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EMC Test Report

Application for Grant of Equipment Authorization

Industry Canada RSS-Gen Issue 3 / RSS 210 Issue 8
FCC Part 15, Subpart E

Model: WS-AP3710i

FCC ID:	QQD10I
IC CERTIFICATION #:	5248S-10I
APPLICANT:	Flextronics 21 Richardson Side Road Kanata, ON K2K 2C1, Canada
TEST SITE(S):	NTS Silicon Valley 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-4, 2845B-5, 2845B-7
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A2LA ACCREDITED
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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	02-04-2013	Initial release	

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SCOPE

An electromagnetic emissions test has been performed on the Flextronics model WS-AP3710i, 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 KDB 789033)

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 NTS Silicon Valley test procedures:

ANSI C63.4:2003
FCC UNII test procedure KDB 789033

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 Flextronics model WS-AP3710i 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 Flextronics model WS-AP3710i and therefore apply only to the tested sample. The sample was selected and prepared by Georges Fares of Flextronics.

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 5.15 – 5.25 GHz Band

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407(e)	A9.2(1)	Indoor operation only	Refer to user's manual	N/A	Complies
15.407(a) (2)		26dB Bandwidth	a: 23.5 MHz n20: 25.3 MHz n40: 44.7 MHz	N/A – limits output power if < 20MHz	N/A
15.407 (a) (1)		Output Power	802.11a: 14.4 dBm n20: 15.1 dBm n40: 16.5 dBm (Max eirp: 0.130 W)[1]	a:16.2dBm[2] n20: 17.0 n40: 17.0	Complies
	A9.2(1)			a: 15.5dBm[3] n20: 16.6[3] n40: 17.0	Complies
15.407 (a) (1)	-	Power Spectral Density	a: 3.0 dBm/MHz n20: 3.2 dBm/MHz n40: 2.0 dBm/MHz	3.2[4] dBm/MHz	Complies
-	A9.2 (1) A9.4(2)			3.2[4] dBm/MHz	Complies

Note 1: EIRP calculated using antenna gain of 6.8 dBi (three 2 dBi antennas) for the highest EIRP system in legacy mode.
Note 2: Limit reduced to 16.2 dBm from 17 dBm as effective antenna gain exceeded 6 dBi by 0.8 dBi for legacy mode.
Note 3: Limit reduced to 15.5/16.8 dBm from 17 dBm as effective antenna gain exceeded 6 dBi by 0.8 dBi for legacy mode and the minimum 99% BW is 16.9/18.0 MHz for 20 MHz modes.
Note 4: Limit reduced to 3.2 dBm from 4 dBm as effective antenna gain exceeded 6 dBi by 0.8 dBi.

Requirements for all U-NII/LELAN bands

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407	A9.4(1)	Modulation	System uses 802.11a/n techniques	Digital modulation is required	Complies
15.407(b) (5) / 15.209	A9.2(1) / RSS-GEN	Spurious Emissions below 1GHz	29.3 dBµV/m @ 37.75 MHz (-10.7 dB)	Refer to page 21	Complies
15.407(b) (5) / 15.209	A9.2(1) / RSS-GEN	Spurious Emissions above 1GHz	52.3 dBµV/m @ 5150.0 MHz (-1.7 dB)		Complies
15.407(a)(6)	-	Peak Excursion Ratio	a: 8.6 dB n20: 8.0 dB n40: 8.5 dB	< 13dB	Complies
	A9.4(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		
15.407 (c)	A9.4(4)	Operation in the absence of information to transmit	Operation is discontinued in the absence of information (See Operational Description)	Device shall automatically discontinue operation in the absence of information to transmit	Complies

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407 (g)		Frequency Stability	Frequency stability is such that the signal remains in band (See Operational Description)	Signal shall remain within the allocated band	Complies
15.407 (h2)	A9.3	Dynamic frequency Selection (device with radar detection)	Device does not operate in either 5470 – 5725 or 5250 – 5350 MHz bands.		N/A
	A9.4(6) & (7)	User Manual information	Refer to User Manual for details	Warning regarding interference from Satellite Systems	Complies

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Integral antenna	Unique or integral antenna required	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	48.3 dBµV @ 1.188 MHz (-7.7 dB)	Refer to page 18	Complies
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSP 100 RSS GEN 7.1.3	User Manual	Refer to User Manual for details	Statement required regarding non-interference	Complies
-	RSP 100 RSS GEN 7.1.2	User Manual	No detachable antenna	Statement for products with detachable antenna	N/A
-	RSP 100 RSS GEN 4.4.1 RSS-210 A9.2(1)	99% Bandwidth	a: 16.9 MHz n20: 18.1 MHz n40: 36.6 MHz	Information only	N/A

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 Flextronics model WS-AP3710i is a multiple radio access point, each radio operating in 3x3 MIMO and legacy modes. It incorporates both a 2.4 GHz band 802.11b/g/n and a 5.2 GHz band and 5.8 GHz band 802.11a/n radio in a single enclosure. Since the EUT could be placed in any position during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 48 Volts DC, 0.8 Amps.

The sample was received on November 29, 2012 and tested on December 13, 18, 19 and 20, 2012. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Flextronics	WS-AP3710i	Access Point	None	QQD10I

ANTENNA SYSTEM

The antenna system consists of three integral antennas for both radios.

ENCLOSURE

The EUT enclosure measures approximately 20 by 18.5 by 3 centimeters. It is constructed of uncoated plastic and cast metal.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at NTS Silicon Valley.

SUPPORT EQUIPMENT

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

Company	Model	Description	Serial Number	FCC ID
PowerDsine	9001G-40/SP	POE adapter	N114565190018 46A01	-
Dell	Latitude D610	Laptop Computer	26895386773	-

A remote Ethernet/POE switch (Enterasys model C5G124-24P2, serial # 11110824225H) was used for testing from 30-1000 MHz instead of the POE adapter.

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet/POE	Remote POE adapter or switch	Cat 5	Unshielded	10
Remote POE Data or switch	Laptop	Cat 5	Unshielded	2

The console port was not connected during testing as this is used only during configuration of the radio.

EUT OPERATION

During testing, the EUT was configured to transmit a continuous modulated signal at the selected frequency and power level on all three chains of both radios.

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 7	A2LA accreditation	2845B-7	41039 Boyce Road Fremont, CA 94538-2435

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.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

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.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

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.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

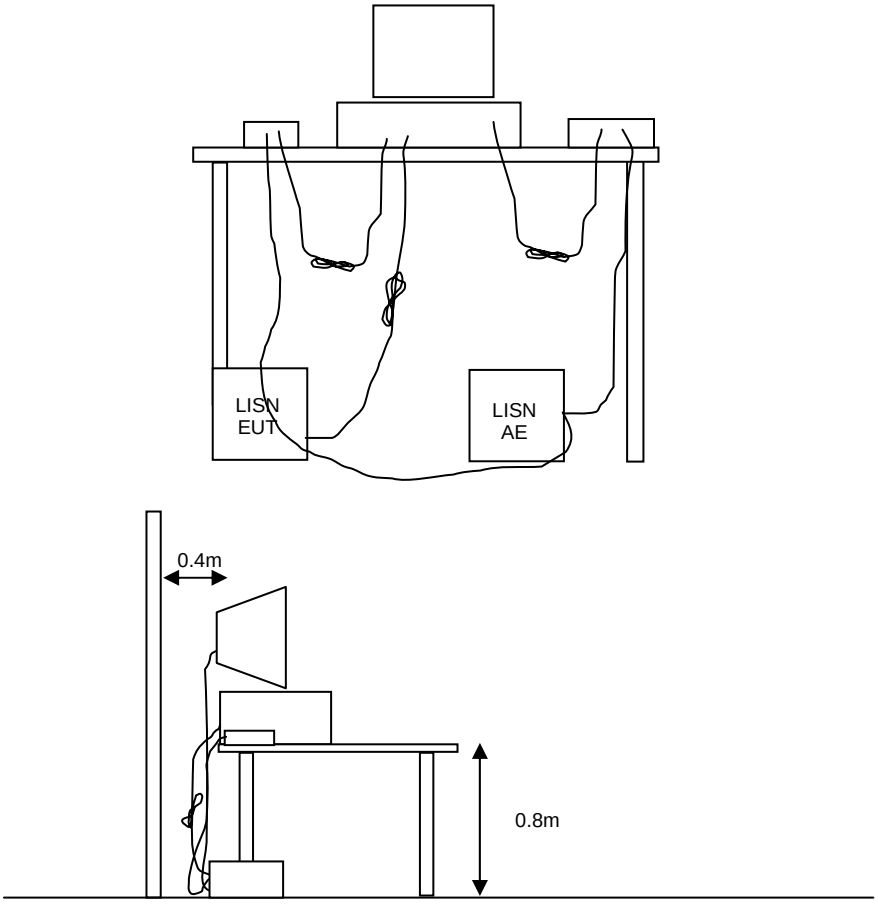


Figure 1 Typical Conducted Emissions Test Configuration

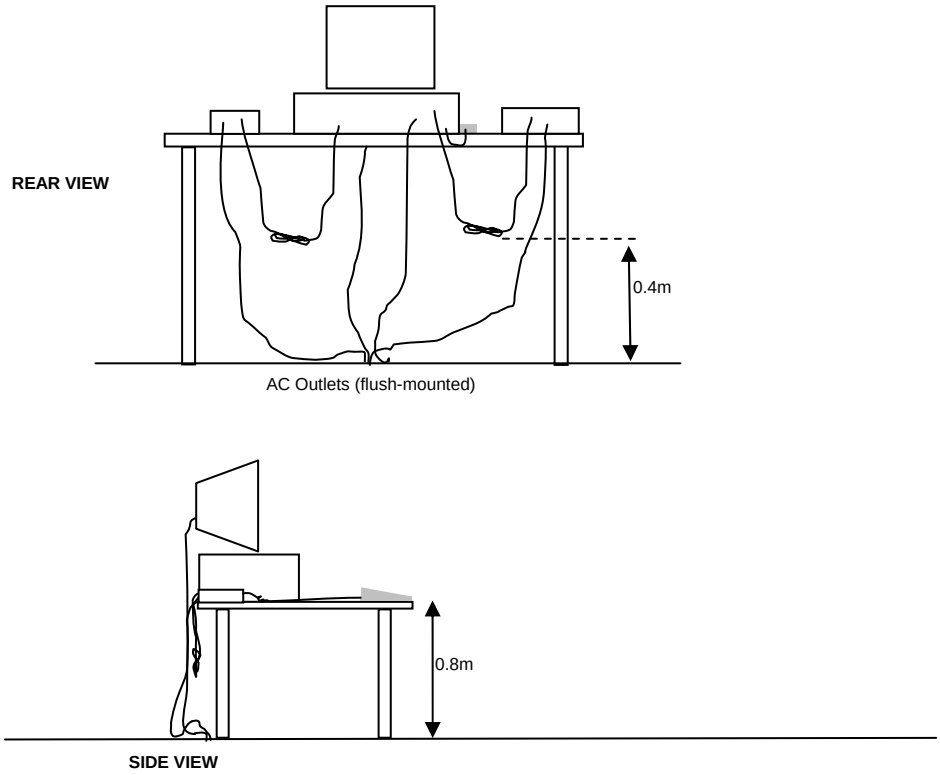
RADIATED EMISSIONS

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.

