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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 15, Subpart C (15.247) DTS Specifications and Industry Canada RSS 210 Issue 5 for an Intentional Radiator on the Westell Tech Inc Model: D90-327W30-06

FCC ID:	CH8D90327W30-XX
GRANTEE:	Westell Tech Inc 750 North Commons Dr. Aurora, IL 60504
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	February 8, 2006
FINAL TEST DATE:	January 31 and February 2, 2006
AUTHORIZED SIGNATORY:	Juan Martinez Senior EMC Engineer

ACCREDITED
2016-01

DECLARATIONS OF COMPLIANCE

Equipment Name and Model:
D90-327W30-06

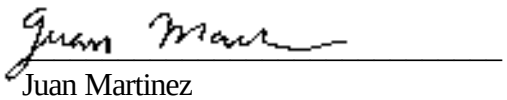
Manufacturer:
Westell Tech Inc
750 North Commons Dr.
Aurora, IL 60504

Tested to applicable standards:
RSS-210, Issue 5, November 2001 (Low Power License-Exempt Radiocommunication Devices)
FCC Part 15.247 (DTS)

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 SV2 Dated August 16, 2007
Departmental Acknowledgement Number: IC2845 SV3 Dated August 16, 2007

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards (through the use of ANSI C63.4:2003 as detailed in section 5.3 of RSS-210, Issue 6); and that the equipment performed in accordance with the data submitted in this report.

Signature	
Name	Juan Martinez
Title	Senior EMC Engineer
Company	Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA
Date:	February 8, 2006

Maintenance of compliance with the above standards 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.).

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SCOPE

An electromagnetic emissions test has been performed on the Westell Tech Inc model D90-327W30-06 pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators and RSS-210 Issue 6 for licence-exempt low power devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4:2003 as outlined in Elliott Laboratories test procedures.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC 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.

The test results recorded herein are based on a single type test of the Westell Tech Inc model D90-327W30-06 and therefore apply only to the tested sample. The sample was selected and prepared by Al Engelkens of Westell Tech Inc

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules and RSS-210 Issue 6 for license-exempt low power devices for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their 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.

SUMMARY OF RESULTS

FCC Part 15 Section	RSS 210 Section	Description	Measured Value	Comments	Result
15.247(a)	6.2.2(o)(b)	Digital Modulation	Systems uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	6.2.2(o)(b)	6dB Bandwidth	802.11b=13.2MHz 802.11g=16.6MHz	Minimum allowed is 500kHz	Complies
	RSP 100	99% Bandwidth	802.11b=15.7MHz 802.11g=18.5MHz	For information only	Complies
15.247 (b) (3)	6.2.2(o)(b)	Output Power, 2400 - 2483.5 MHz	26dBm (0.398 Watts) EIRP = 0.631 W	Multi-point applications: Maximum permitted is 1Watt, with EIRP limited to 4 Watts.	Complies
15.247(d)	6.2.2(o)(b)	Power Spectral Density	802.11b=-1.83dBm 802.11g=-3.0dBm	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	6.2.2(o)(e1)	Antenna Port Spurious Emissions – 30MHz – 25 GHz	All spurious emissions < -20dBc	All spurious emissions < -20dBc.	Complies
15.247(c) / 15.209		Radiated Spurious Emissions – 30MHz – 25 GHz	51.2dBuV/m @ 2390.02MHz (-2.8dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
15.207		AC Conducted Emissions	Refer to additional report	Pages 15 & 16	Complies
	RSS Gen (7.2.2)	AC Conducted Emissions	Refer to additional report	Pages 15 & 16	Complies
15.247 (b) (5)	RSS Gen (7.2.4)	Receiver	63.9µV/m @ 9846.8MHz (-23.9dB)	Table 1	Complies
15.247 (b) (5)		RF Exposure Requirements	MPE Calculation		Complies
15.203		RF Connector	Hiroshe connections (internal to device)	Unique antenna connection required for user-installed applications.	Complies

EIRP calculated using antenna gain of dBi (2) for the highest EIRP point-to-multipoint system.

MEASUREMENT UNCERTAINTIES

ISO Guide 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	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Westell Tech Inc model D90-327W30-06 is a 802.11 b/g wireless access point that is designed to send and receive data in the 2.4GHz unlicensed band. Since the EUT would be placed on a table top 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 120 Volts , 60 Hz, 1 Amps.

