5	13.7	18.3		PASS

Frequency (MHz)	99%[4] BW	Total Power	PSD[2,5] dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 1	Chain 2	Chain 3	mW/MHz	dBm/MHz	FCC	RSS 210[3]	
5270	36.6	18.2	-0.8	-0.1		1.8	2.6	5.3	11.0	PASS
5310	36.6	13.7	-1.5	-1.7		1.4	1.4	5.3	10.6	PASS

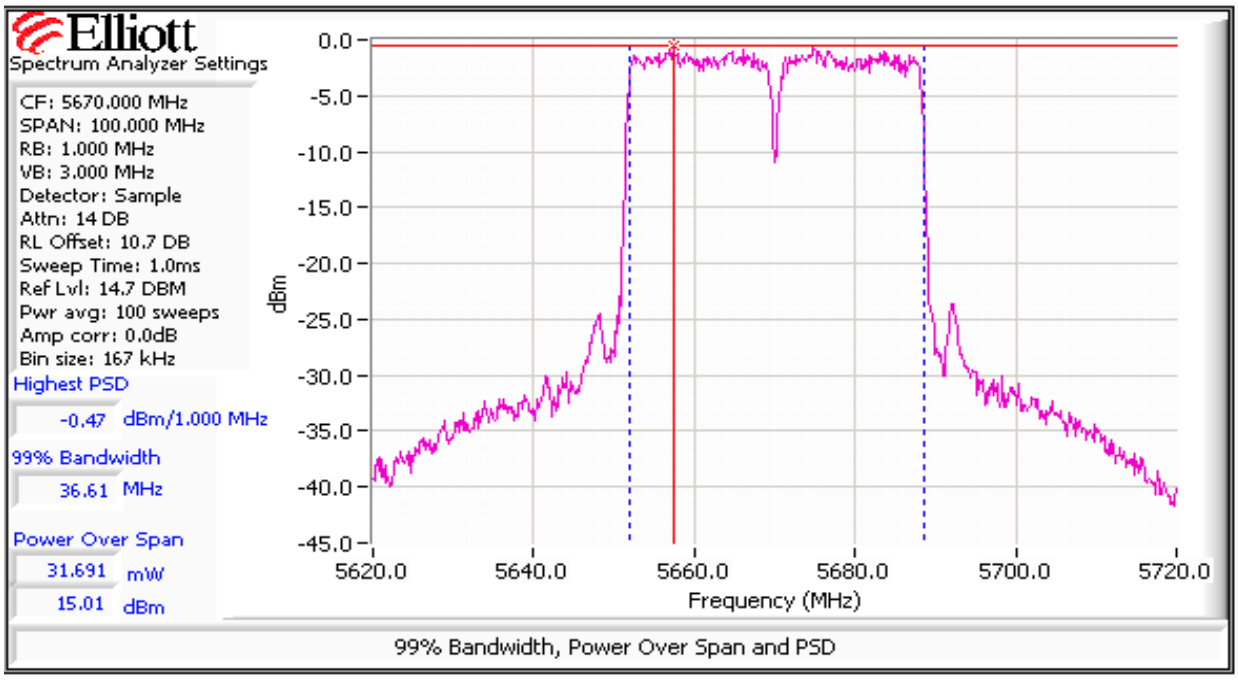
	Chain 1	Chain 2	Chain 3	Coherent	Effective[5]	EIRP (mW)	EIRP (dBm)
Antenna Gain[6] (dBi):	8.76	8.76		Yes	11.8	950.7	29.8

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power[1,5] dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 1	Chain 2	Chain 3	mW	dBm			
5510	-	41.1	12.5	12.6		36.0	15.6	18.2	0.063	PASS
5550	-	51.3	14.8	15.0		61.8	17.9	18.2		PASS
5670	-	72.5	15.0	15.0		63.2	18.0	18.2		PASS

Frequency (MHz)	99%[4] BW	Total Power	PSD[2,5] dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 1	Chain 2	Chain 3	mW/MHz	dBm/MHz	FCC	RSS 210[3]	
5510	36.6	15.6	-0.5	-1.2		1.7	2.2	5.2	11.0	PASS
5550	36.8	17.9	1.4	2.4		3.1	4.9	5.2	11.0	PASS
5670	36.6	18.0	-0.8	-0.5		1.7	2.4	5.2	11.0	PASS

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Note:	Highlighed items indicate power was reduced from the integral antenna configuration for use with the new antennas. Non highlighted measurements were taken from original testing (J78065).
Note 1:	Output power measured using a spectrum analyzer (see plots below): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 100 MHz
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB
Note 5:	For MIMO systems the total output power and total PSD are calculated form the sum of the powers of the individual chains (in linear terms). The antenna gain used to determine the EIRP and limits for PSD/Output power depends on the operating mode of the MIMO device. If the signals on the non-coherent between the transmit chains then the gain used to determine the limits is the highest gain of the individual chains and the EIRP is the sum of the products of gain and power on each chain. If the signals are coherent then the effective antenna gain is the sum (in linear terms) of the gains for each chain and the EIRP is the product of the effective gain and total power.



99% Bandwidth, Power Over Span and PSD

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

RSS-210 (LELAN) and FCC 15.407(UNII)
Antenna Port Measurements
Power and PSD - STBC Operation

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/18/2011
Test Engineer: David Bare
Test Location: FT EMC Lab #4

Config. Used: 3
Config Change: None
EUT Voltage: POE

Summary of Results

Sample 2011-2606

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power, 5250 - 5350MHz	15.407(a) (1), (2)	Pass	802.11n 20MHz: 74.1 mW 802.11n n40MHz: 77.4 mW
1	PSD, 5250 - 5350MHz	15.407(a) (1), (2)	Pass	802.11n 20MHz: 6.3 dBm/MHz 802.11n n40MHz: 3.3 dBm/MHz
1	Max EIRP 5250 - 5350MHz	TPC required if EIRP≥ 500mW (27dBm). EIRP ≥ 200mW (23dBm) DFS threshold = -64dBm.	Pass	EIRP = 27.5 dBm (567.7 mW)
1	26dB Bandwidth	15.407 (Information only)	-	> 20MHz for all modes
1	99% Bandwidth	RSS 210 (Information only)	-	802.11n 20MHz: 18.1 MHz 802.11n n40MHz: 36.6 MHz

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

General Test Configuration

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators and cables used.

Ambient Conditions:

Temperature:	22 °C
Rel. Humidity:	41 %

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Test Notes

STBC mode, non coherent, MCS 0 used for all tests.

= measurement from original testing
= power reduced due to radiated bandedge

Note 1:	Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was not continuous but the analyzer was configured with a gated sweep such that the analyzer was only sweeping when the device was transmitting) and power integration over 50 or 100 MHz (method 1 of DA-02-2138A1).
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >=3xRB
Note 5:	For MIMO systems the total output power and total PSD are calculated from the sum of the powers of the individual chains (in linear terms). The antenna gain used to determine the EIRP and limits for PSD/Output power depends on the operating mode of the MIMO device. If the signals on the non-coherent between the transmit chains then the gain used to determine the limits is the highest gain of the individual chains and the EIRP is the sum of the products of gain and power on each chain. If the signals are coherent then the effective antenna gain is the sum (in linear terms) of the gains for each chain and the EIRP is the product of the effective gain and total power.

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #1: Bandwidth, Output Power and Power Spectral Density - MIMO Systems

MIMO Device - 5250-5350 MHz Band
NOTE - total power can not exceed 18.9dBm (0.078W)

	Chain 1	Chain 2	Chain 3	Coherent	Effective[5]	EIRP (mW)	EIRP (dBm)
Antenna Gain (dBi):	8.66	8.66		No	8.7	568.5	27.5

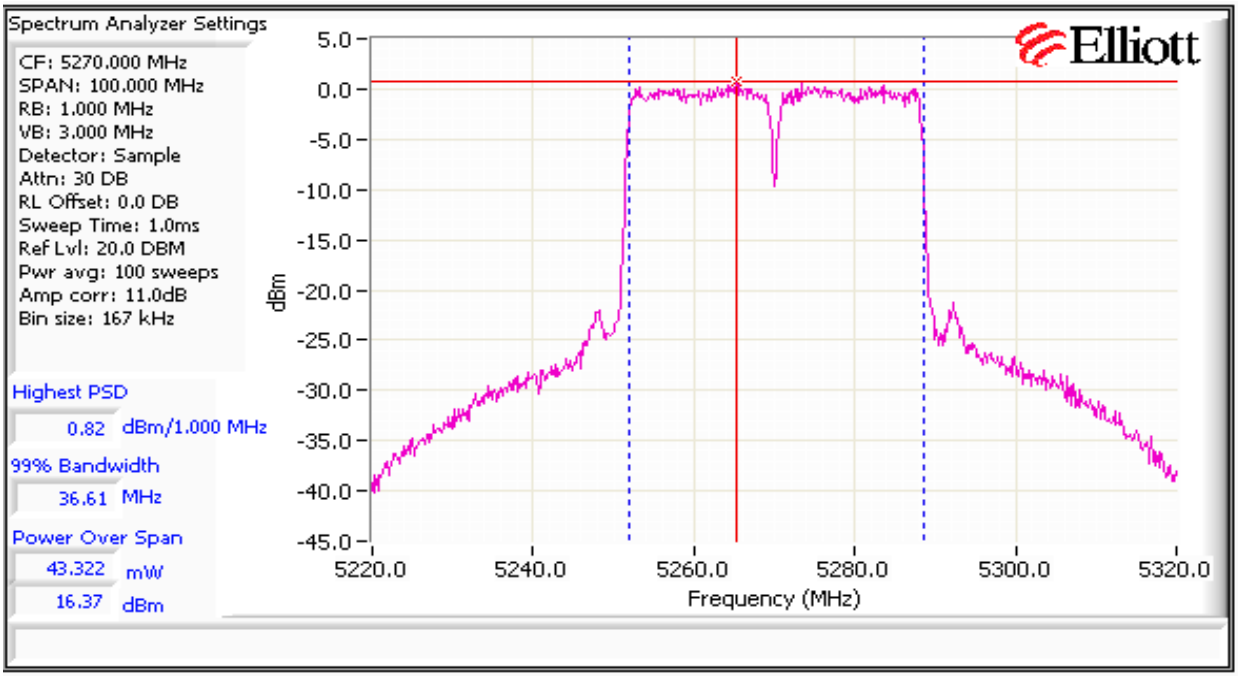
Power

Frequency (MHz)	Software Setting	26dB BW (MHz)	Measured Output Power[1] dBm			Total		Limit (dBm)	Max Power (W)	Pass or Fail
			Chain 1	Chain 2	Chain 3	mW	dBm			
20MHz Mode										
5260	-	30.3	16.3	14.9		73.6	18.7	21.3	0.074	PASS
5300	-	30.0	16.4	14.9		74.1	18.7	21.3		PASS
5320	-	26.5	14.2	13.2		47.2	16.7	21.3		PASS
40MHz Mode										
5270	-	61.3	16.4	15.3		77.4	18.9	21.3	0.077	PASS
5310	-	41.3	11.6	11.0		27.0	14.3	21.3		PASS