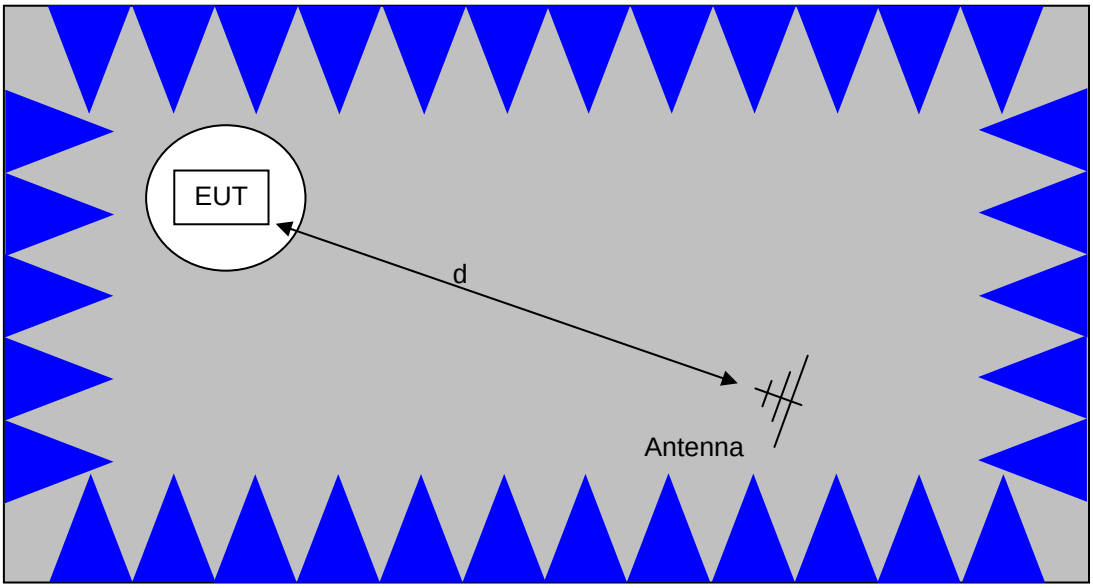
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

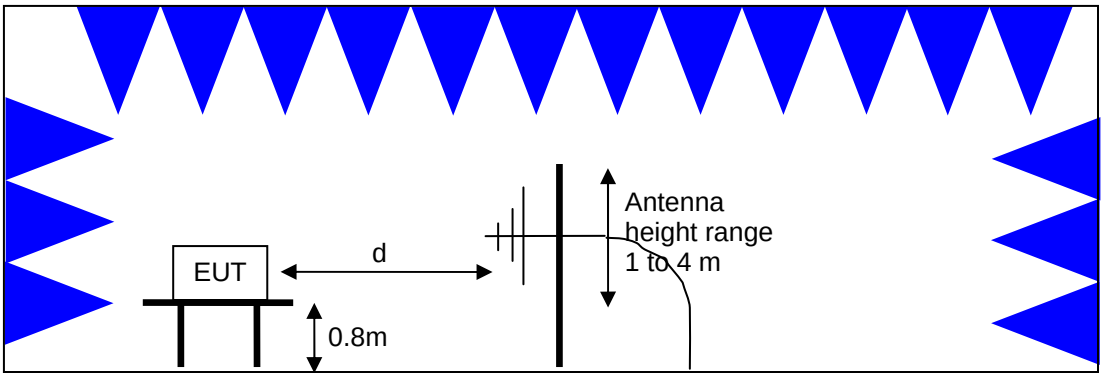


Typical Test Configuration for Radiated Field Strength Measurements



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.

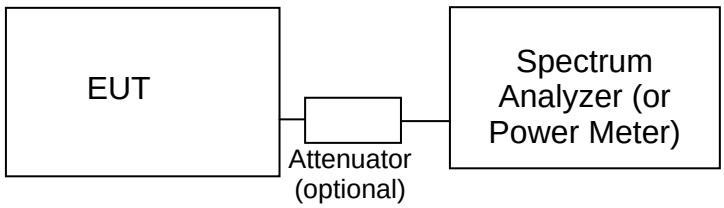
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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 NTS Silicon Valley'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:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1] (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

[1] 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)[2] 1W (30dBm) eirp	11 dBm/MHz
5470 – 5725	250 mW (24 dBm)[3] 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.

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

Radio Antenna Port (Power and Spurious Emissions), 29-Nov-12 to 28-Dec-12

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/1/2013
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts use with 20dB attenuator sn:100059 only	NRV-Z32	1423	9/18/2013
Rohde & Schwarz	Power Meter, Single Channel, +1795+1796	NRVS	1534	6/28/2013
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	5/21/2013
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/23/2013

Radiated Emissions, 1,000 - 40,000 MHz, 3-Dec-12 to 20-Dec-12

Manufacturer	Description	Model	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/29/2013
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/19/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/1/2013
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
Hewlett Packard	Head (Inc flex cable, (1742,1743) Blue)	84125C	1620	5/17/2013
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	5/21/2013
Hewlett Packard	Head (Inc W1-W4, 1946 , 1947) Purple	84125C	1772	5/1/2013
A.H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	4/17/2013
A.H. Systems	Spare System Horn, 18-40GHz	SAS-574, p/n: 2581	2162	5/8/2013
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/23/2013
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	8/10/2013
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	11/9/2013
EMCO	Antenna, Horn, 1-18GHz	3115	868	6/19/2014
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	9/14/2013

Radiated Emissions, 30 - 1,000 MHz, 19-Dec-12

Manufacturer	Description	Model	Asset #	Cal Due
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	6/4/2014
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	5/21/2013
Com-Power Corp.	Preamplifier, 30-1000 MHz	PAM-103	2380	11/9/2013

Conducted Emissions - AC Power Ports, 20-Dec-12

Manufacturer	Description	Model	Asset #	Cal Due
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1594	5/22/2013
Com-Power	9KHz-30MHz, 50uH, 15Aac, 10Adc, max	LI-215A	2672	5/25/2013

Appendix B Test Data

T89870 Pages 25 - 61

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Emissions Standard(s):	15.247, 15.407, RSS-210	Class:	-
Immunity Standard(s):		Environment:	Radio

EMC Test Data

For The

Flextronics

Model

WS-AP3710i

Date of Last Test: 1/3/2013

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	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.

Date of Test: 12/13/2012
Test Engineer: Jack Liu
Test Location: FT7

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

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: 17-25 °C
Rel. Humidity: 35-52 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Peak Excursion Envelope	15.407(a) (6) 13dB	Pass	a: 8.6 dB n20: 8.0 dB n40: 8.5 dB
2	Antenna Conducted - Out of Band Spurious	15.407(b) -27dBm/MHz		All emissions below the -27dBm/MHz limit

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

All measurements performed at the antenna port of the module inside the chassis

Pigtail loss 0.5dB

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run #1: Peak Excursion Measurement

20MHz: Device meets the requirement for the peak excursion

802.11a			802.11n		
Freq	Peak Excursion(dB)		Freq	Peak Excursion(dB)	
(MHz)	Value	Limit	(MHz)	Value	Limit
5180	8.3	13.0	5180	7.5	13.0
5200	8.4	13.0	5200	7.7	13.0
5240	8.6	13.0	5240	8.0	13.0

40MHz: Device meets the requirement for the peak excursion

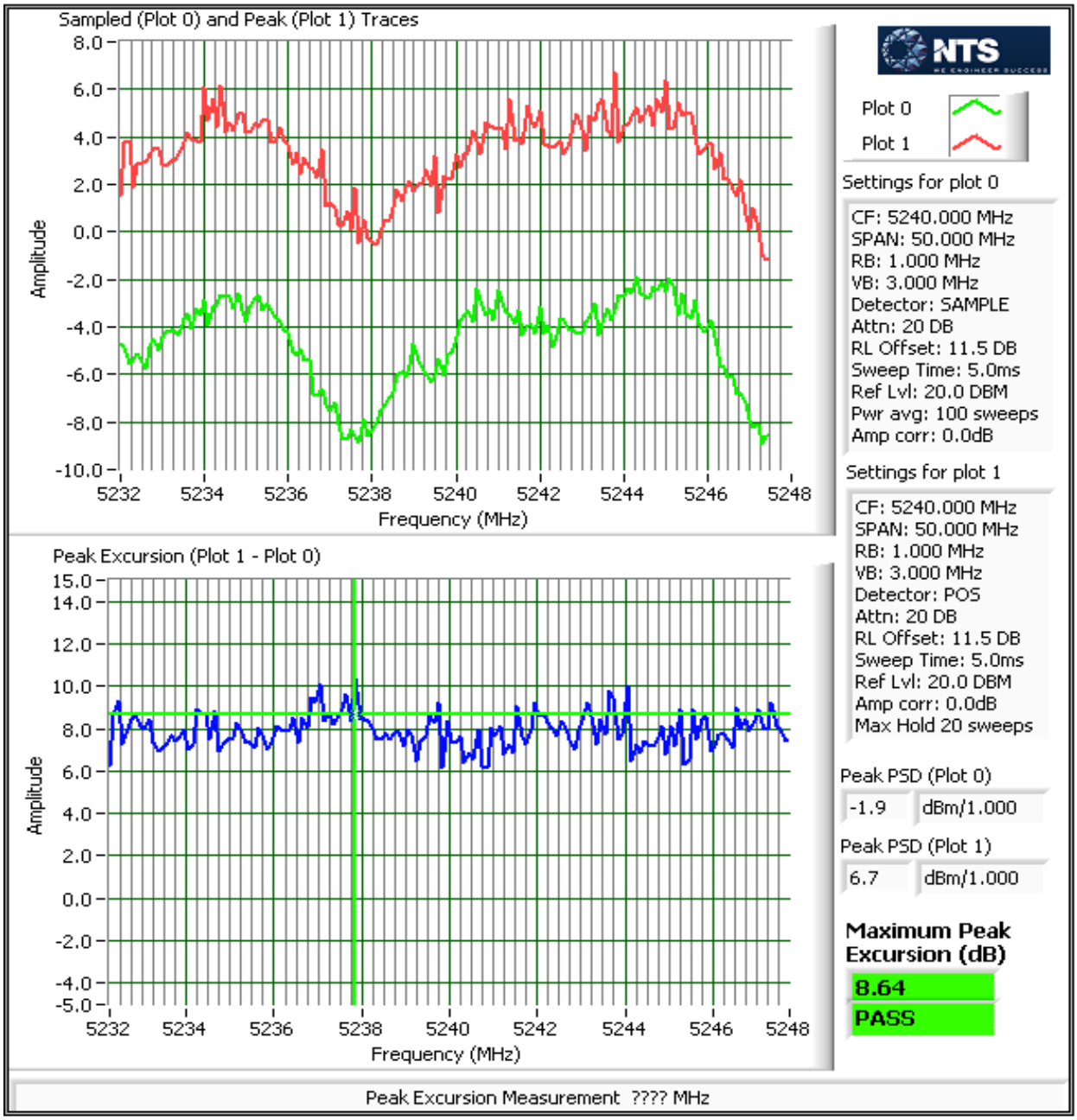
Freq	Peak Excursion(dB)	
(MHz)	Value	Limit
5190	7.9	13.0
5230	8.5	13.0

Plots Showing Peak Excursion

Trace A: RBW = 1MHz, VBW = 3MHz, Peak hold

Trace B: Same settings as used for power/PSD measurements (RBW = 1 MHz, VBW = 3MHz, Integrated **average** power)

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	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.

Date of Test: 12/13/2012
Test Engineer: Jack Liu
Test Location: FT7

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

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: 20 °C
Rel. Humidity: 36 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Power, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	802.11a: 26.9 mW 802.11n 20MHz: 30.9 mW 802.11n n40MHz: 36.3 mW
1	PSD, 5150 - 5250MHz	15.407(a) (1), (2)	Pass	802.11a: 2.8 dBm/MHz 802.11n 20MHz: 2.9 dBm/MHz 802.11n n40MHz: 1.1 dBm/MHz
1	26dB Bandwidth	15.407 (Information only)	-	> 20MHz for all modes
1	99% Bandwidth	RSS 210 (Information only)	N/A	802.11a: 16.9 MHz 802.11n 20MHz: 18.1 MHz 802.11n n40MHz: 36.6 MHz

Antenna:

#	Model	Type	Freq. Band (GHz)	Gain (dBi)	Ind/Out	Xpol?	Pt to Pt?
1	(Antennas B & C)	IFA	5.2	0	Indoor	No	No

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

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

All measurements performed at the antenna port of the module inside the chassis

Pigtail loss 0.5dB

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

MIMO Device - 5150-5250 MHz Band

		Chain 1	Chain 2	Chain 3	Coherent	Effective[5]	EIRP (mW)	EIRP (dBm)
Legacy	Antenna Gain (dBi):	2	2	2	yes	6.8	129.7	21.1
MIMO	Antenna Gain (dBi):	2	2	2	no	2.0	70.6	18.5

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 a Mode										
5180	8.5	23.0	9.1	9.5	10.1	27.3	14.4	16.2	0.027	PASS
5200	8.5	21.8	9.1	9.4	9.7	26.2	14.2	16.2		PASS
5240	9.0	23.5	8.9	8.9	10.5	26.7	14.3	16.2		PASS
20MHz n Mode										
5180	9.5	24.9	9.4	10.3	11.2	32.7	15.1	17.0	0.033	PASS
5200	9.5	24.6	9.4	10.2	10.8	31.2	14.9	17.0		PASS
5240	9.5	25.3	9.1	9.5	10.7	28.7	14.6	17.0		PASS
40MHz n Mode										
5190	10.0	44.7	10.8	11.2	11.9	40.7	16.1	17.0	0.045	PASS
5230	10.5	44.7	11.2	11.4	12.5	44.6	16.5	17.0		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 a Mode										
5180	16.9	14.4	-1.5	-2.6	-1.7	1.9	2.9	3.2	3.2	PASS
5200	16.9	14.2	-1.6	-2.2	-1.7	2.0	3.0	3.2	3.2	PASS
5240	16.9	14.3	-1.9	-2.7	-1.1	1.9	2.9	3.2	3.2	PASS
20MHz n Mode										
5180	18.1	15.1	-2.0	-2.1	-0.7	2.1	3.2	3.2	3.2	PASS
5200	18.1	14.9	-1.8	-2.1	-1.1	2.1	3.1	3.2	3.2	PASS
5240	18.0	14.6	-2.1	-2.7	-1.0	1.9	2.9	3.2	3.2	PASS
40MHz n Mode										
5190	36.6	16.1	-2.6	-3.9	-2.1	1.6	2.0	3.2	3.2	PASS
5230	36.3	16.5	-3.1	-3.8	-2.7	1.4	1.6	3.2	3.2	PASS