The sample was received on January 31, 2006 and tested on January 31 and February 2, 2006. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Westell Tech	327W	2.4GHz WLAN Access Point	-	CH8D90327W30-XX
Westell Tech	JOD-48U-04	AC adpater	-	-

OTHER EUT DETAILS

ENCLOSURE

The EUT enclosure is primarily constructed of molded plastic . It measures approximately 21 cm wide by 16 cm deep by 4 cm high.

MODIFICATIONS

The EUT required the following modifications during testing in order to comply with the emission specifications:

Mod. #	Test	Date	Modification
1	RE	1/31/2006	Soldered around entire border of RF shield on radio board to attenuate signal at 4874MHz (CH 6 2nd harmonic, b mode)

SUPPORT EQUIPMENT

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

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	Latitude	Laptop #1	N/A	DoC
US Robotics		PDA		

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

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	Latitude	Laptop #2		DoC

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet	Laptop #1	CAT 5	Unshielded	2.0
Ethernet (x3)	Unterminated	CAT 5	Unshielded	2.0
DSL	Unterminated	Multiwire	Unshielded	2.0
Power input	AC Mains	2 wire	Unshielded	1.5

Laptop #1 Cabling

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet	EUT Ethernet	CAT 5	Unshielded	2.0
Serial	PDA	Multiwire	Shielded	1.5

EUT OPERATION DURING TESTING

During Tx mode testing the EUT was sending data to Laptop #2. In 802.11b mode the duty cycle was approx. 95%. In 802.11g mode the duty cycle was approx 80%. Measurements were taken at the low, 2412MHz, middle, 2437MHz, and high, 2462MHz, channels

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on January 31 and February 2, 2006at the Elliott Laboratories Open Area Test Site #2 & 3 located at 684 West Maude Avenue, Sunnyvale, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Federal Communications Commission. In accordance with Industry Canada rules detailed in RSS 210 Issue 5 and RSS-212, construction, calibration, and equipment data for the test sites have been filed with the Federal Communications Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

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. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 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.

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.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde and 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.

POWER METER

A power meter and peak power sensor are used for all direct output power measurements from transmitters as they provide a broadband indication of the power output.

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 biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

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.

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 FCC requires 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.

RADIATED EMISSIONS

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

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. 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. Emissions which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements are performed 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.

Measurement bandwidths (video and resolution) are set in accordance with FCC procedures for the type of radio being tested.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions from the AC power port are given in units of microvolts, the limits for radiated electric field emissions are given in units of microvolts per meter at a specified test distance and the output power limits are given in temrs of Watts, milliwatts or dBm. 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.

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp) the following formula is used to determine the field strength limit in terms of microvolts per meter at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \text{ v } 30 \text{ P}}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

For reference, converting the voltage and electric field strength specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. Conversion of power specification limits from linear units (in milliwatts) to decibel form (in dBm) is accomplished by taking the base ten logarithm, then multiplying by 10.

FCC 15.407 (a)and RSS 210 (o) 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
902 – 928	1 Watts (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watts (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watts (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

RSS 210 (o) AND FCC 15.247 SPURIOUS RADIATED EMISSIONS LIMITS

T limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands detailed in Part 15.205 and for all spurious emissions from the receiver are:

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

All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level.

FCC 15.205 AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in FCC Part 15.205.

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

RSS-210 SECTION 6.6 AC POWER PORT CONDUCTED EMISSIONS LIMITS

The table below shows the limits for emissions on the AC power line as detailed in Industry Canada RSS-210 section 6.6.

Frequency Range (MHz)	Limit (uV)	Limit (dBuV)
0.450 to 30.000	250	48

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - B = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

B = Broadband Correction Factor*

C = Corrected Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

* Broadband Level - Per ANSI C63.4:2003 , 13 dB may be subtracted from the quasi-peak level if it is determined that the emission is broadband in nature. If the signal level in the average mode is six dB or more below the signal level in the peak mode, the emission is classified as broadband.