PSD

Frequency (MHz)	99%[4] BW	Total Power	PSD[2] dBm/MHz			Total PSD		Limit		Pass or Fail
			Chain 1	Chain 2	Chain 3	mW/MHz	dBm/MHz	FCC	RSS 210[3]	
20MHz Mode										
5260	18.1	18.7	3.8	2.3		4.1	6.1	8.3	11.0	PASS
5300	18.1	18.7	4.2	2.1		4.2	6.3	8.3	11.0	PASS
5320	18.1	16.7	1.8	0.9		2.7	4.4	8.3	11.0	PASS
40MHz Mode										
5270	36.6	18.9	0.8	-0.4		2.1	3.3	8.3	11.0	PASS
5310	36.4	14.3	-3.6	-3.9		0.8	-0.7	8.3	11.0	PASS

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Config Change: Console port no cabled EUT Voltage: POE

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 21 °C

Rel. Humidity: 38 %

Summary of Results

Run #	Mode	Channel	Power Setting		Test Performed	Limit	Result / Margin
2	802.11n20	5250-5350 Low	-		Radiated Emissions, 1 - 18 GHz	FCC 15.209 / 15 E	42.8dBµV/m @ 10519.7MHz (-11.2dB)
	802.11n20	5250-5350 Center	-		Radiated Emissions, 1 - 18 GHz	FCC 15.209 / 15 E	47.0dBµV/m @ 5460.0MHz (-7.0dB)
	802.11n20	5250-5350 High	-		Radiated Emissions, 1 - 18 GHz	FCC 15.209 / 15 E	51.2dBµV/m @ 5434.8MHz (-2.8dB)
	802.11n20	5250-5350 High	-		Restricted Band Edge at 5350 MHz	15.209	53.7dBµV/m @ 5351.62MHz (-0.3dB)
4	802.11n40	5250-5350 Low	-		Radiated Emissions, 1 - 18 GHz	FCC 15.209 / 15 E	44.2dBµV/m @ 10540.0MHz (-24.1dB)
	802.11n40	5250-5350 High	-		Radiated Emissions, 1 - 18 GHz	FCC 15.209 / 15 E	41.9dBµV/m @ 10616.9MHz (-12.1dB)
	802.11n40	5250-5350 High	-		Restricted Band Edge at 5350 MHz	15.209	53.9dBµV/m @ 5350.11MHz (-0.1dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Test Notes

A near field scan showed no emissions above 18GHz. No radio related emissions were detected below 1GHz.

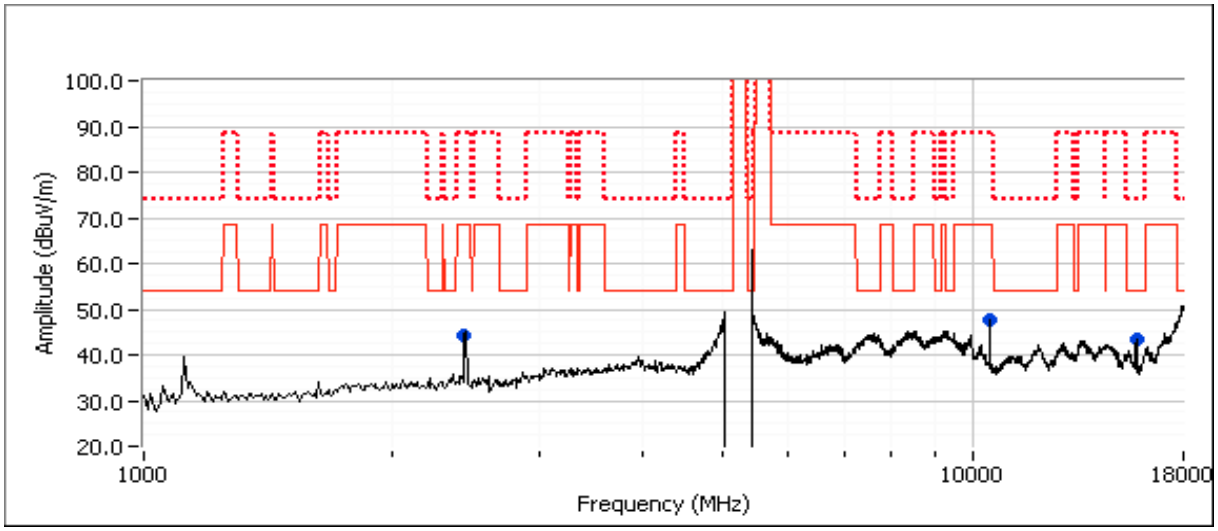
Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is the same measurement method used to determine the in-band power spectral density or a peak measurement (RB=1MHz, VB>1MHz). Pavg indicates that the power averaging method of measurement was used for the measurement of emissions outside of the restricted bands. PK indicates that a peak measurement was made.

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #2, Radiated Spurious Emissions, 1,000 - 18,000 MHz. Operation in the 5250-5350 MHz Band, 802.11n20 STBC

Date of Test: 7/19/2011
Test Engineer: Mark Hill
Test Location: FT#3

Run #2a: Low Channel

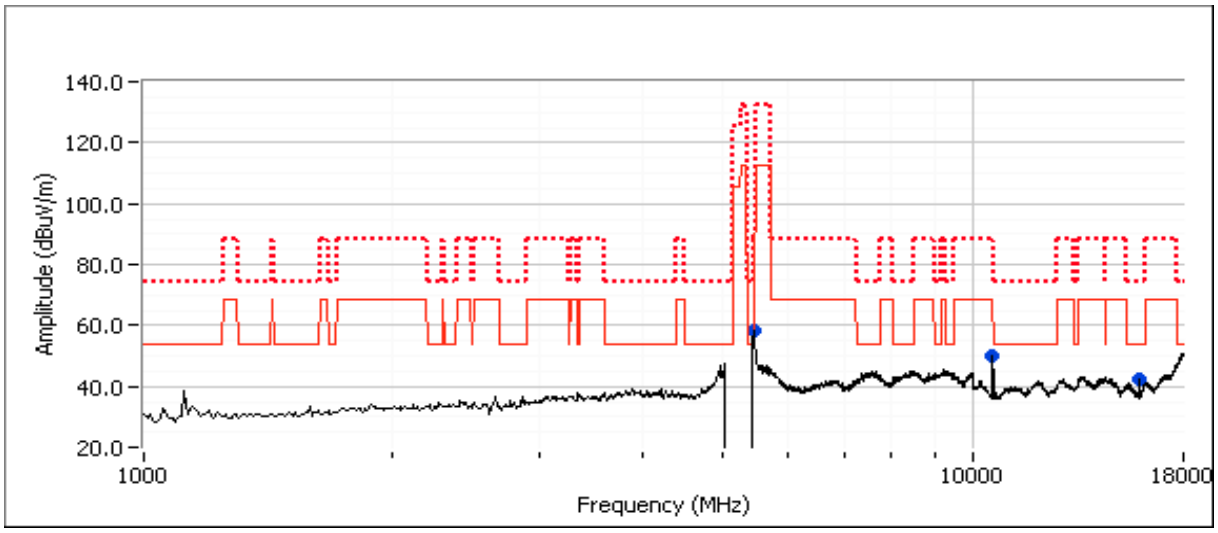


Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
10519.720	42.8	H	54.0	-11.2	AVG	173	1.1	RB 1 MHz;VB 10 Hz;Pk
15782.240	40.7	H	54.0	-13.3	AVG	158	1.0	RB 1 MHz;VB 10 Hz;Pk
10519.650	38.4	V	54.0	-15.6	AVG	158	1.0	RB 1 MHz;VB 10 Hz;Pk
15783.370	38.3	V	54.0	-15.7	AVG	151	1.0	RB 1 MHz;VB 10 Hz;Pk
10519.390	54.0	H	74.0	-20.0	PK	173	1.1	RB 1 MHz;VB 3 MHz;Pk
15784.440	53.3	H	74.0	-20.7	PK	158	1.0	RB 1 MHz;VB 3 MHz;Pk
15788.700	51.5	V	74.0	-22.5	PK	151	1.0	RB 1 MHz;VB 3 MHz;Pk
10522.250	50.5	V	74.0	-23.5	PK	158	1.0	RB 1 MHz;VB 3 MHz;Pk