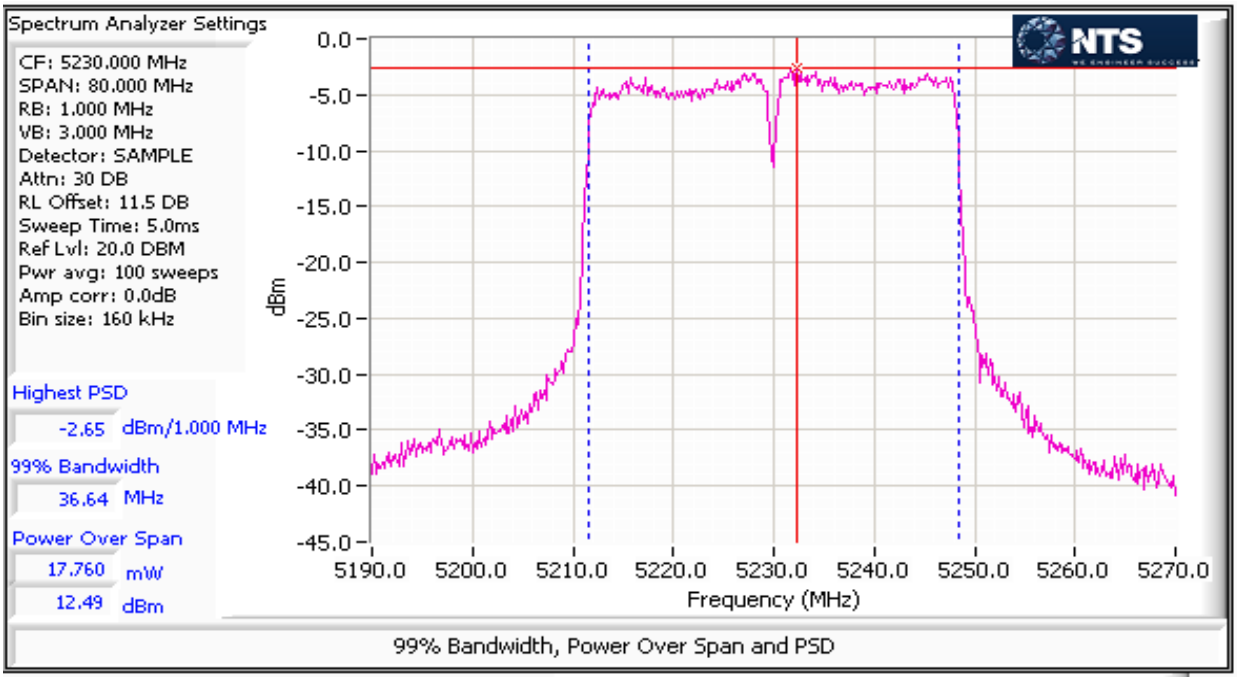
Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Power (RSS Limit)

Frequency (MHz)	Software Setting	99% 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 a Mode										
5180	8.5	16.9	9.1	9.5	10.1	27.3	14.4	15.5	0.027	PASS
5200	8.5	16.9	9.1	9.4	9.7	26.2	14.2	15.5		PASS
5240	9.0	16.9	8.9	8.9	10.5	26.7	14.3	15.5		PASS
20MHz n Mode										
5180	9.5	18.1	9.4	10.3	11.2	32.7	15.1	16.6	0.033	PASS
5200	9.5	18.1	9.4	10.2	10.8	31.2	14.9	16.6		PASS
5240	9.5	18.0	9.1	9.5	10.7	28.7	14.6	16.6		PASS
40MHz n Mode										
5190	10.0	36.6	10.8	11.2	11.9	40.7	16.1	17.0	0.045	PASS
5230	10.5	36.3	11.2	11.4	12.5	44.6	16.5	17.0		PASS

Note 1:	Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, # of points in sweep ≥ 2*span/RBW, Sample detector, power averaging on (transmitted signal was continuous) and power integration over **50** MHz (method SA-1 of KDB 789033).
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. 802.11n modes are treated as not coherent for Power.

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

RSS 210 and FCC 15.407 (NII) 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 approximately 30 meters from the EUT with all I/O connections running on top of the groundplane or routed in overhead in the GR-1089 test configuration.

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

Ambient Conditions:

Temperature: 20.8 °C
Rel. Humidity: 37 %

Summary of Results - Device Operating in the 5150-5250 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Run # 1	802.11a Chain A+B+C	#36 5180MHz	8.5		Restricted Band Edge at 5150 MHz	15.209/15.407	39.9 dBµV/m @ 5120.0 MHz (-14.1 dB)
		#48 5240MHz	9.0		Restricted Band Edge at 5350 MHz	15.209/15.407	41.9 dBµV/m @ 5360.0 MHz (-12.1 dB)
Run # 2	802.11n20 Chain A+B+C	#36 5180MHz	9.5		Restricted Band Edge at 5150 MHz	15.209/15.407	42.1 dBµV/m @ 5120.0 MHz (-11.9 dB)
		#48 5240MHz	9.5		Restricted Band Edge at 5350 MHz	15.209/15.407	43.0 dBµV/m @ 5360.0 MHz (-11.0 dB)
Run # 3	802.11n40 Chain A+B+C	#38 5190MHz	10.0		Restricted Band Edge at 5150 MHz	15.209/15.407	52.3 dBµV/m @ 5150.0 MHz (-1.7 dB)
		#46 5230MHz	10.5		Restricted Band Edge at 5350 MHz	15.209/15.407	43.3 dBµV/m @ 5360.0 MHz (-10.7 dB)

Antenna:

#	Model	Type	Freq. Band (GHz)	Gain (dBi)	Ind/Out	Xpol?	Pt to Pt?
1	(Antennas B & C)	IFA	5.2	2	Indoor	No	No

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

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

Antenna: antenna(s) connected
Duty Cycle: 99.0%

ART GUI (Singleradio test) Or Command Line Script (multiple radio test)

ART GUI Used:	No
ART GUI Boot File:	-
	-
ART GUI Calibration file:	-
	-
Command Line Script:	3710i Pilot_935942 boot and initialize all 3 radios to NART Command Line Interface - Low Power

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run # 1, Band Edge Field Strength - 802.11a, Chain A+B+C

Date of Test: 12/18/2012 Test Location: FT7

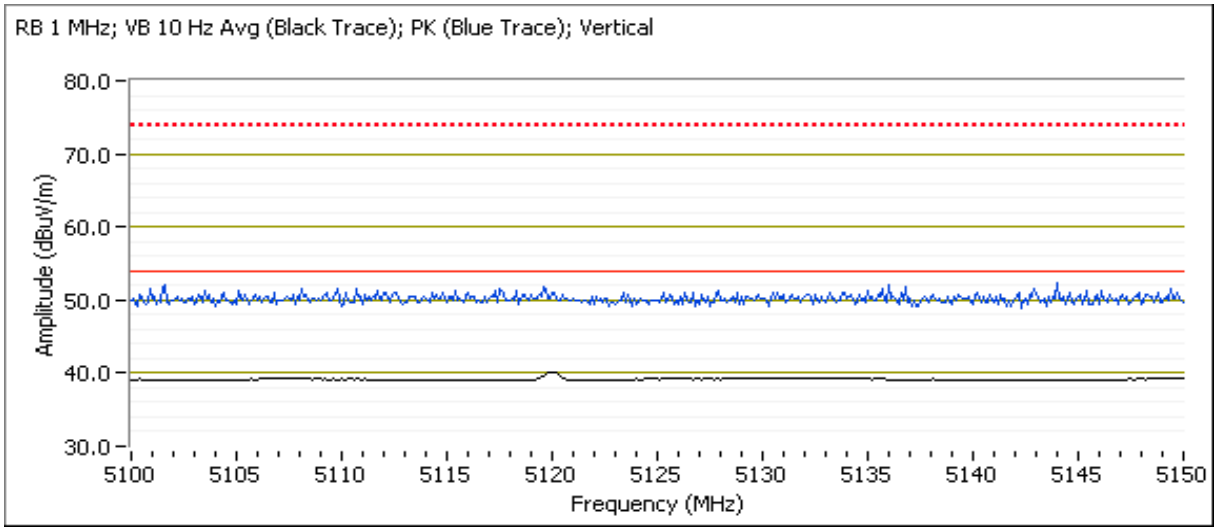
Test Engineer: Rafael Varelas Config Change: none

Run # 1a, EUT on Channel #36 5150MHz - 802.11a, Chain A+B+C

Radio	Freq	Power Setting
1	5180 MHz	8.5
2	2437 MHz	21.0

5150 MHz Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5120.020	39.9	V	54.0	-14.1	AVG	167	1.0	POS; RB 1 MHz; VB: 10 Hz
5113.130	50.8	V	74.0	-23.2	PK	167	1.0	POS; RB 1 MHz; VB: 3 MHz
5133.650	39.0	H	54.0	-15.0	AVG	360	1.0	POS; RB 1 MHz; VB: 10 Hz
5146.790	51.0	H	74.0	-23.0	PK	360	1.0	POS; RB 1 MHz; VB: 3 MHz



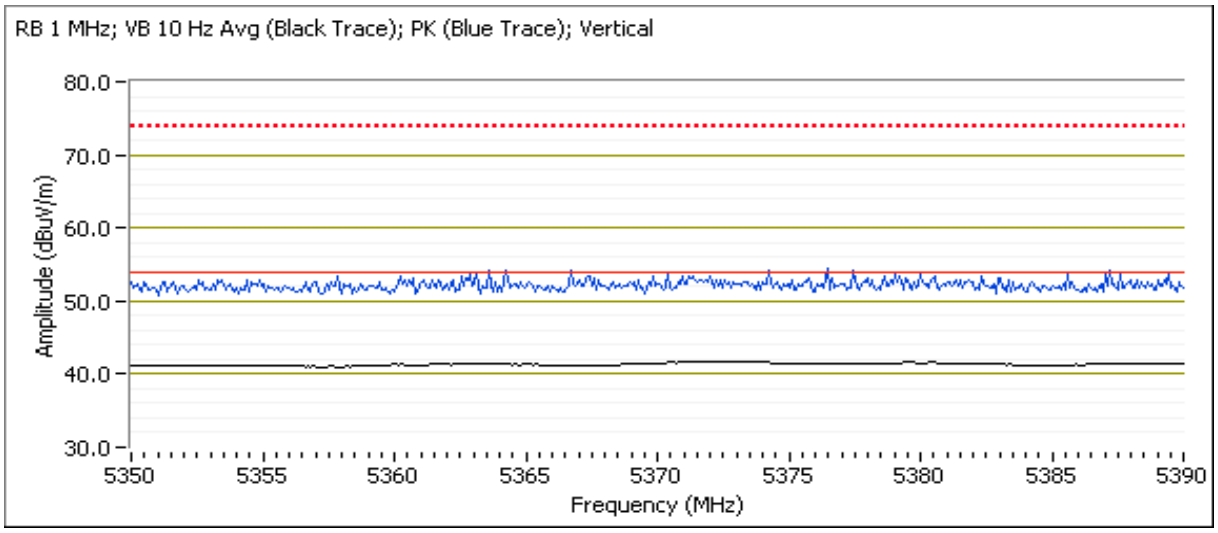
Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run # 1b, EUT on Channel #48 5240MHz - 802.11a, Chain A+B+C

Radio	Freq	Power Setting
1	5240 MHz	9.0
2	2437 MHz	21.0

5350 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5360.020	41.9	V	54.0	-12.1	AVG	166	1.0	POS; RB 1 MHz; VB: 10 Hz
5353.850	51.8	V	74.0	-22.2	PK	166	1.0	POS; RB 1 MHz; VB: 3 MHz
5371.640	41.7	H	54.0	-12.3	AVG	96	1.0	POS; RB 1 MHz; VB: 10 Hz
5387.030	53.5	H	74.0	-20.5	PK	96	1.0	POS; RB 1 MHz; VB: 3 MHz



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run # 2, Band Edge Field Strength - 802.11n20, Chain A+B+C