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, 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

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

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 1000 - 26,500 MHz, 31-Jan-06
Engineer: Chris Byleckie

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	26-Apr-06
EMCO	Horn antenna, D. Ridge 1-18GHz (SA40 system antenna)30Hz sunnyvale	3115	1142	11-Jun-06
Hewlett Packard	EMC Spectrum Analyzer 30Hz - 40GHz, Sunnyvale (SA40) Red	8564E (84125C)	1148	09-Sep-06
EMCO	Horn antenna, 18-26.5 GHz (SA40 30Hz)	3160-09 (84125C)	1150	12-Sep-06

Radiated Emissions, 30 - 26,500 MHz, 02-Feb-06
Engineer: Chris Byleckie

Manufacturer	Description	Model #	Asset #	Cal Due
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	28-Nov-06
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-07
Filtek	High Pass Filter, 1GHz	HP12/1000-5BA	957	18-Apr-06
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	23-May-06
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 40 GHz, Fremont (SA40) Blue	8564E (84125C)	1393	10-Nov-06
EMCO	Biconical Antenna, 30-300 MHz	3110B	1320	05-Oct-06
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1321	30-Mar-07

Radio Antenna Port (Power and Spurious Emissions), 02-Feb-06
Engineer: Chris Byleckie

Manufacturer	Description	Model #	Asset #	Cal Due
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1422	14-Oct-06
Rohde & Schwarz	Peak Power Sensor 100uW - 2 Watts	NRV-Z32	1536	09-May-06
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 40 GHz, Purple (SA40)	8564E (84125C)	1771	02-Aug-06
Rohde & Schwarz	Power Sensor 300uW - 30 Watts	NRV-Z54	1788	20-Jan-07

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T62676 31 Pages

Elliott

EMC Test Data

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	Test-Log Number:	T62676
		Project Manager:	Esther Zhu
Contact:	Al Engelkins		
Emissions Spec:	FCC 15.247	Class:	-
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Westell

Model

327W WLAN Access Point

Date of Last Test: 3/8/2006

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	Test-Log Number:	T62676
		Project Manager:	Esther Zhu
Contact:	Al Engelkins		
Emissions Spec:	FCC 15.247	Class:	-
Immunity Spec:	-	Environment:	-

EUT INFORMATION

The following information was collected during the test sessions(s).

General Description

The EUT is a 802.11 b/g wireless access point that is designed to send and recieve data in the 2.4GHz unlicensed band. Since the EUT would be placed on a table top 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 120 Volts , 60 Hz, 1 Amps.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Westell Tech	327W	2.4GHz WLAN Access	-	
Westell Tech	JOD-48U-04	AC adpater	-	-

EUT Antenna (Intentional Radiators Only)

The EUT antenna has an external Tx antenna, an external Rx antenna and an integral Rx antenna.
The external antennas are omnidirectional. The transmit antenna has a gain of 2dB
The internal antenna is a patch
The external antennas are fixed mounted to the chassis

EUT Enclosure

The EUT enclosure is primarily constructed of molded plastic . It measures approximately 21 cm wide by 16 cm deep by 4 cm high.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Project Manager:	Esther Zhu
Contact:	Al Engelkins		
Emissions Spec:	FCC 15.247	Class:	-
Immunity Spec:	-	Environment:	-

Test Configuration #1

The following information was collected during the test sessions(s).

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	Latitude	Laptop #1		DoC
US Robotics		PDA		

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	Latitude	Laptop #2		DoC

EUT Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet	Laptop #1	CAT 5	Unshielded	2.0
Ethernet (x3)	Unterminated	CAT 5	Unshielded	2.0
DSL	Unterminated	multiwire	Unshielded	2.0
Power input	AC Mains	2 wire	Unshielded	1.5

Laptop #1 Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet	EUT Ethernet	CAT 5	Unshielded	2.0
Serial	PDA	Multiwire	Shielded	1.5

EUT Operation During Emissions Tests

During Tx mode testing the EUT was sending data to Laptop #2. In 802.11b mode the duty cycle was approx. 95%. In 802.11g mode the duty cycle was approx 80%. Measurements were taken at the low, 2412MHz, middle, 2437MHz, and high, 2462MHz, channels

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions

Test Specifics

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: 1/31/2006
Test Engineer: Chris Byleckie
Test Location: SVOATS #3
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

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.

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

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 used.

Ambient Conditions: Temperature: 12 °C
Rel. Humidity: 69 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 30 - 25000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	51.2dBuV/m (364.8uV/m) @ 2390.02MHz (-2.8dB)
2	6dB Bandwidth	15.247(a)	Pass	13.18MHz @ 2412MHz
3	Output Power	15.247(b)	Pass	24dBm
4	Power Spectral Density (PSD)	15.247(d)	Pass	-1.83dBm

Modifications Made During Testing:

The following modifications were made:
Soldered the the entire perimeter of the RF shiled on the radio board during radiated testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Data rate 1Mbps