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #2b: Center Channel



Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5460.000	47.0	H	54.0	-7.0	AVG	182	1.3	POS; RB 1 MHz; VB: 10 Hz
10600.170	46.0	H	54.0	-8.0	AVG	115	1.1	RB 1 MHz;VB 10 Hz;Pk
15903.130	39.0	H	54.0	-15.0	AVG	211	1.0	RB 1 MHz;VB 10 Hz;Pk
5459.280	57.7	H	74.0	-16.3	PK	182	1.3	POS; RB 1 MHz; VB: 10 MHz
15896.130	50.6	H	74.0	-23.4	PK	211	1.0	RB 1 MHz;VB 3 MHz;Pk
10597.770	59.3	H	88.3	-29.0	PK	115	1.1	RB 1 MHz;VB 3 MHz;Pk

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

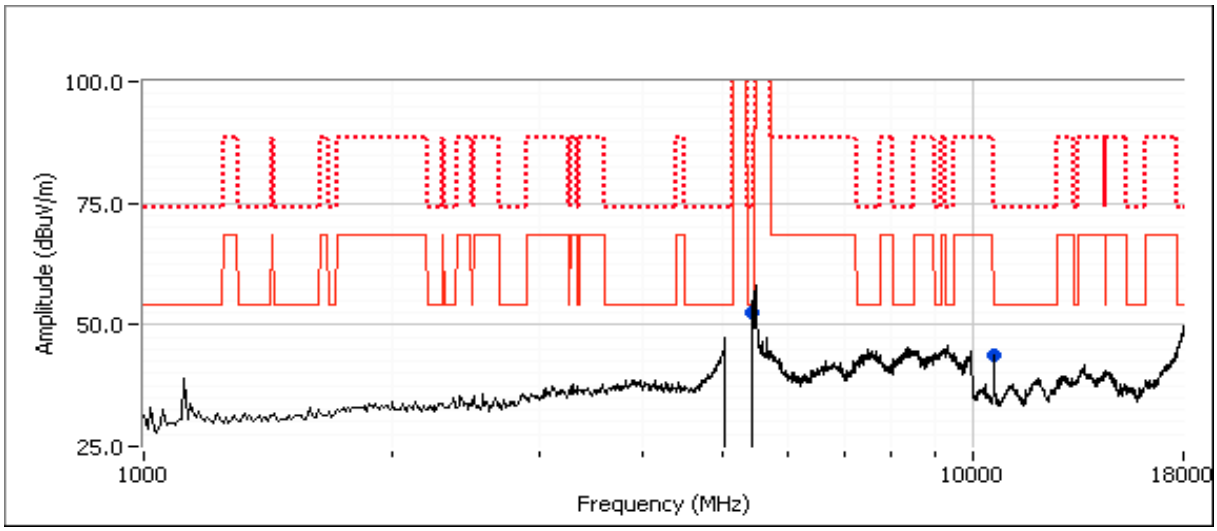
Run #2c: High Channel

5350 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5351.620	53.7	H	54.0	-0.3	AVG	335	1.1	POS; RB 1 MHz; VB: 10 Hz
5351.360	70.0	H	74.0	-4.0	PK	335	1.1	POS; RB 1 MHz; VB: 10 MHz

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5434.800	51.2	H	54.0	-2.8	AVG	159	1.0	RB 1 MHz;VB 10 Hz;Pk
5432.000	62.6	H	74.0	-11.4	PK	159	1.0	RB 1 MHz;VB 3 MHz;Pk
10640.080	45.2	H	54.0	-8.8	AVG	192	1.0	RB 1 MHz;VB 10 Hz;Pk
10637.380	57.8	H	74.0	-16.2	PK	192	1.0	RB 1 MHz;VB 3 MHz;Pk



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #4, Radiated Spurious Emissions, 1,000 - 18,000 MHz. Operation in the 5250-5350 MHz Band, 802.11n40 STBC

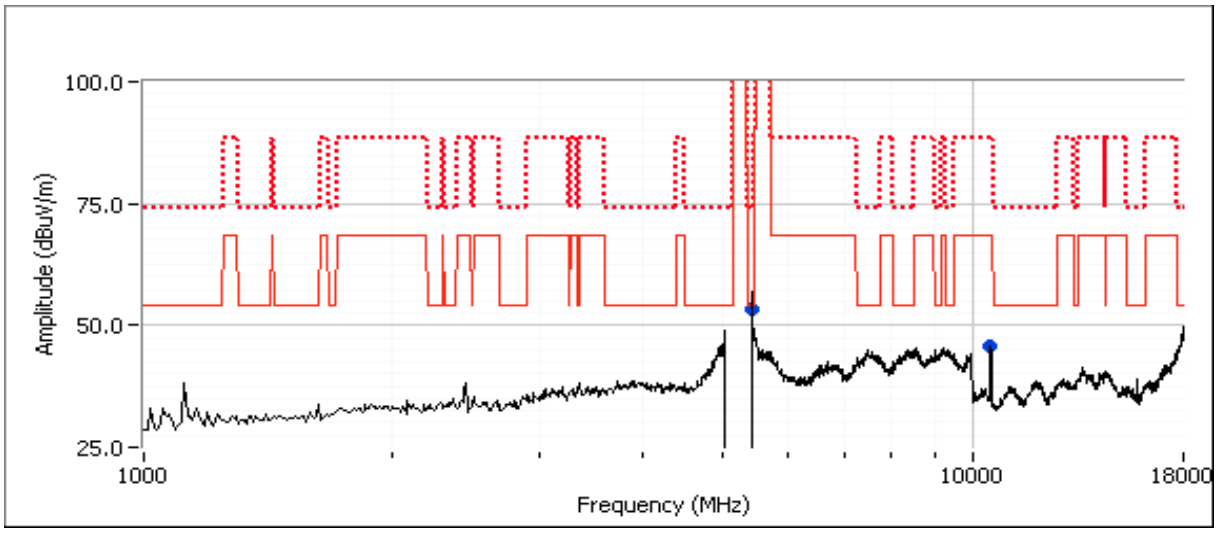
Date of Test: 7/19/2011 Test Location: FT chamber #3

Test Engineer: Mehran Birgani

Run #4a: Low Channel

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5430.120	47.5	H	54.0	-6.5	AVG	174	1.2	RB 1 MHz;VB 10 Hz;Pk
5434.590	56.5	H	74.0	-17.5	PK	174	1.2	RB 1 MHz;VB 3 MHz;Pk
10539.970	44.2	H	68.3	-24.1	AVG	182	1.6	RB 1 MHz;VB 10 Hz;Pk
10539.500	57.3	H	88.3	-31.0	PK	182	1.6	RB 1 MHz;VB 3 MHz;Pk

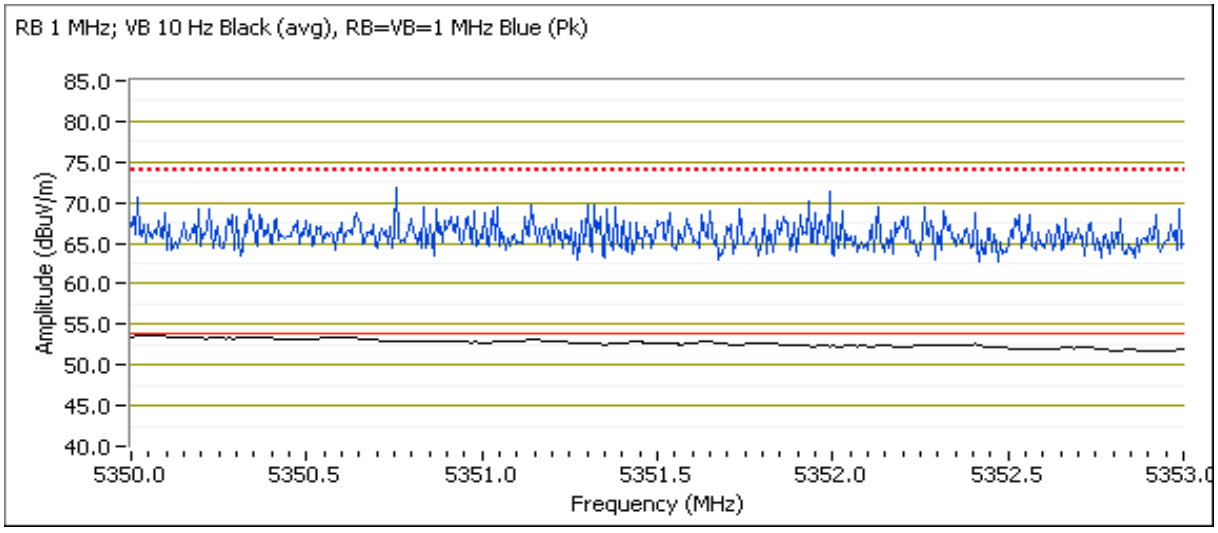


Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #4b: High Channel

5350 MHz Band Edge Signal Radiated Field Strength

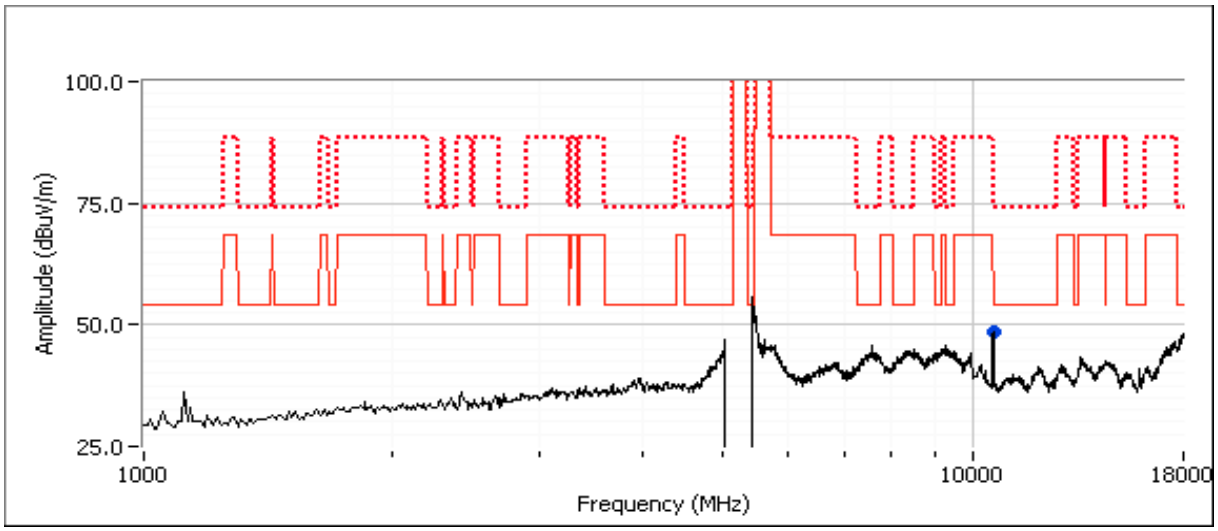
Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5350.110	53.9	V	54.0	-0.1	AVG	325	1.1	POS; RB 1 MHz; VB: 10 Hz
5350.800	71.8	V	74.0	-2.2	PK	325	1.1	POS; RB 1 MHz; VB: 10 MHz
5350.000	53.5	H	54.0	-0.5	AVG	333	1.0	POS; RB 1 MHz; VB: 10 Hz
5350.240	70.8	H	74.0	-3.2	PK	333	1.0	POS; RB 1 MHz; VB: 10 MHz