Date of Test: 12/18/2012 Test Location: FT7

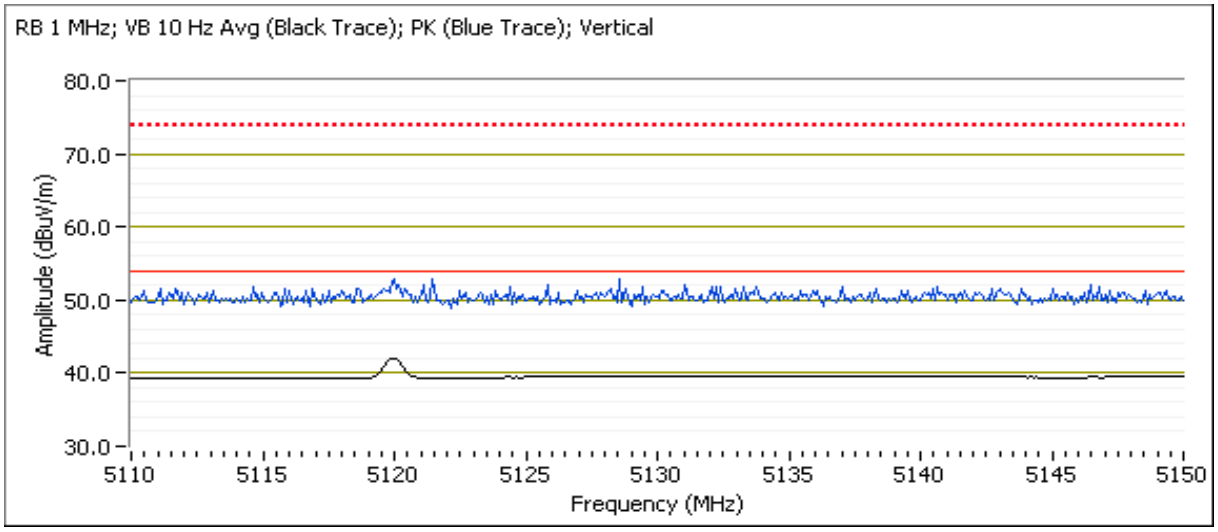
Test Engineer: Rafael Varelas Config Change: none

Run # 2a, EUT on Channel #36 5180MHz - 802.11n20, Chain A+B+C

Radio	Freq	Power Setting
1	5180 MHz	9.5
2	2437 MHz	21.0

5150 MHz Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5120.020	42.1	V	54.0	-11.9	AVG	171	1.0	POS; RB 1 MHz; VB: 10 Hz
5119.940	51.2	V	74.0	-22.8	PK	171	1.0	POS; RB 1 MHz; VB: 3 MHz
5120.020	40.8	H	54.0	-13.2	AVG	336	1.0	POS; RB 1 MHz; VB: 10 Hz
5121.060	50.8	H	74.0	-23.2	PK	336	1.0	POS; RB 1 MHz; VB: 3 MHz



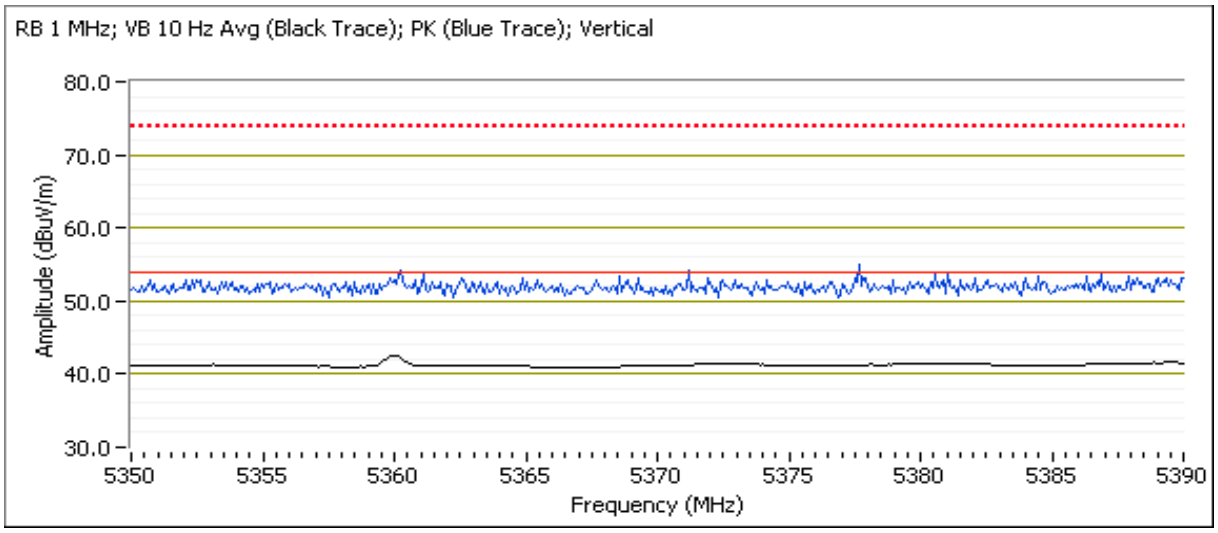
Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run # 2b, EUT on Channel #48 5240MHz - 802.11n20, Chain A+B+C

Radio	Freq	Power Setting
1	5240 MHz	9.5
2	2437 MHz	21.0

5350 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5360.020	43.0	V	54.0	-11.0	AVG	357	1.0	POS; RB 1 MHz; VB: 10 Hz
5387.920	52.8	V	74.0	-21.2	PK	357	1.0	POS; RB 1 MHz; VB: 3 MHz
5359.780	42.2	H	54.0	-11.8	AVG	162	1.0	POS; RB 1 MHz; VB: 10 Hz
5373.170	52.1	H	74.0	-21.9	PK	162	1.0	POS; RB 1 MHz; VB: 3 MHz



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run # 3, Band Edge Field Strength - 802.11n40, Chain A+B+C

Date of Test: 12/18/2012 Test Location: FT7

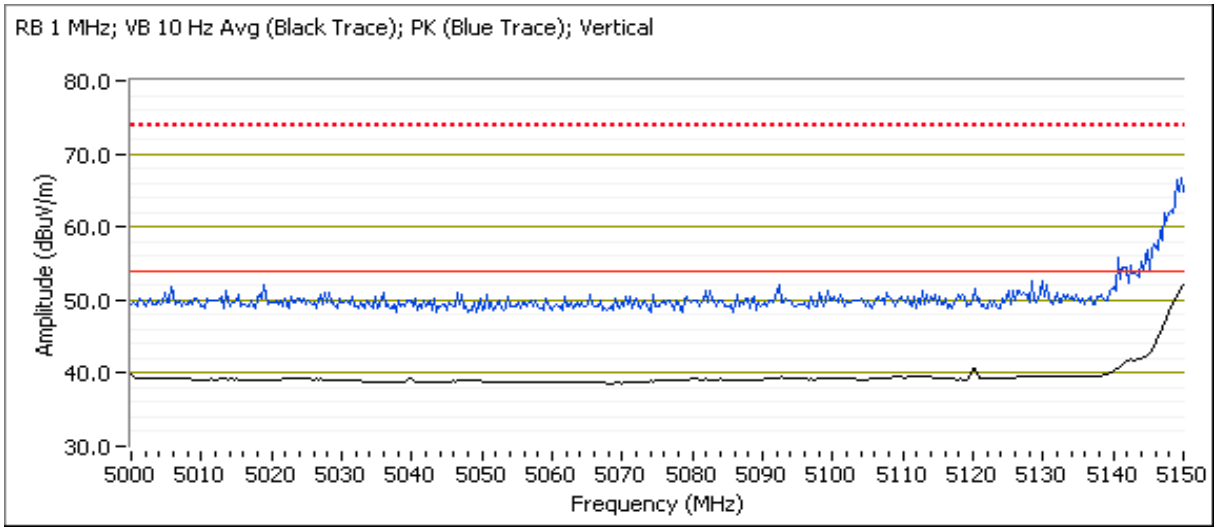
Test Engineer: Rafael Varelas Config Change: none

Run # 3a, EUT on Channel #38 5190MHz - 802.11n40, Chain A+B+C

Radio	Freq	Power Setting
1	5190 MHz	10.0
2	2437 MHz	21.0

5150 MHz Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.000	52.3	V	54.0	-1.7	AVG	83	1.7	POS; RB 1 MHz; VB: 10 Hz
5148.880	67.9	V	74.0	-6.1	PK	83	1.7	POS; RB 1 MHz; VB: 3 MHz
5150.000	48.1	H	54.0	-5.9	AVG	28	1.0	POS; RB 1 MHz; VB: 10 Hz
5149.200	62.6	H	74.0	-11.4	PK	28	1.0	POS; RB 1 MHz; VB: 3 MHz



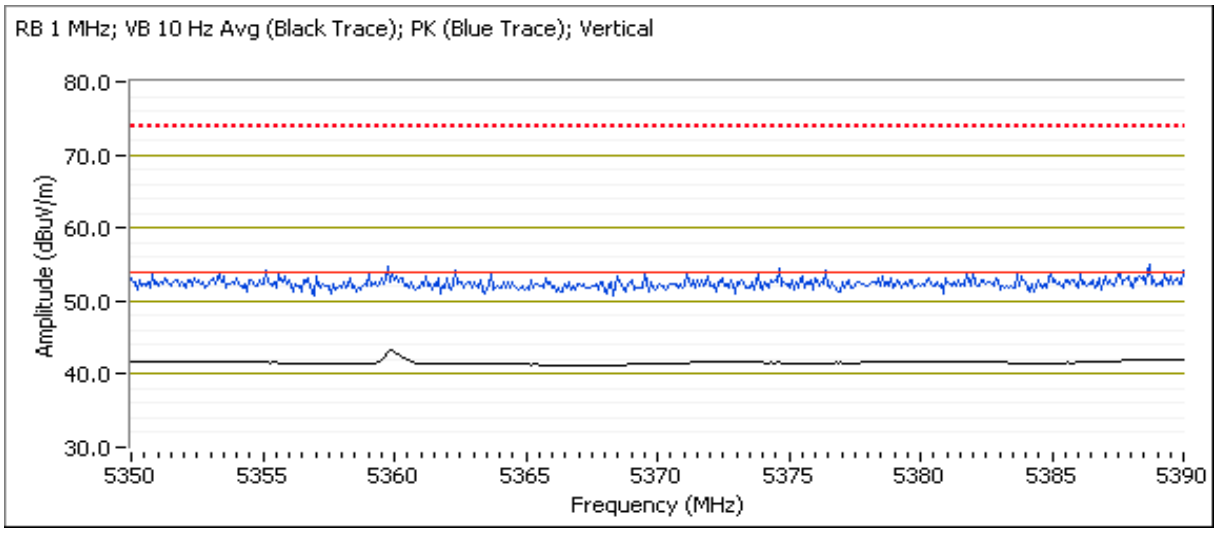
Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run # 3b, EUT on Channel #46 5230MHz - 802.11n40, Chain A+B+C

Radio	Freq	Power Setting
1	5230 MHz	10.5
2	2437 MHz	21.0

5350 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5360.020	43.3	V	54.0	-10.7	AVG	360	1.0	POS; RB 1 MHz; VB: 10 Hz
5363.710	53.6	V	74.0	-20.4	PK	360	1.0	POS; RB 1 MHz; VB: 3 MHz
5359.940	42.9	H	54.0	-11.1	AVG	166	1.0	POS; RB 1 MHz; VB: 10 Hz
5360.100	52.9	H	74.0	-21.1	PK	166	1.0	POS; RB 1 MHz; VB: 3 MHz



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

RSS 210 and FCC 15.407 (NII) 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 approximately 30 meters from the EUT with all I/O connections running on top of the groundplane or routed in overhead in the GR-1089 test configuration.

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

Ambient Conditions:

Temperature: 20.8 °C
Rel. Humidity: 37 %

Summary of Results - Device Operating in the 5150-5250 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Run #1	802.11b	2412 MHz	16.5		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15.407	50.9 dBµV/m @ 5452.5 MHz (-3.1 dB)
		5180 MHz	8.5				
	802.11a	2437 MHz	21				48.9 dBµV/m @ 5453.3 MHz (-5.1 dB)
		5200 MHz	8.5				
	Chain A+B+C	2462 MHz	16.5				49.7 dBµV/m @ 5453.2 MHz (-4.3 dB)
		5240 MHz	9				
Run #2	802.11g	2412 MHz	19		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15.407	50.5 dBµV/m @ 5452.4 MHz (-3.5 dB)
		5180 MHz	8.5				
	802.11a	2437 MHz	19				50.4 dBµV/m @ 5453.3 MHz (-3.6 dB)
		5200 MHz	8.5				
	Chain A+B+C	2462 MHz	19				46.6 dBµV/m @ 5453.1 MHz (-7.4 dB)
		5240 MHz	9				
Run #3	802.11n20	2412 MHz	12		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15.407	48.0 dBµV/m @ 5450.1 MHz (-6.0 dB)
		5180 MHz	9.5				
	802.11n20	2437 MHz	18				47.9 dBµV/m @ 5440.0 MHz (-6.1 dB)
		5200 MHz	9.5				
	Chain A+B+C	2462 MHz	12.5				48.0 dBµV/m @ 5440.3 MHz (-6.0 dB)
		5240 MHz	9.5				

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Run # 4	802.11n40	2422 MHz	16		Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15.247	49.8 dBµV/m @ 5440.0 MHz (-4.2 dB)
		5190 MHz	10				
	802.11n40	2437 MHz	16				47.8 dBµV/m @ 5443.7 MHz (-6.2 dB)
		5230 MHz	10.5				
	Chain A+B+C	2452 MHz	16				48.1 dBµV/m @ 5440.1 MHz (-5.9 dB)
		5230 MHz	10.5				

Antenna:

#	Model	Type	Freq. Band (GHz)	Gain (dBi)	Ind/Out	Xpol?	Pt to Pt?
1	(Antenna A)	IFA	2.4	2	Indoor	No	No
1	(Antennas B & C)	IFA	5.2	2	Indoor	No	No

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

Antenna: antenna(s) connected
Duty Cycle: 99.0%

ART GUI (Singleradio test) Or Command Line Script (multiple radio test)

ART GUI Used: No

ART GUI Boot File: -
-

ART GUI Calibration file: -
-

Command Line Script: 3710i Pilot_935942 boot and initialize all 3 radios to NART Command Line Interface - Low Power

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run #1, Radiated Spurious Emissions, 1-40GHz, 802.11b/802.11a, Chain A+B+C

Run #1a, EUT on Channel #1 2412MHz - 802.11b and Channel #36 5180MHz - 802.11a - Chain A+B+C

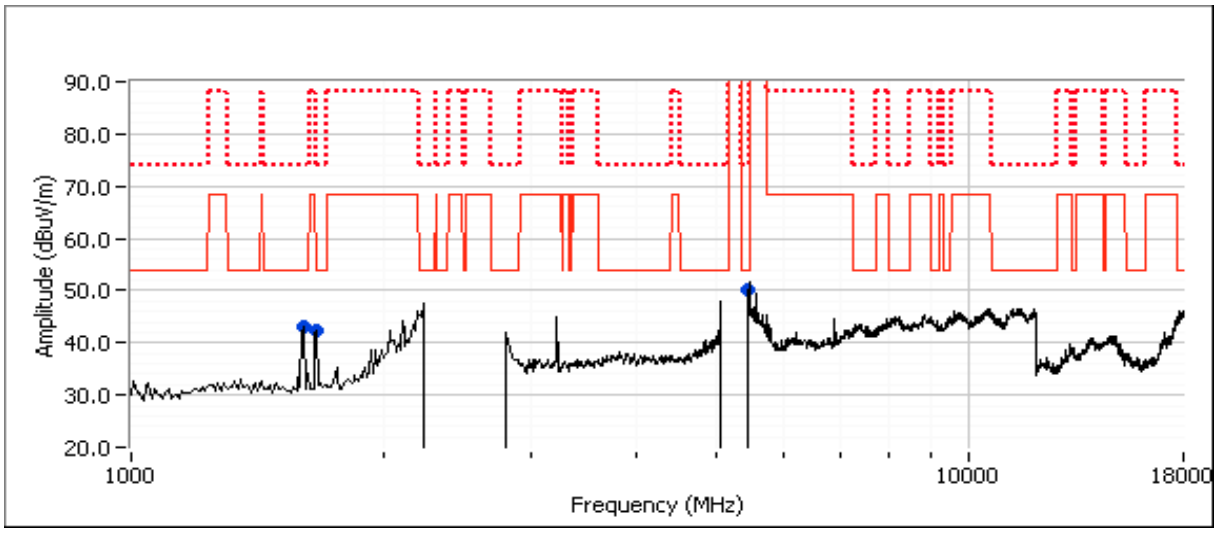
Date of Test: 12/18/2012 Test Location: FT7
Test Engineer: Jack Liu Config Change: None

Radio	Freq	Power Setting
1	5180 MHz	8.5
2	2412 MHz	16.5

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5452.530	50.9	V	54.0	-3.1	AVG	98	1.4	RB 1 MHz;VB 10 Hz;Peak
5448.460	61.3	V	74.0	-12.7	PK	98	1.4	RB 1 MHz;VB 3 MHz;Peak
1608.030	42.1	H	54.0	-11.9	AVG	245	1.0	RB 1 MHz;VB 10 Hz;Peak
1607.930	45.1	H	74.0	-28.9	PK	245	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.700	40.7	H	54.0	-13.3	AVG	210	1.2	RB 1 MHz;VB 10 Hz;Peak
1666.570	45.1	H	74.0	-28.9	PK	210	1.2	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

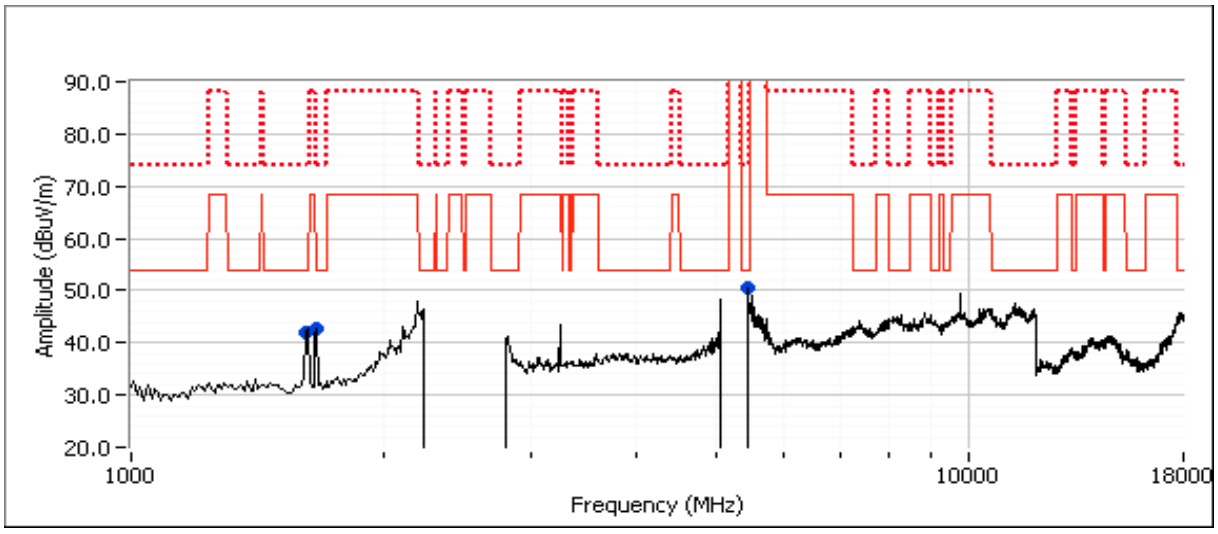
Run #1b, EUT on Channel #6 2437MHz - 802.11b and Channel #40 5200MHz - 802.11a, Chain A+B+C

Radio	Freq	Power Setting
1	5200 MHz	8.5
2	2437 MHz	21.0

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5453.250	48.9	V	54.0	-5.1	AVG	184	1.2	RB 1 MHz;VB 10 Hz;Peak
5456.920	60.6	V	74.0	-13.4	PK	184	1.2	RB 1 MHz;VB 3 MHz;Peak
1666.700	42.3	V	54.0	-11.7	AVG	228	1.1	RB 1 MHz;VB 10 Hz;Peak
1666.600	46.3	V	74.0	-27.7	PK	228	1.1	RB 1 MHz;VB 3 MHz;Peak
1624.790	42.7	H	54.0	-11.3	AVG	300	1.0	RB 1 MHz;VB 10 Hz;Peak
1624.770	46.0	H	74.0	-28.0	PK	300	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.
Note 2:	Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

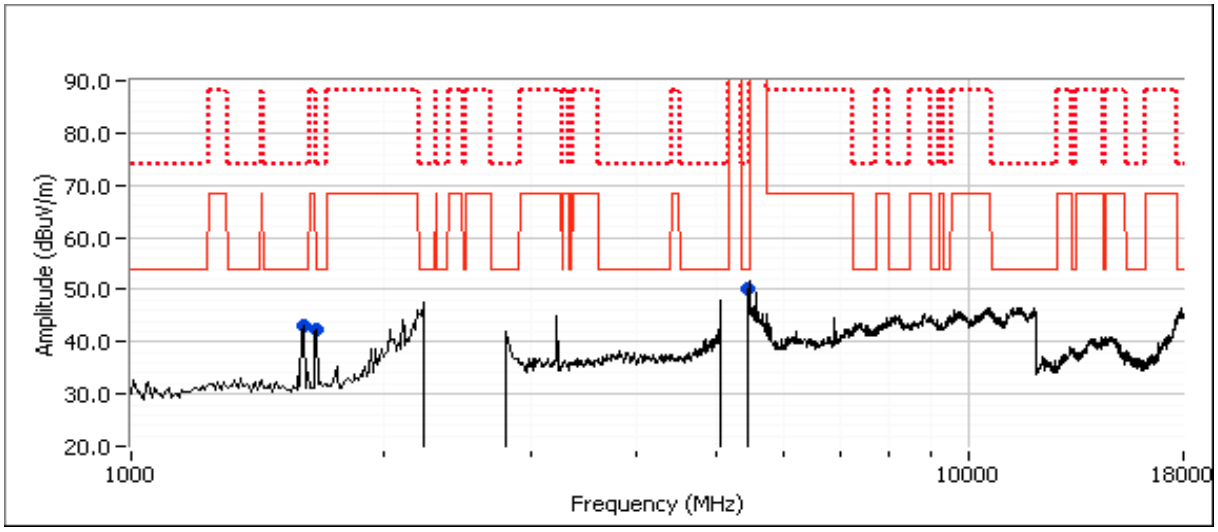
Run #1c, EUT on Channel #11 2462MHz - 802.11b and Channel #48 5240MHz - 802.11a, Chain A+B+C

Radio	Freq	Power Setting
1	5240 MHz	9.0
2	2462 MHz	16.5

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5453.200	49.7	V	54.0	-4.3	AVG	331	1.0	RB 1 MHz;VB 10 Hz;Peak
5452.260	59.9	V	74.0	-14.1	PK	331	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.700	43.2	V	54.0	-10.8	AVG	224	1.1	RB 1 MHz;VB 10 Hz;Peak
1666.650	47.0	V	74.0	-27.0	PK	224	1.1	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run #2, Radiated Spurious Emissions, 1-40GHz, 802.11g/802.11a, Chain A+B+C

Run #2a, EUT on Channel #1 2412MHz - 802.11g and Channel #36 5180MHz - 802.11a - Chain A+B+C

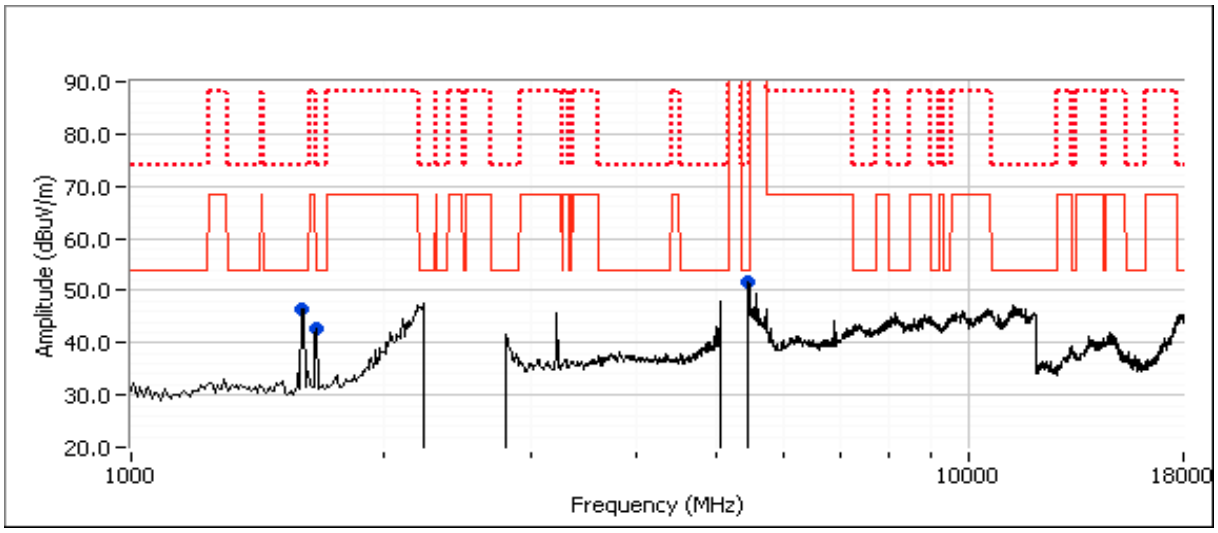
Date of Test: 12/18/2012 Test Location: FT7
Test Engineer: Jack Liu Config Change: None

Radio	Freq	Power Setting
1	5180 MHz	8.5
2	2412 MHz	19.0

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5452.400	50.5	V	54.0	-3.5	AVG	101	1.4	RB 1 MHz;VB 10 Hz;Peak
5452.330	62.4	V	74.0	-11.6	PK	101	1.4	RB 1 MHz;VB 3 MHz;Peak
1608.080	46.8	H	54.0	-7.2	AVG	249	1.0	RB 1 MHz;VB 10 Hz;Peak
1608.100	49.4	H	74.0	-24.6	PK	249	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.690	41.6	H	54.0	-12.4	AVG	210	1.0	RB 1 MHz;VB 10 Hz;Peak
1666.550	46.1	H	74.0	-27.9	PK	210	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