Run #1a: Radiated Spurious Emissions, 30 - 25000 MHz. Low Channel @ 2412 MHz

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2411.766	109.4	v	-	-	Pk	262	1.3	RB = VB = 1MHz
2411.766	105.7	v	-	-	Avg	262	1.3	RB = 1MHz, VB = 10Hz
2408.166	105.9	v	-	-	Pk	262	1.3	RB = VB = 100kHz
2413.334	107.6	h	-	-	Pk	50	1.0	RB = VB = 1MHz
2413.334	88.5	h	-	-	Avg	50	1.0	RB = 1MHz, VB = 10Hz
2408.600	101.2	h	-	-	Pk	50	1.0	RB = VB = 100kHz

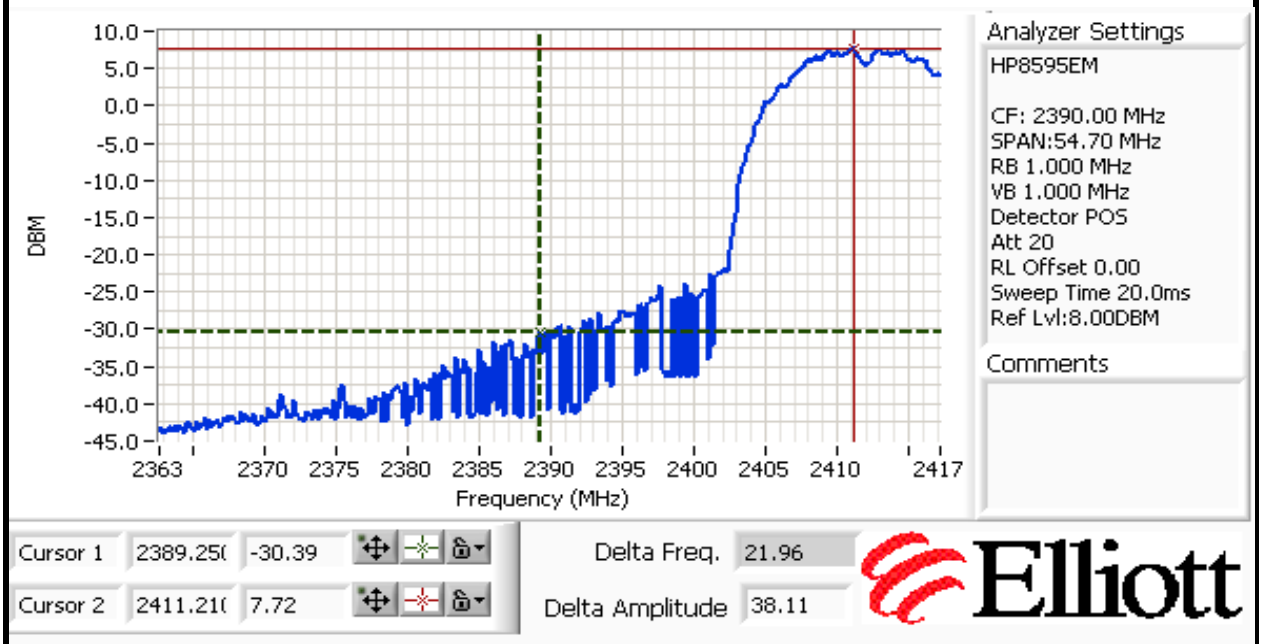
Delta Marker - Peak	38.1 dB
Delta Marker - Average	54.5 dB