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
10616.860	41.9	H	54.0	-12.1	AVG	107	1.0	RB 1 MHz;VB 10 Hz;Pk
10616.460	56.2	H	74.0	-17.8	PK	107	1.0	RB 1 MHz;VB 3 MHz;Pk



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

RSS 210 and FCC 15.407 (UNII) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located outside the chamber.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 12-17 °C

Rel. Humidity: 30-50 %

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Notes

Spurious emissions testing performed for the worst case OFDM mode from the original filing for each band. Bandedge measurements performed for all modes.

A near field scan showed no emissions above 18GHz. No radio related emissions were detected below 1GHz.

Prior to testing, the output power was configured to be consistent with the level in the original testing.

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Summary of Results - Device Operating in the 5150-5350 MHz Band and 5470-5725 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1d	a	64	-	-	Restricted Band Edge (5350 MHz)	FCC Part 15.209	53.6dBµV/m @ 5350.1MHz (-0.4dB)
1e	a	100	-	-	Restricted Band Edge (5460 MHz)	FCC Part 15.209	53.3dBµV/m @ 5459.5MHz (-0.7dB)
		100	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	52.4dBµV/m @ 11001.2MHz (-1.6dB)
1f	a	116	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	53.0dBµV/m @ 11160.8MHz (-1.0dB)
1g	a	140	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	50.9dBµV/m @ 11400.4MHz (-3.1dB)
2b	n20 CDD	64	-	-	Restricted Band Edge (5350 MHz)	FCC Part 15.209	49.3dBµV/m @ 5365.1MHz (-4.7dB)
2c	n20 CDD	100	-	-	Restricted Band Edge (5460 MHz)	FCC Part 15.209	53.5dBµV/m @ 5459.5MHz (-0.5dB)
3b	n40 CDD	54	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	43.0dBµV/m @ 10540.1MHz (-25.3dB)
3c	n40 CDD	62	-	-	Restricted Band Edge (5350 MHz)	FCC Part 15.209	51.3dBµV/m @ 5350.1MHz (-2.7dB)
		62	-	-	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	52.9dBµV/m @ 5460.3MHz (-15.4dB)
3d	n40 CDD	102	-	-	Restricted Band Edge (5460 MHz)	FCC Part 15.209	53.3dBµV/m @ 5460.0MHz (-0.7dB)

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 40000 MHz. Operating Mode: 802.11a

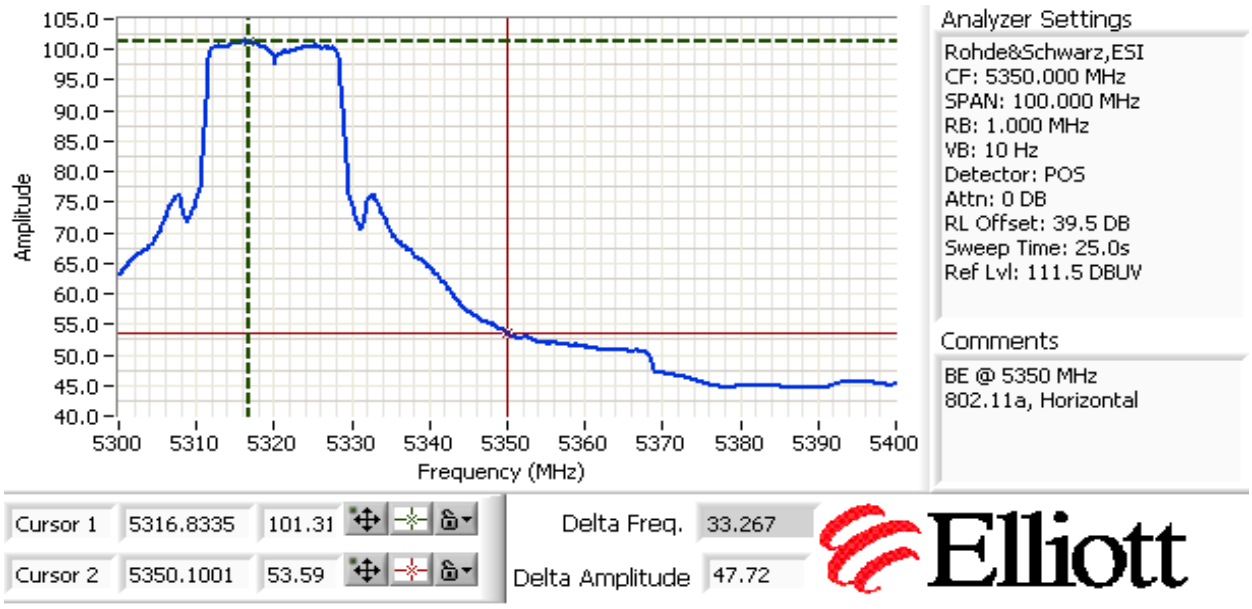
Date of Test: 6/1/2011 Test Location: FT Chamber #4

Test Engineer: M. Birgani / R. Varelas

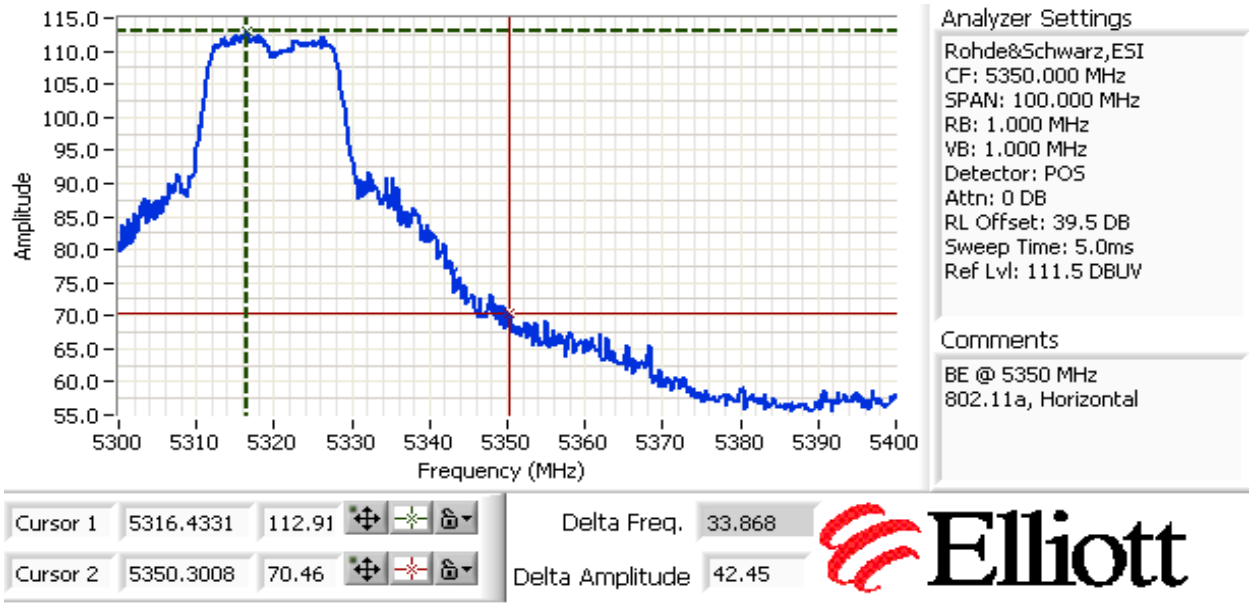
Run #1d: Channel 64 @ 5320 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5350.100	53.6	H	54.0	-0.4	Avg	6	1.0	
5350.301	70.5	H	74.0	-3.5	Pk	6	1.0	
5350.100	40.0	V	54.0	-14.0	Avg	345	1.4	
5350.701	54.3	V	74.0	-19.7	Pk	345	1.4	