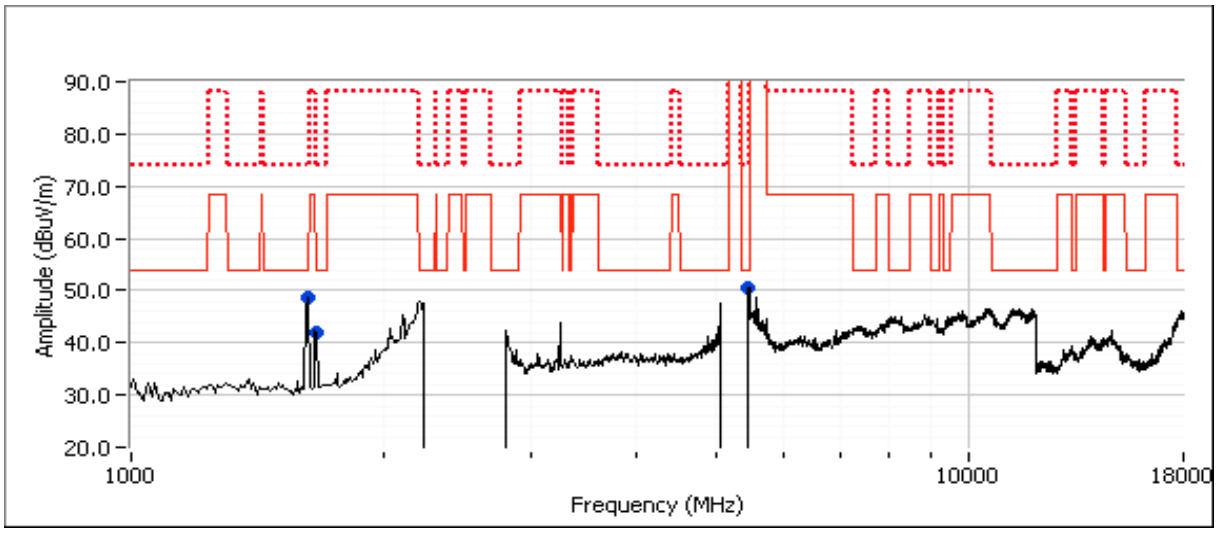
Run #2b, EUT on Channel #6 2437MHz - 802.11g and Channel #40 5200MHz - 802.11a, Chain A+B+C

Radio	Freq	Power Setting
1	5200 MHz	8.5
2	2437 MHz	19.0

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5453.330	50.4	V	54.0	-3.6	AVG	95	1.0	RB 1 MHz;VB 10 Hz;Peak
5452.200	60.9	V	74.0	-13.1	PK	95	1.0	RB 1 MHz;VB 3 MHz;Peak
1624.780	48.0	H	54.0	-6.0	AVG	247	1.0	RB 1 MHz;VB 10 Hz;Peak
1624.800	51.0	H	74.0	-23.0	PK	247	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.690	41.6	H	54.0	-12.4	AVG	211	1.0	RB 1 MHz;VB 10 Hz;Peak
1666.640	46.3	H	74.0	-27.7	PK	211	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.
Note 2:	Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

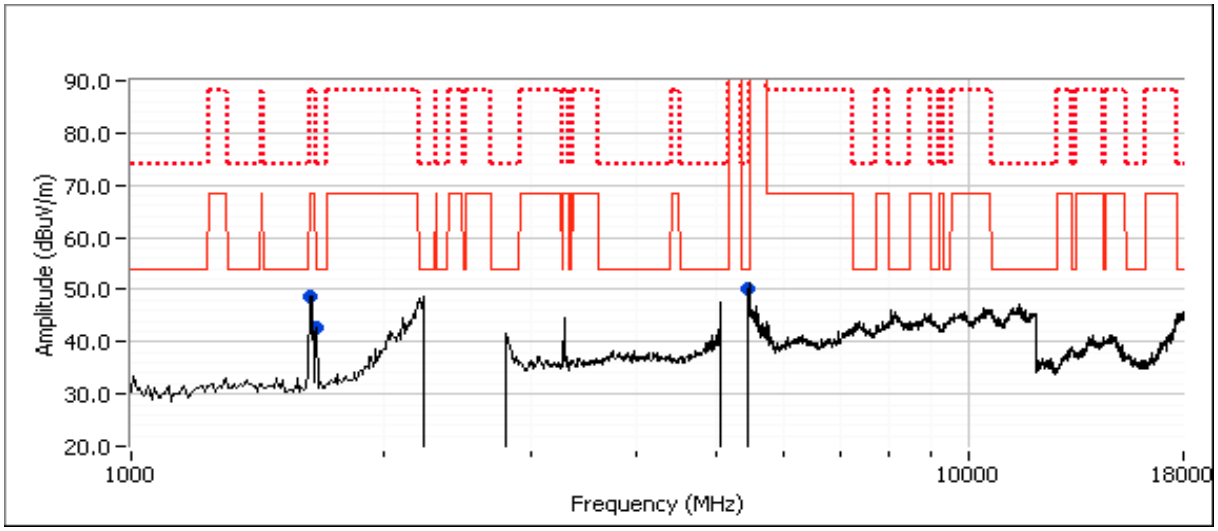
Run #2c, EUT on Channel #11 2462MHz - 802.11g and Channel #48 5240MHz - 802.11a, Chain A+B+C

Radio	Freq	Power Setting
1	5240 MHz	9.0
2	2462 MHz	19.0

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5453.090	46.6	V	54.0	-7.4	AVG	360	1.0	RB 1 MHz;VB 10 Hz;Peak
5450.490	58.1	V	74.0	-15.9	PK	360	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.740	43.1	V	54.0	-10.9	AVG	225	1.1	RB 1 MHz;VB 10 Hz;Peak
1666.740	46.6	V	74.0	-27.4	PK	225	1.1	RB 1 MHz;VB 3 MHz;Peak
1641.400	48.8	H	-	-	AVG	245	1.0	Note1

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run #3, Radiated Spurious Emissions, 1-40GHz, 802.11n20/802.11n20, Chain A+B+C

Run #3a, EUT on Channel #1 2412MHz - 802.11n20 and Channel #36 5180MHz - 802.11n20 - Chain A+B+C

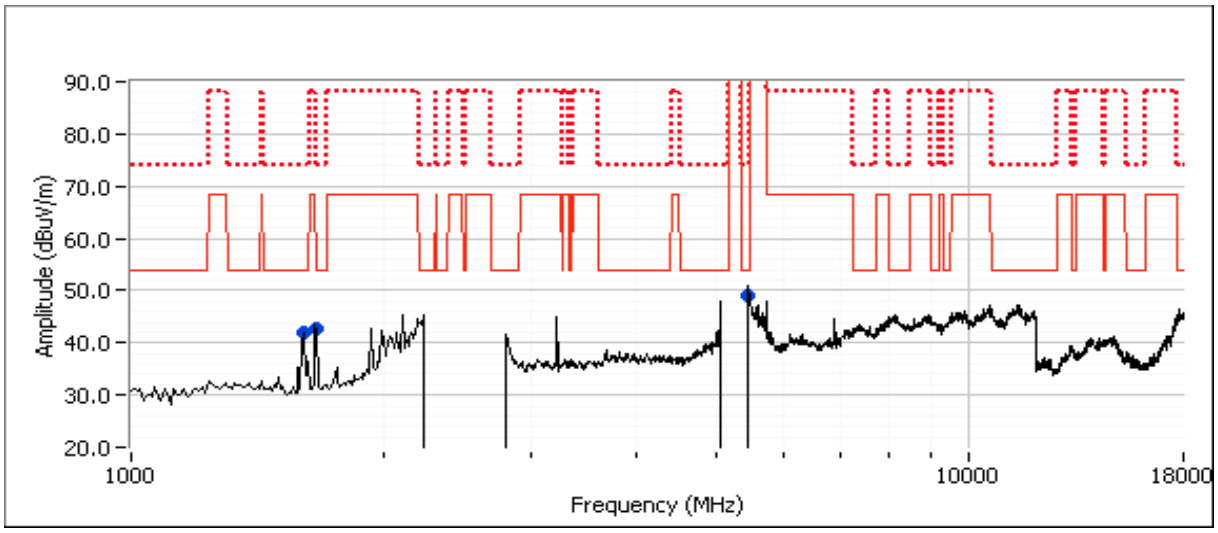
Date of Test: 12/18/2012 Test Location: FT7
Test Engineer: Rafael Varelas Config Change: None

Radio	Freq	Power Setting
1	5180 MHz	9.5
2	2412 MHz	12.0

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5450.140	48.0	V	54.0	-6.0	AVG	7	1.0	RB 1 MHz;VB 10 Hz;Peak
5449.640	59.6	V	74.0	-14.4	PK	7	1.0	RB 1 MHz;VB 3 MHz;Peak
1608.010	43.2	H	54.0	-10.8	AVG	246	1.0	RB 1 MHz;VB 10 Hz;Peak
1607.980	46.6	H	74.0	-27.4	PK	246	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.600	42.2	H	54.0	-11.8	AVG	210	1.0	RB 1 MHz;VB 10 Hz;Peak
1666.680	46.2	H	74.0	-27.8	PK	210	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

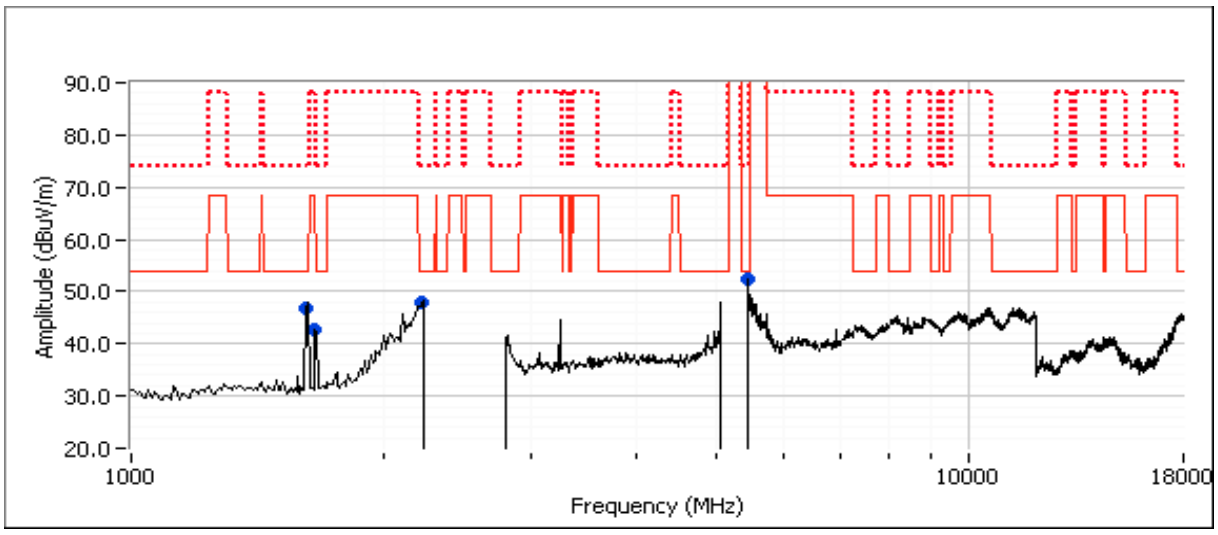
Run #3b, EUT on Channel #6 2437MHz - 802.11n20 and Channel #40 5200MHz - 802.11n20, Chain A+B+C

Radio	Freq	Power Setting
1	5200 MHz	9.5
2	2437 MHz	18.0

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5439.950	47.9	V	54.0	-6.1	AVG	242	1.0	RB 1 MHz;VB 10 Hz;Peak
5441.090	58.9	V	74.0	-15.1	PK	242	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.610	42.4	H	54.0	-11.6	AVG	210	1.3	RB 1 MHz;VB 10 Hz;Peak
1666.750	46.0	H	74.0	-28.0	PK	210	1.3	RB 1 MHz;VB 3 MHz;Peak
1624.740	47.6	H	54.0	-6.4	AVG	242	1.0	RB 1 MHz;VB 10 Hz;Peak
1624.560	50.2	H	74.0	-23.8	PK	242	1.0	RB 1 MHz;VB 3 MHz;Peak
2223.710	47.6	H	54.0	-6.4	AVG	322	1.0	RB 1 MHz;VB 10 Hz;Peak
2231.340	58.2	H	74.0	-15.8	PK	322	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.
Note 2:	Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