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

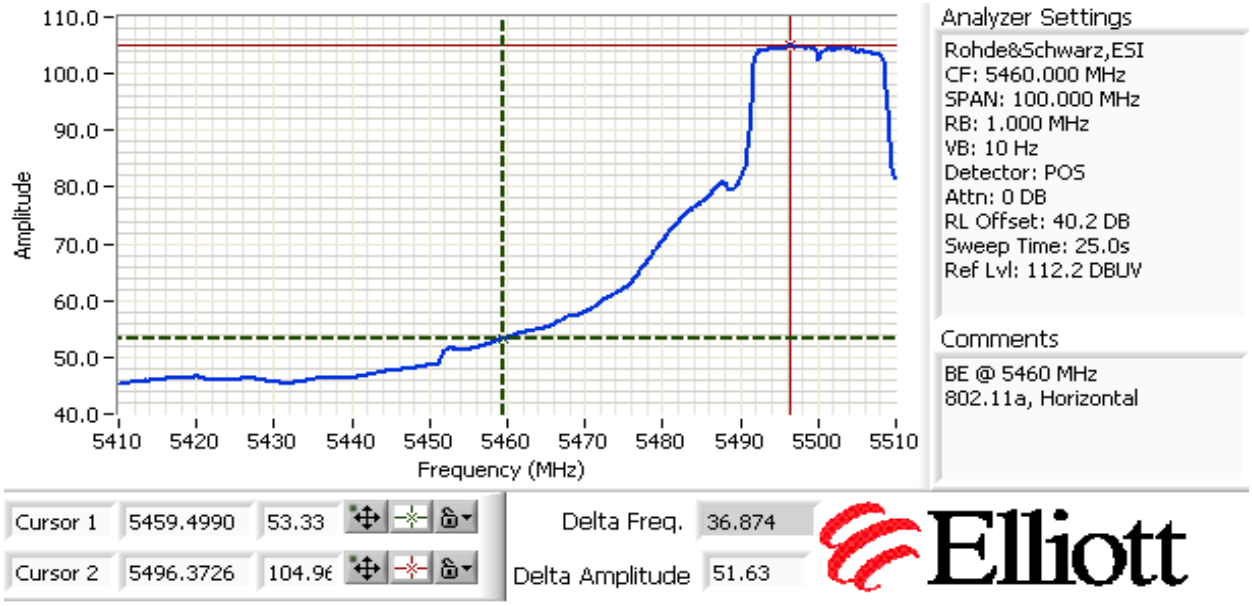


Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

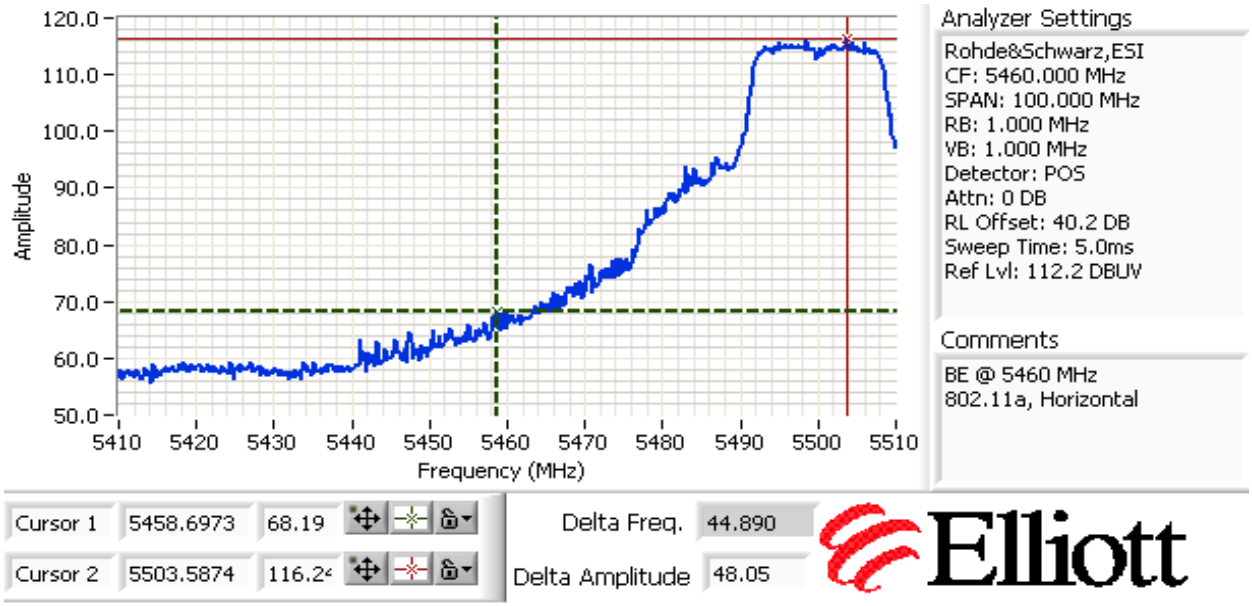
Run #1e: Channel 100 @ 5500 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5459.499	53.3	H	54.0	-0.7	Avg	5	1.0	
5458.697	68.2	H	74.0	-5.8	Pk	5	1.0	
5460.000	40.7	V	54.0	-13.3	Avg	0	1.0	
5458.497	53.8	V	74.0	-20.2	Pk	0	1.0	



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

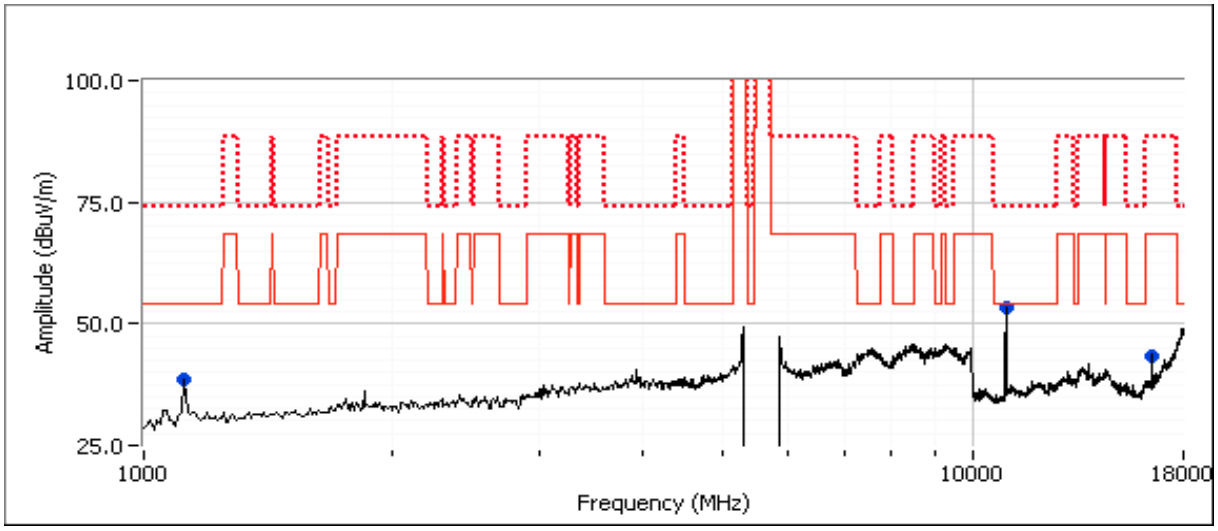


Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
11001.200	52.4	H	54.0	-1.6	AVG	30	1.0	RB 1 MHz;VB 10 Hz;Pk
11007.930	63.8	H	74.0	-10.2	PK	30	1.0	RB 1 MHz;VB 3 MHz;Pk
1125.000	35.4	H	54.0	-18.6	AVG	57	1.5	RB 1 MHz;VB 10 Hz;Pk
1124.900	42.8	H	74.0	-31.2	PK	57	1.5	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the average limit was set to -27dBm/MHz (~68dBuV/m).

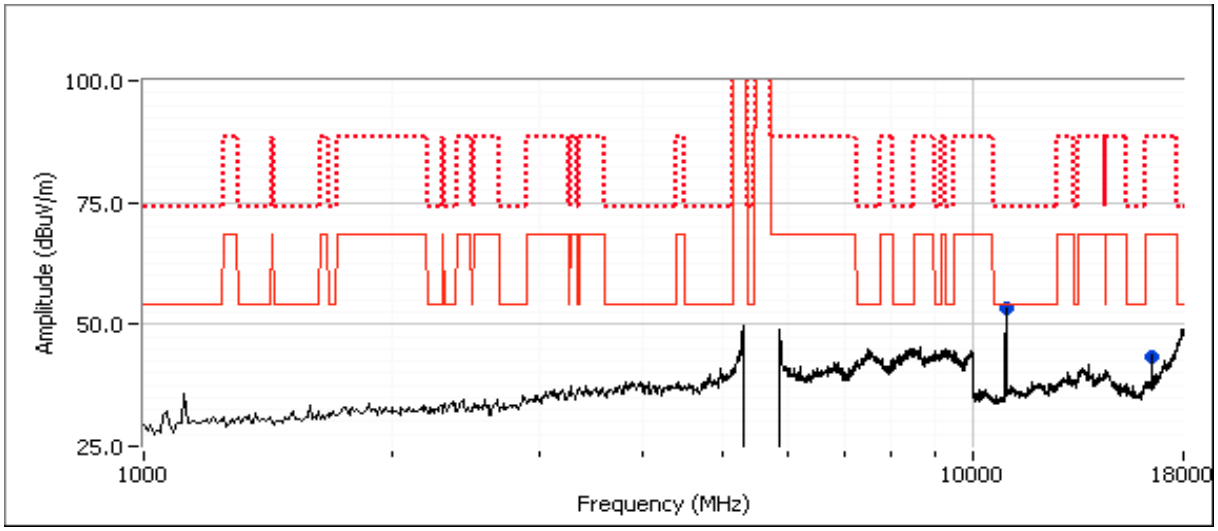


Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #1f: Channel 116 @ 5580 MHz
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
11160.800	53.0	H	54.0	-1.0	AVG	25	1.0	RB 1 MHz;VB 10 Hz;Pk
11166.400	64.3	H	74.0	-9.7	PK	25	1.0	RB 1 MHz;VB 3 MHz;Pk
16500.000	44.8	H	68.3	-23.5	PK	30	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the average limit was set to -27dBm/MHz (~68dBuV/m).

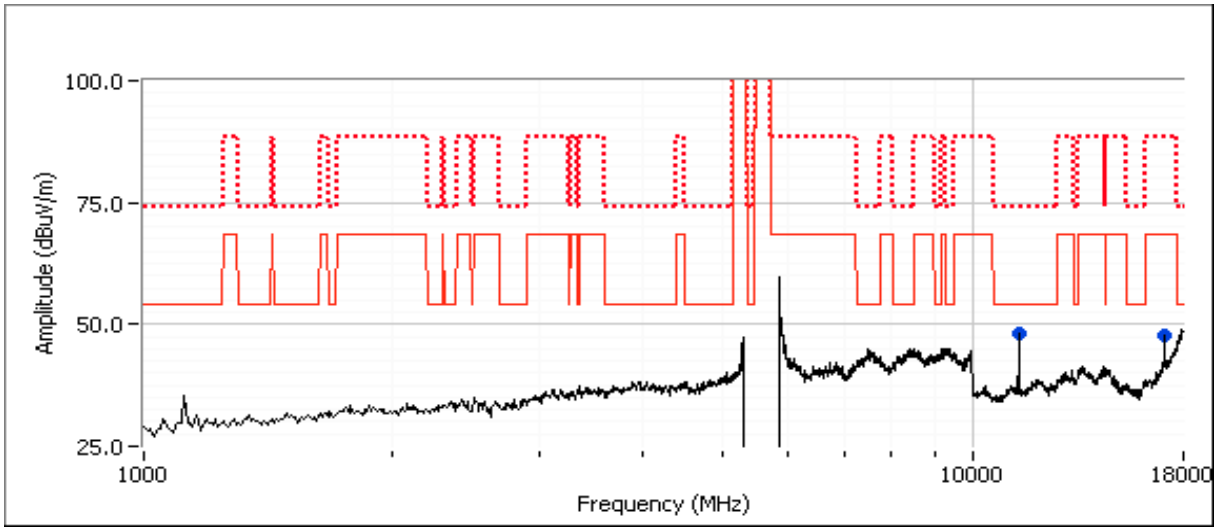


Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #1g: Channel 140 @ 5700 MHz
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
11400.430	50.9	H	54.0	-3.1	AVG	28	1.0	RB 1 MHz;VB 10 Hz;Pk
11398.200	62.3	H	74.0	-11.7	PK	28	1.0	RB 1 MHz;VB 3 MHz;Pk
17093.330	47.9	V	68.3	-20.4	PK	294	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the average limit was set to -27dBm/MHz (~68dBuV/m).



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #2: Radiated Spurious Emissions, 30 - 26500 MHz. Operating Mode: 802.11n 20MHz CDD

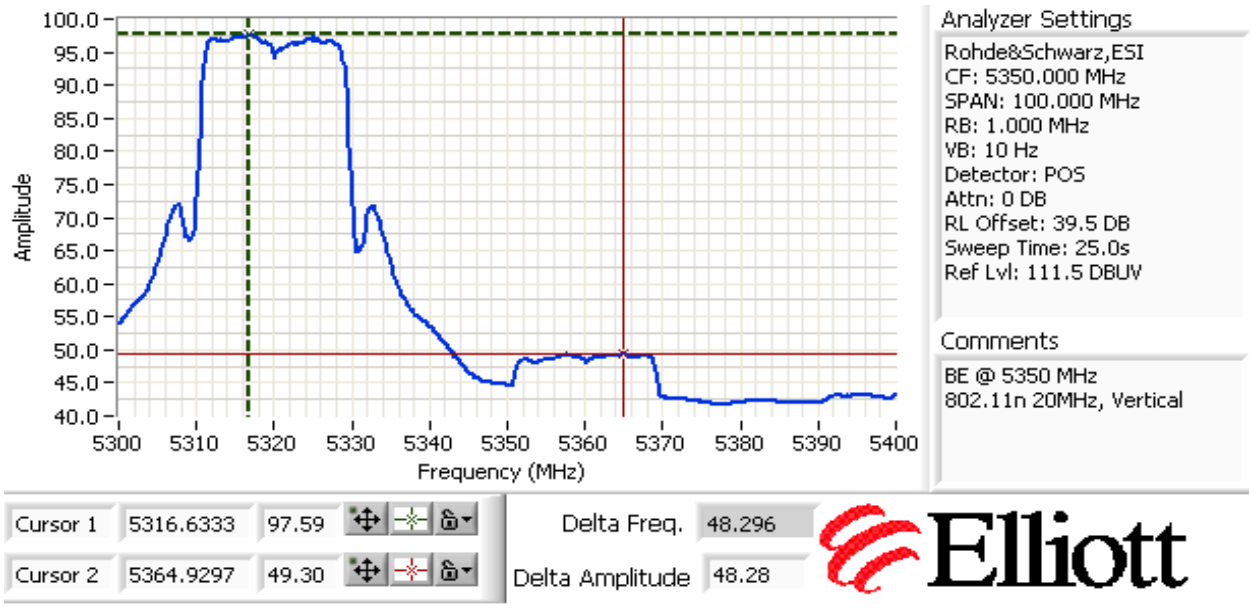
Date of Test: 6/1/2011 Test Location: FT Chamber #3

Test Engineer: Rafael Varelas

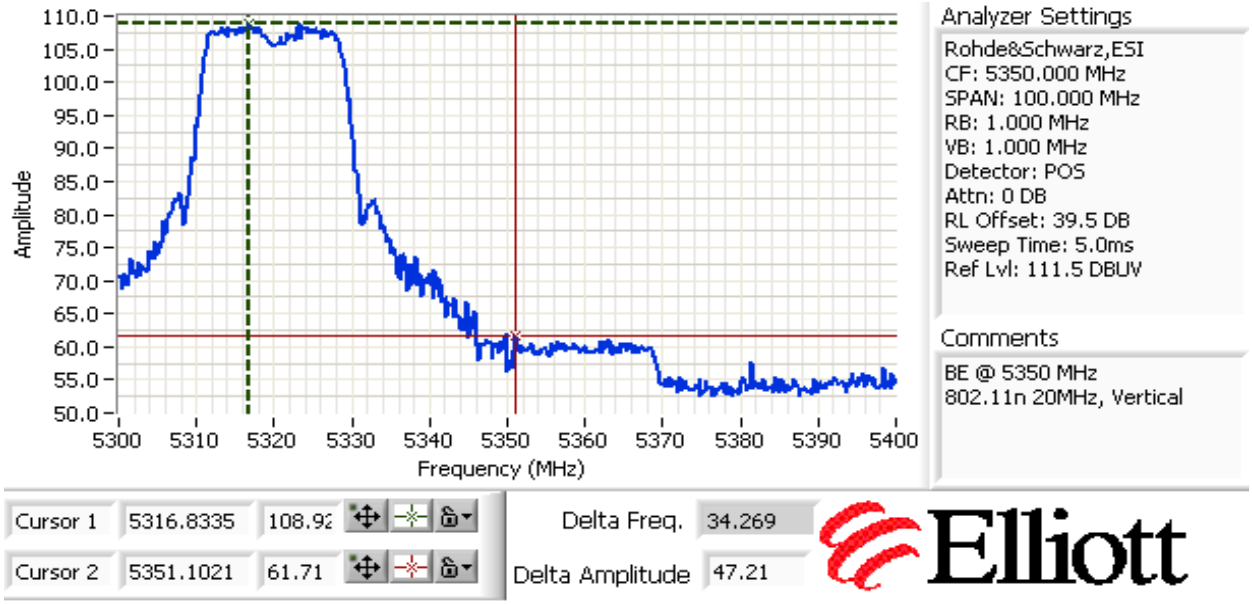
Run #2b: Channel 64 @ 5320 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5365.130	49.3	V	54.0	-4.7	Avg	17	1.0	
5351.102	61.7	V	74.0	-12.3	Pk	17	1.0	
5363.527	45.8	H	54.0	-8.2	Avg	0	1.2	
5354.108	58.8	H	74.0	-15.2	Pk	0	1.2	