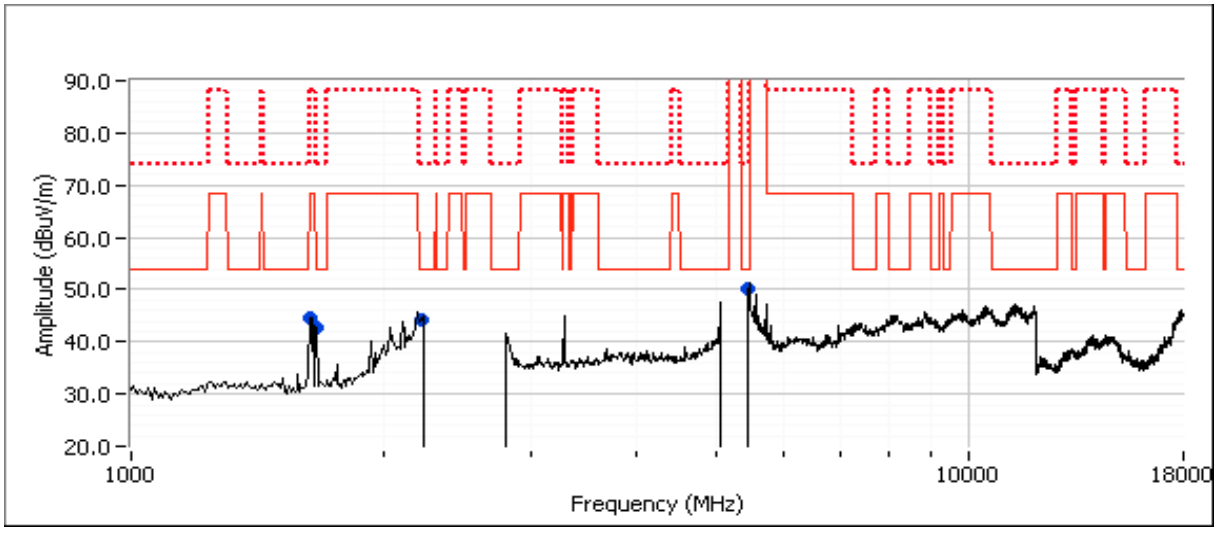
Run #3c, EUT on Channel #11 2462MHz - 802.11n20 and Channel #48 5240MHz - 802.11n20, Chain A+B+C

Radio	Freq	Power Setting
1	5240 MHz	9.5
2	2462 MHz	12.5

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5440.270	48.0	V	54.0	-6.0	AVG	242	1.0	RB 1 MHz;VB 10 Hz;Peak
5436.230	58.2	V	74.0	-15.8	PK	242	1.0	RB 1 MHz;VB 3 MHz;Peak
2224.340	43.8	V	54.0	-10.2	AVG	301	1.6	RB 1 MHz;VB 10 Hz;Peak
2224.310	55.0	V	74.0	-19.0	PK	301	1.6	RB 1 MHz;VB 3 MHz;Peak
1641.290	47.5	H	-	-	PK	247	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.670	42.1	H	54.0	-11.9	AVG	204	1.4	RB 1 MHz;VB 10 Hz;Peak
1666.650	46.2	H	74.0	-27.8	PK	204	1.4	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run #4, Radiated Spurious Emissions, 1-40GHz, 802.11n40/802.11n40, Chain A+B+C

Run #4a, EUT on Channel #3 2422MHz - 802.11n40 and Channel #38 5190MHz - 802.11n40 - Chain A+B+C

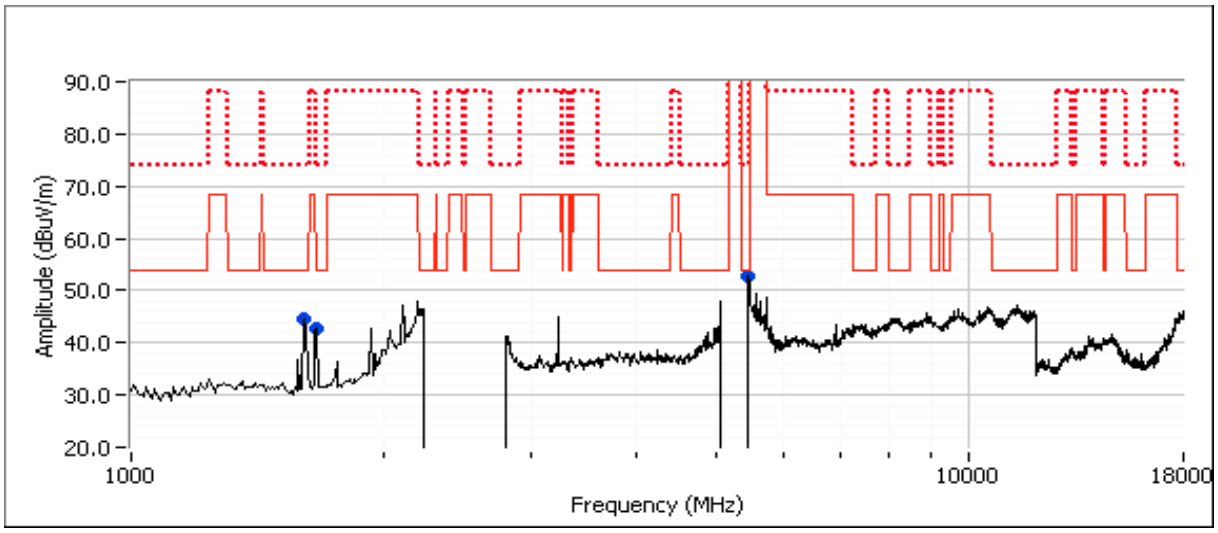
Date of Test: 12/18/2012 Test Location: FT7
Test Engineer: Rafael Varelas Config Change: None

Radio	Freq	Power Setting
1	5190 MHz	10.0
2	2422 MHz	16.0

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5440.020	49.8	V	54.0	-4.2	AVG	356	1.0	RB 1 MHz;VB 10 Hz;Peak
5435.220	59.7	V	74.0	-14.3	PK	356	1.0	RB 1 MHz;VB 3 MHz;Peak
1614.710	44.0	H	54.0	-10.0	AVG	248	1.0	RB 1 MHz;VB 10 Hz;Peak
1614.890	47.3	H	74.0	-26.7	PK	248	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.690	43.0	V	54.0	-11.0	AVG	228	1.1	RB 1 MHz;VB 10 Hz;Peak
1666.810	46.9	V	74.0	-27.1	PK	228	1.1	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

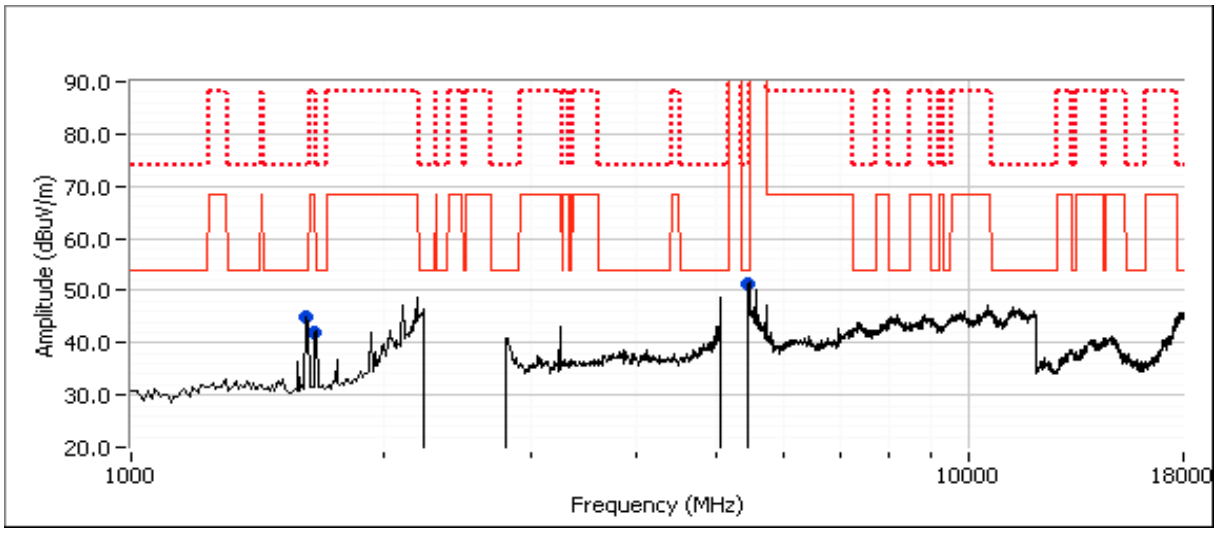
Run #4b, EUT on Channel #6 2437MHz - 802.11n40 and Channel #46 5230MHz - 802.11n40, Chain A+B+C

Radio	Freq	Power Setting
1	5230 MHz	10.5
2	2437 MHz	16.0

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5443.680	47.8	V	54.0	-6.2	AVG	99	1.0	RB 1 MHz;VB 10 Hz;Peak
5434.580	58.3	V	74.0	-15.7	PK	99	1.0	RB 1 MHz;VB 3 MHz;Peak
1624.720	44.2	H	54.0	-9.8	AVG	241	1.0	RB 1 MHz;VB 10 Hz;Peak
1624.890	47.7	H	74.0	-26.3	PK	241	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.690	41.8	H	54.0	-12.2	AVG	211	1.0	RB 1 MHz;VB 10 Hz;Peak
1666.780	46.3	H	74.0	-27.7	PK	211	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.
Note 2:	Scans made between 18 - 40GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no signifcant emissions in this frequency range



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

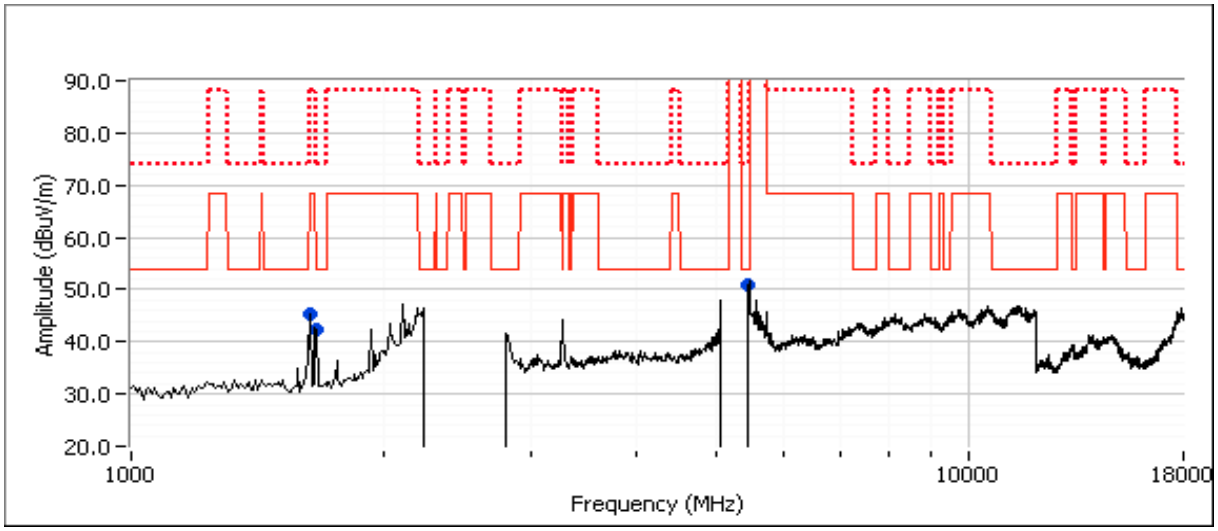
Run #4c, EUT on Channel #9 2452MHz - 802.11n40 and Channel #46 5230MHz - 802.11n40, Chain A+B+C

Radio	Freq	Power Setting
1	5230 MHz	10.5
2	2452 MHz	16.0

Spurious Radiated Emissions:

Frequency	Level	Pol	15.209/15.407		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5440.080	48.1	V	54.0	-5.9	AVG	0	1.0	RB 1 MHz;VB 10 Hz;Peak
5435.350	58.3	V	74.0	-15.7	PK	0	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.700	42.0	H	54.0	-12.0	AVG	210	1.0	RB 1 MHz;VB 10 Hz;Peak
1666.700	46.2	H	74.0	-27.8	PK	210	1.0	RB 1 MHz;VB 3 MHz;Peak
1634.710	47.7	H	-	-	PK	331	1.0	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit is -27dBm/MHz for peak measurements in a measurement bandwidth of 1MHz.



Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Radiated Emissions 30-1000 MHz, (FCC 15.247/RSS 210)

(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: 12/19/2012
Test Engineer: Jack Liu
Test Location: FT Chamber #7

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

General Test Configuration

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

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: 23 °C
Rel. Humidity: 36 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Radiated Emissions 30 - 1000 MHz Radio1 5785MHz (TX) Radio2 2412MHz (TX)	FCC 15.209 / RSS 210	Pass	29.3 dBµV/m @ 37.75 MHz (-10.7 dB)
2	Radiated Emissions 30 - 1000 MHz Radio1 5825MHz (TX) Radio2 2462MHz (TX)	FCC 15.209 / RSS 210	Pass	26.5 dBµV/m @ 37.81 MHz (-13.5 dB)

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.

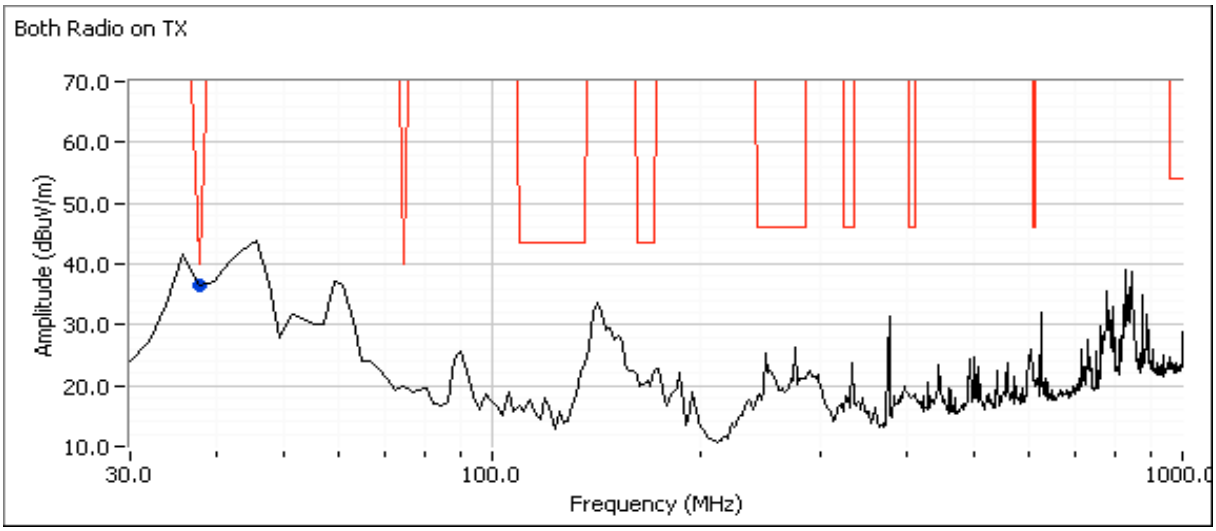
Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0

Configured Radio 1 to Tx , 802.11n20 19dBm on each chain (settings 19) on channel 157, Radio 2 to Tx, 802.11n20 19dBm on each chain (settings 19) on channel 1

#	Model	Type	Freq. Band (GHz)	Gain (dBi)	Ind/Out	Xpol?	Pt to Pt?
1	(Antenna A)	IFA	2.4	2	Indoor	No	No
1	(Antenna B & C)	IFA	5.2	2	Indoor	No	No



Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	FCC 15.209 / RSS 210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
37.750	36.5	V	40.0	-3.5	Peak	15	1.0	

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol	FCC 15.209 / RSS 210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
37.750	**29.3**	V	40.0	**-10.7**	QP	183	1.0	

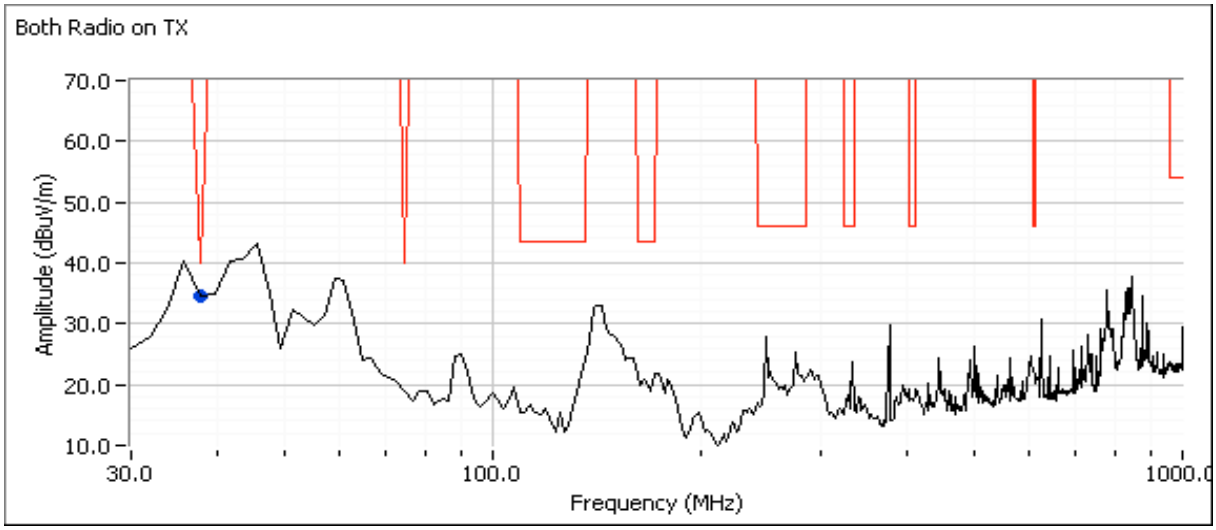
Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	N/A

Run #2: Preliminary Radiated Emissions, 30 - 1000 MHz

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0

Configured Radio 1 to Tx , 802.11n20 19dBm on each chain (settings 19) on channel 165, Radio 2 to Tx, 802.11n20 19dBm on each chain (settings 19) on channel 11

#	Model	Type	Freq. Band (GHz)	Gain (dBi)	Ind/Out	Xpol?	Pt to Pt?
1	(Antenna A)	IFA	2.4	2	Indoor	No	No
1	(Antenna B & C)	IFA	5.2	2	Indoor	No	No



Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	FCC 15.209 / RSS 210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
37.806	34.5	V	40.0	-5.5	Peak	315	1.0	

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol	FCC 15.209 / RSS 210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
37.806	26.5	V	40.0	-13.5	QP	315	1.0	QP (1.00s)

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	-

Conducted 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: 12/20/2012
Test Engineer: Jack Liu
Test Location: FT Chamber #7

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

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN. Remote support equipment was located outside of 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.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 40 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	15.207	Pass	48.3 dBµV @ 1.188 MHz (-7.7 dB)

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:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

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

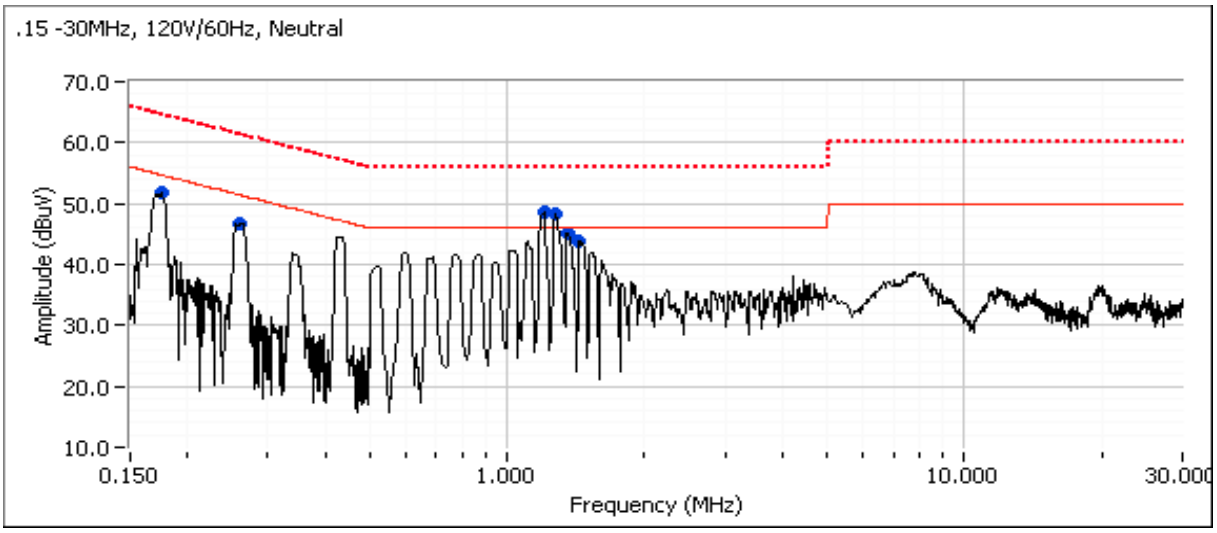
Frequency	Level	AC	FCC 15.207		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
1.191	48.7	Neutral	46.0	2.7	Peak	
1.280	48.3	Neutral	46.0	2.3	Peak	
1.362	45.0	Neutral	46.0	-1.0	Peak	
1.377	43.7	Neutral	46.0	-2.3	Peak	
0.173	51.7	Neutral	54.7	-3.0	Peak	
0.258	46.6	Neutral	51.4	-4.8	Peak	
0.257	45.7	Line 1	51.4	-5.7	Peak	
0.171	50.0	Line 1	54.8	-4.8	Peak	
1.106	47.7	Line 1	46.0	1.7	Peak	
1.188	49.3	Line 1	46.0	3.3	Peak	
1.271	45.0	Line 1	46.0	-1.0	Peak	
8.124	40.5	Line 1	50.0	-9.5	Peak	

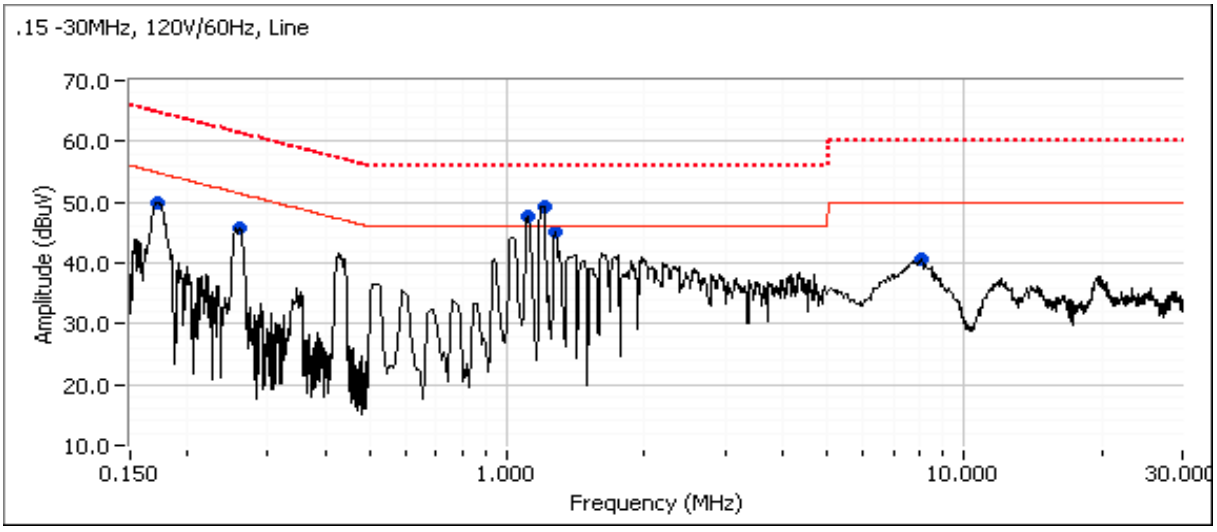
Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	-

Final quasi-peak and average readings

Frequency	Level	AC	FCC 15.207		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
1.188	**48.3**	Line 1	56.0	**-7.7**	QP	QP (1.00s)
0.257	42.9	Neutral	51.5	-8.6	AVG	AVG (0.10s)
1.280	37.2	Neutral	46.0	-8.8	AVG	AVG (0.10s)
1.191	47.2	Neutral	56.0	-8.8	QP	QP (1.00s)
1.280	46.9	Neutral	56.0	-9.1	QP	QP (1.00s)
1.106	46.0	Line 1	56.0	-10.0	QP	QP (1.00s)
0.173	44.5	Neutral	54.8	-10.3	AVG	AVG (0.10s)
1.191	35.4	Neutral	46.0	-10.6	AVG	AVG (0.10s)
0.257	40.6	Line 1	51.5	-10.9	AVG	AVG (0.10s)
1.106	35.0	Line 1	46.0	-11.0	AVG	AVG (0.10s)
1.362	44.2	Neutral	56.0	-11.8	QP	QP (1.00s)
0.170	43.1	Line 1	55.0	-11.9	AVG	AVG (0.10s)
1.362	33.9	Neutral	46.0	-12.1	AVG	AVG (0.10s)
1.271	33.7	Line 1	46.0	-12.3	AVG	AVG (0.10s)
1.271	43.7	Line 1	56.0	-12.3	QP	QP (1.00s)
1.377	43.4	Neutral	56.0	-12.6	QP	QP (1.00s)
1.377	31.7	Neutral	46.0	-14.3	AVG	AVG (0.10s)
1.188	31.5	Line 1	46.0	-14.5	AVG	AVG (0.10s)
0.173	50.3	Neutral	64.8	-14.5	QP	QP (1.00s)
0.257	45.5	Neutral	61.5	-16.0	QP	QP (1.00s)
0.170	48.9	Line 1	65.0	-16.1	QP	QP (1.00s)
0.257	44.3	Line 1	61.5	-17.2	QP	QP (1.00s)
8.124	37.4	Line 1	60.0	-22.6	QP	QP (1.00s)
8.124	23.0	Line 1	50.0	-27.0	AVG	AVG (0.10s)

Client:	Flextronics	Job Number:	J89849
Model:	WS-AP3710i	T-Log Number:	T89870
		Account Manager:	Christine Krebill
Contact:	George Fares		
Standard:	15.247, 15.407, RSS-210	Class:	-





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