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

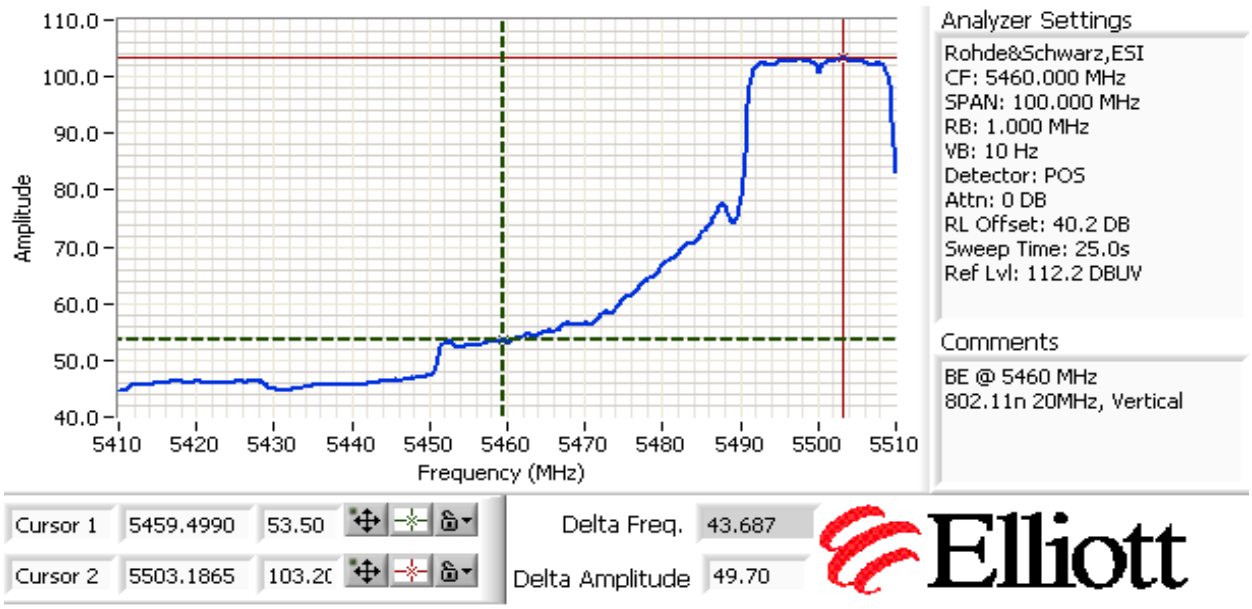


Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

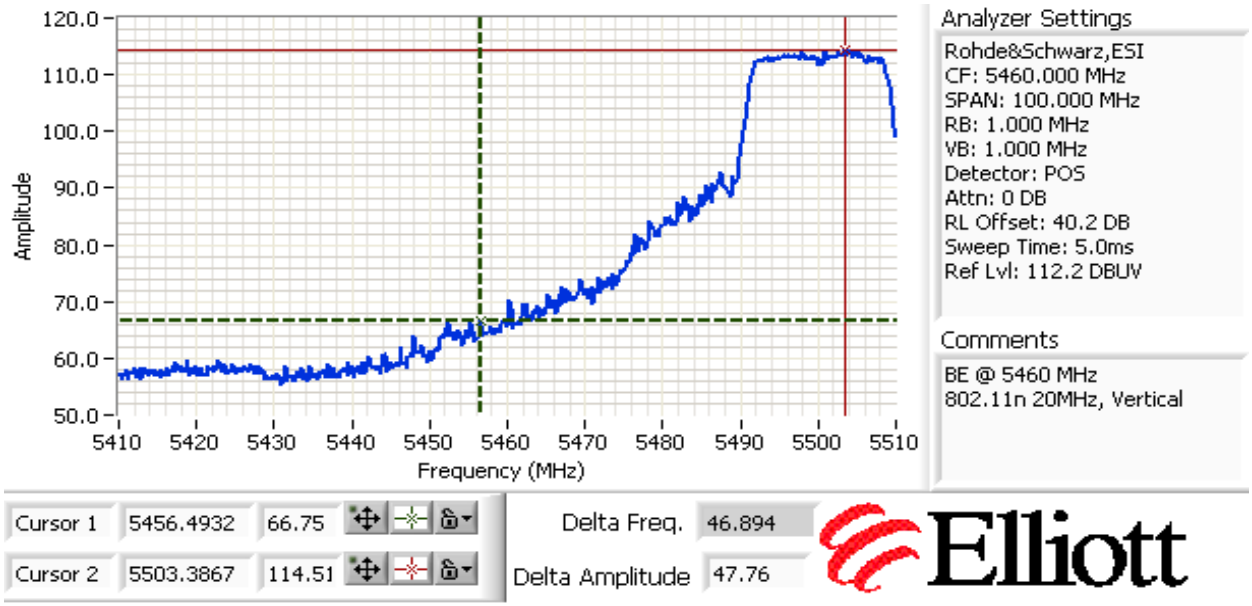
Run #2c: Channel 100 @ 5500 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5459.499	53.5	V	54.0	-0.5	Avg	10	1.1	
5456.493	66.8	V	74.0	-7.3	Pk	10	1.1	
5459.499	50.5	H	54.0	-3.5	Avg	10	1.0	
5459.699	63.3	H	74.0	-10.7	Pk	10	1.0	



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A



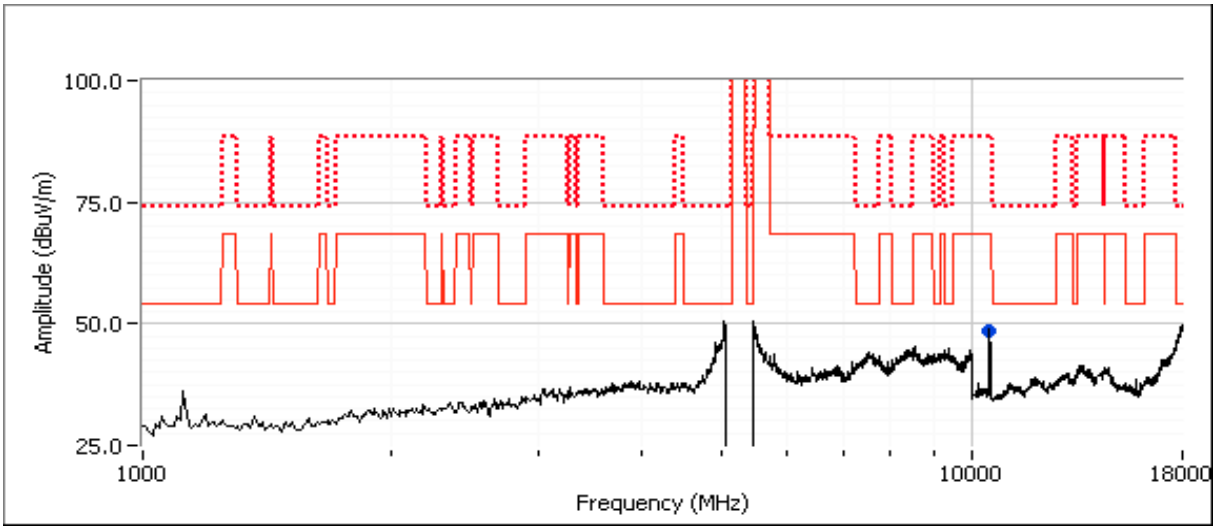
Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

Run #3: Radiated Spurious Emissions, 30 - 40000 MHz. Operating Mode: 802.11n 40MHz CDD
Date of Test: 6/1/2011 Test Location: FT Chamber #4
Test Engineer: Rafael Varelas

Run #3b: Channel 54 @ 5270 MHz
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
10540.130	43.0	H	68.3	-25.3	AVG	315	1.0	RB 1 MHz;VB 10 Hz;Pk
10537.830	56.6	H	88.3	-31.7	PK	315	1.0	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the average limit was set to -27dBm/MHz (~68dBuV/m).

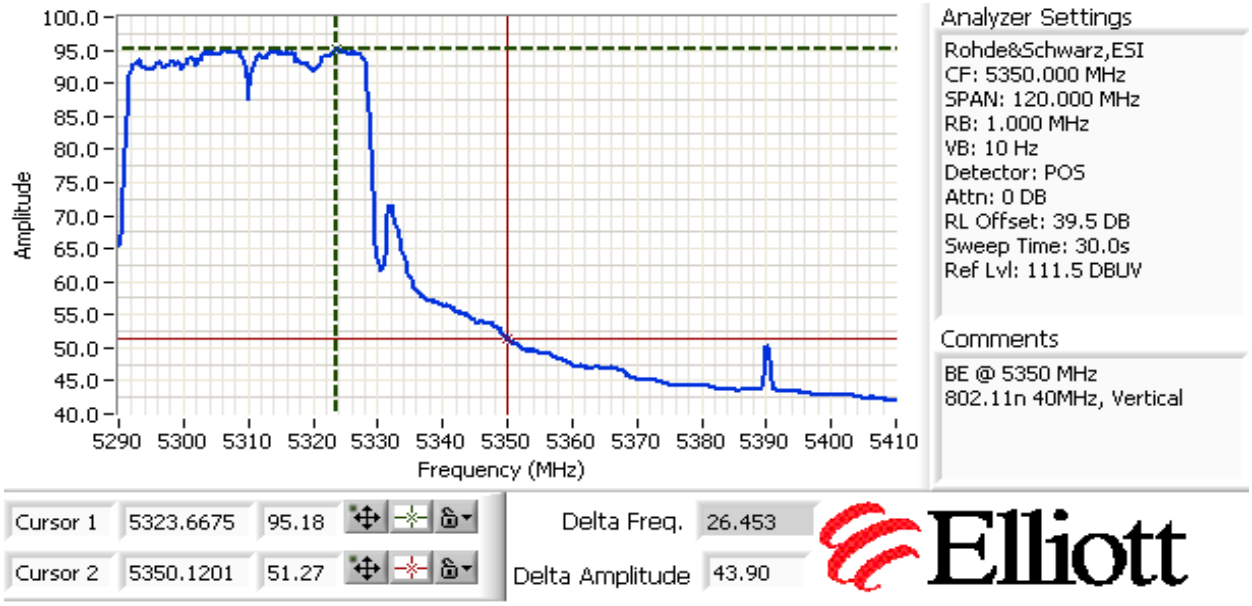


Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

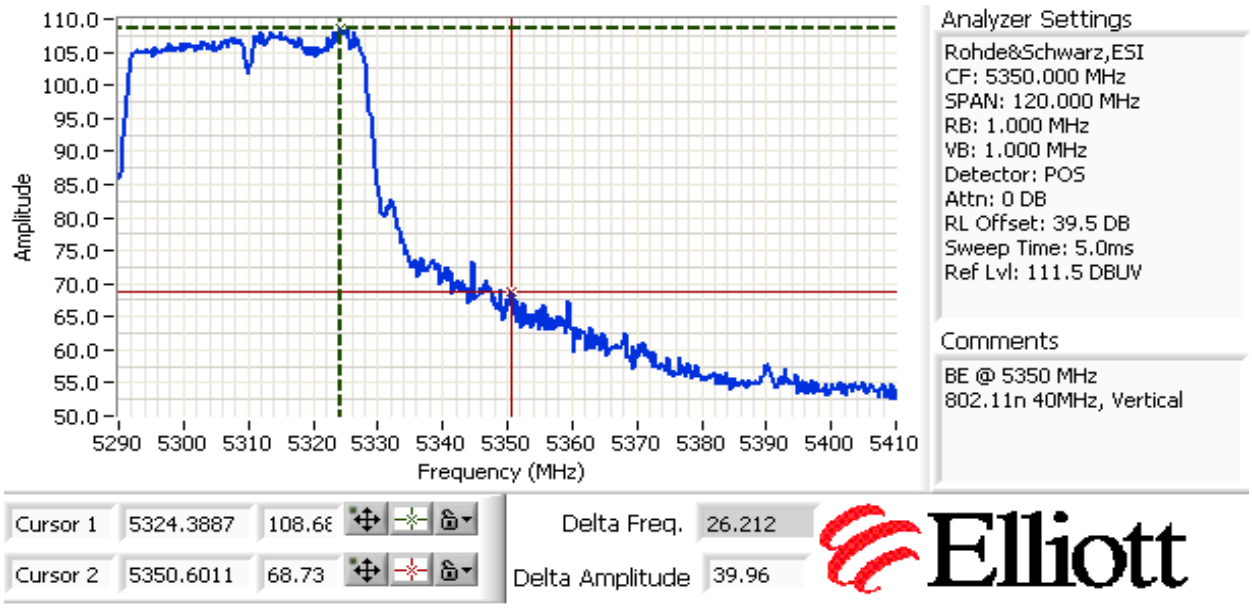
Run #3c: Channel 62 @ 5310 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5350.120	51.3	V	54.0	-2.7	Avg	353	1.0	
5350.601	68.7	V	74.0	-5.3	Pk	353	1.0	
5350.120	50.3	H	54.0	-3.7	Avg	2	1.0	
5351.804	69.5	H	74.0	-4.6	Pk	2	1.0	



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

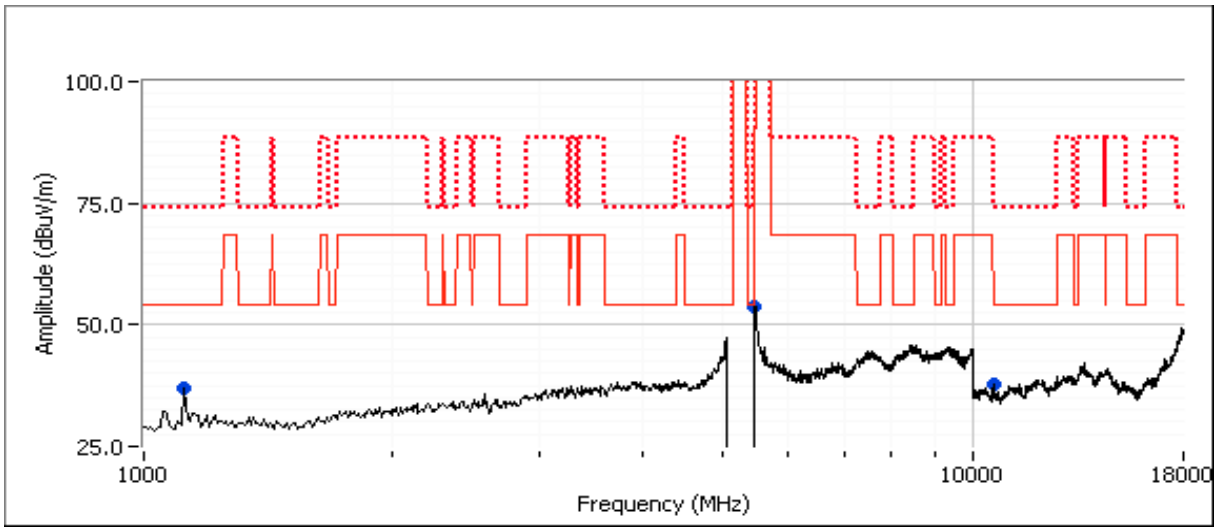


Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5460.310	52.9	V	68.3	-15.4	PK	0	1.0	RB 1 MHz;VB 3 MHz;Pk
10615.970	38.6	H	54.0	-15.4	AVG	10	1.0	RB 1 MHz;VB 10 Hz;Pk
1125.060	34.6	H	54.0	-19.4	AVG	54	1.5	RB 1 MHz;VB 10 Hz;Pk
10615.490	50.2	H	74.0	-23.8	PK	10	1.0	RB 1 MHz;VB 3 MHz;Pk
1125.000	40.5	H	74.0	-33.5	PK	54	1.5	RB 1 MHz;VB 3 MHz;Pk

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the average limit was set to -27dBm/MHz (~68dBuV/m).

Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

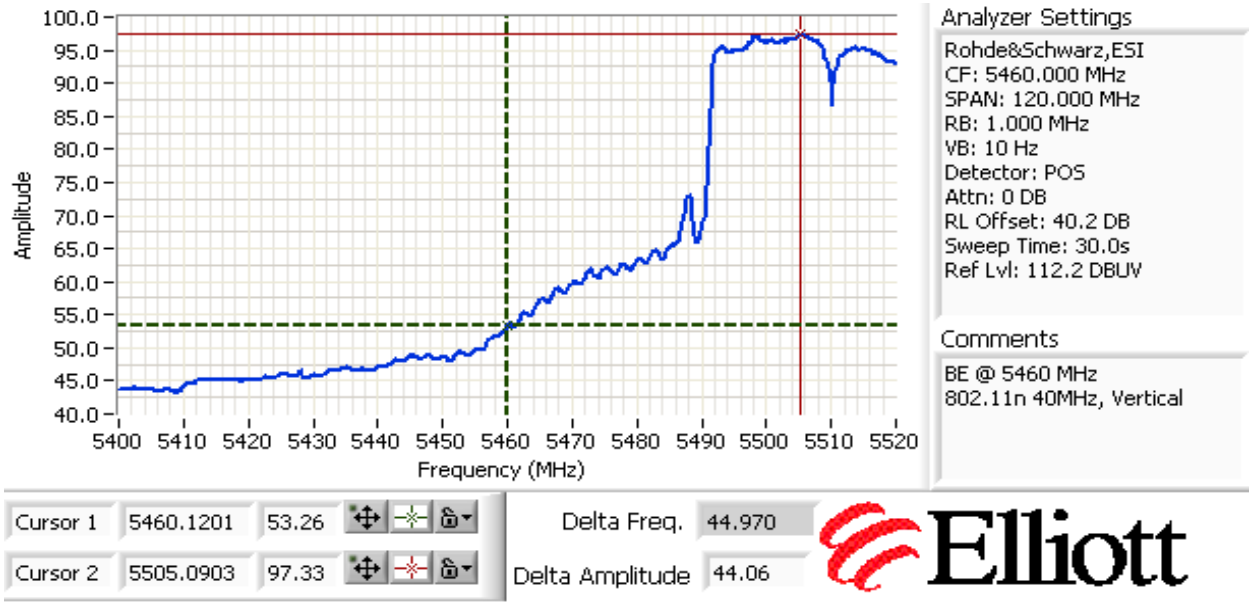


Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A

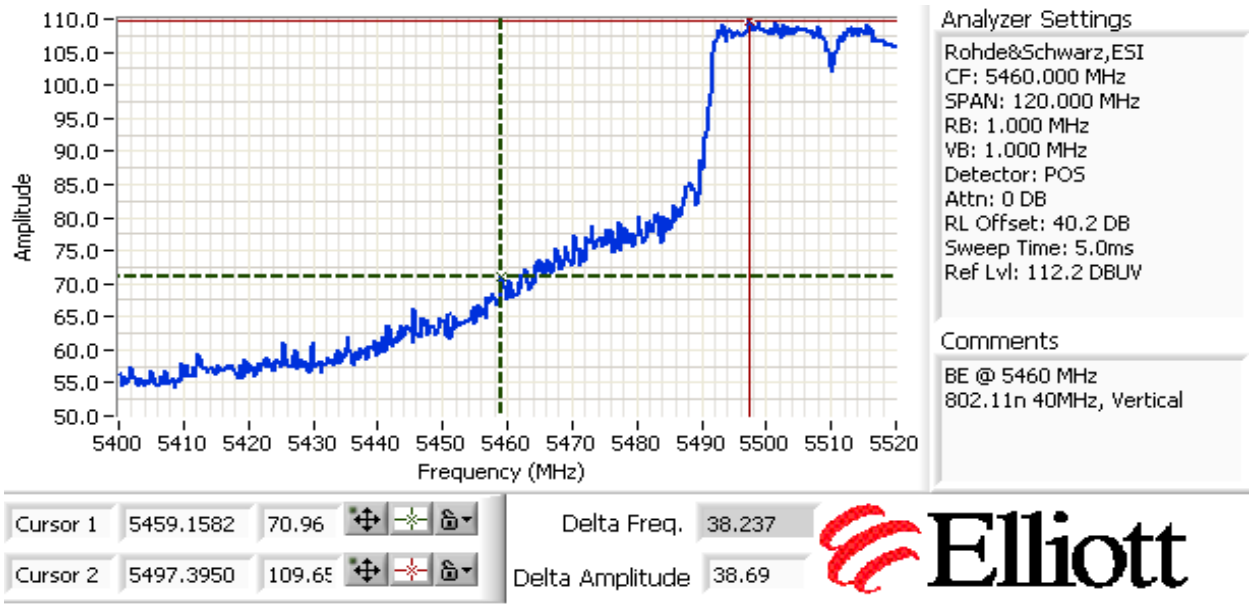
Run #3d: Channel 102 @ 5510 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5460.000	53.3	V	54.0	-0.7	Avg	348	1.0	
5459.158	71.0	V	74.0	-3.0	Pk	348	1.0	
5460.000	52.2	H	54.0	-1.8	Avg	0	1.0	
5459.158	69.1	H	74.0	-4.9	Pk	0	1.0	



Client:	Avaya	Job Number:	J81820
Model:	AP 8120 with 2 external Antenna (Class II Permissive change)	T-Log Number:	T82013
		Account Manager:	Christine
Contact:	Vipin Naik		
Standard:	FCC 15.E	Class:	N/A



End of Report

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