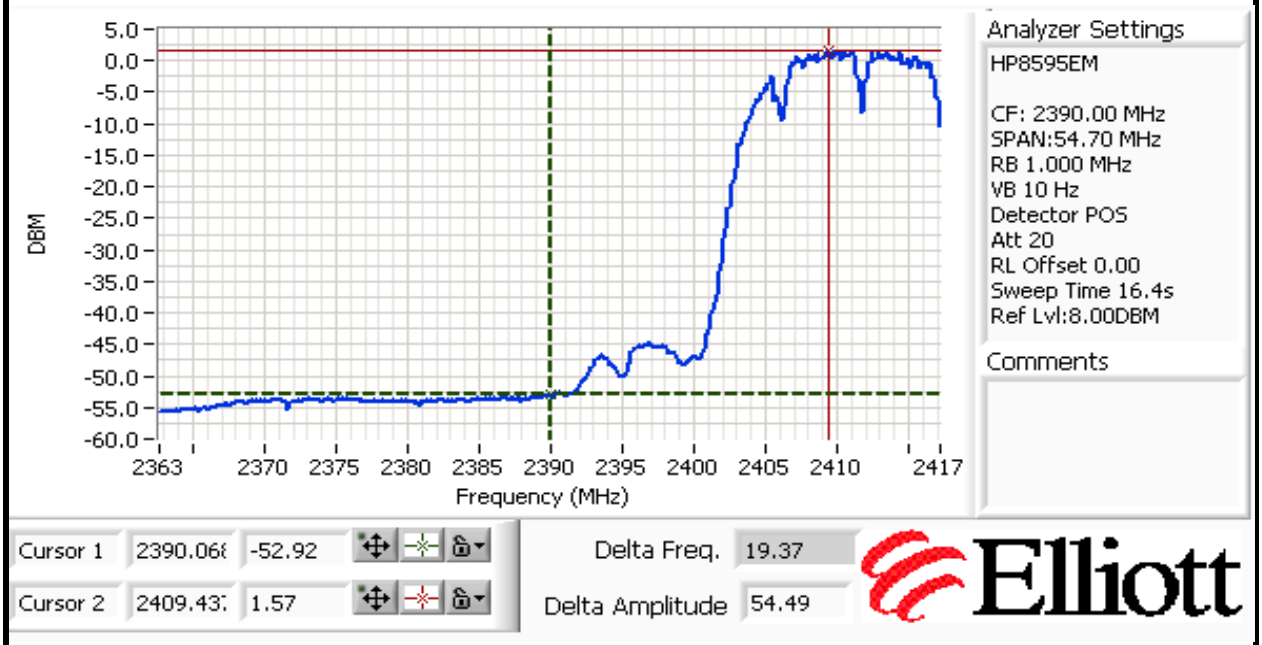
Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2390.000	71.3	v	74.0	-2.8	Pk	262	1.3	
2390.000	51.2	v	54.0	-2.8	Avg	262	1.3	

Note 1: Calculated by subtracting the marker delta values from the fundamental field strength measurements.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A





Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
12058.58	38.9	H	54.0	-15.1	AVG	360	1.0	Noise Floor
12060.13	38.7	H	54.0	-15.3	AVG	360	1.0	Noise Floor
4824.02	36.3	H	54.0	-17.7	AVG	252	2.1	
4824.10	30.8	H	54.0	-23.2	AVG	338	1.2	
12058.58	50.4	H	74.0	-23.6	PK	360	1.0	Noise Floor
12060.13	50.1	H	74.0	-23.9	PK	360	1.0	Noise Floor
4824.02	42.5	H	74.0	-31.5	PK	252	2.1	
4824.10	39.4	H	74.0	-34.6	PK	338	1.2	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Run #1b: Radiated Spurious Emissions, 30 - 25000 MHz. Center Channel @ 2437 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.40	48.2	V	54.0	-5.8	AVG	117	1.0	
4874.67	46.5	H	54.0	-7.5	AVG	46	2.1	
12183.92	38.4	H	54.0	-15.6	AVG	359	1.0	Noise Floor
12183.80	38.4	V	54.0	-15.6	AVG	359	1.0	Noise Floor
7312.23	36.0	V	54.0	-18.1	AVG	360	1.0	Noise Floor
7309.98	35.0	H	54.0	-19.0	AVG	360	1.0	Noise Floor
4874.40	53.0	V	74.0	-21.0	PK	117	1.0	
4874.67	50.5	H	74.0	-23.5	PK	46	2.1	
12183.80	50.4	V	74.0	-23.6	PK	359	1.0	Noise Floor
12183.92	49.1	H	74.0	-24.9	PK	359	1.0	Noise Floor
7312.23	46.8	V	74.0	-27.2	PK	360	1.0	Noise Floor
7309.98	45.8	H	74.0	-28.2	PK	360	1.0	Noise Floor

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #1c: Radiated Spurious Emissions, 30 - 25000 MHz. High Channel @ 2462 MHz

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2461.324	106.3	h	-	-	Pk	272	1.0	RB = VB = 1MHz
2461.324	92.0	h	-	-	Avg	272	1.0	RB = 1MHz, VB = 10Hz
2460.633	99.6	h	-	-	Pk	272	1.0	RB = VB = 100kHz
2464.100	106.9	v	-	-	Pk	49	1.0	RB = VB = 1MHz
2464.100	104.5	v	-	-	Avg	49	1.0	RB = 1MHz, VB = 10Hz
2463.266	103.0	v	-	-	Pk	49	1.0	RB = VB = 100kHz

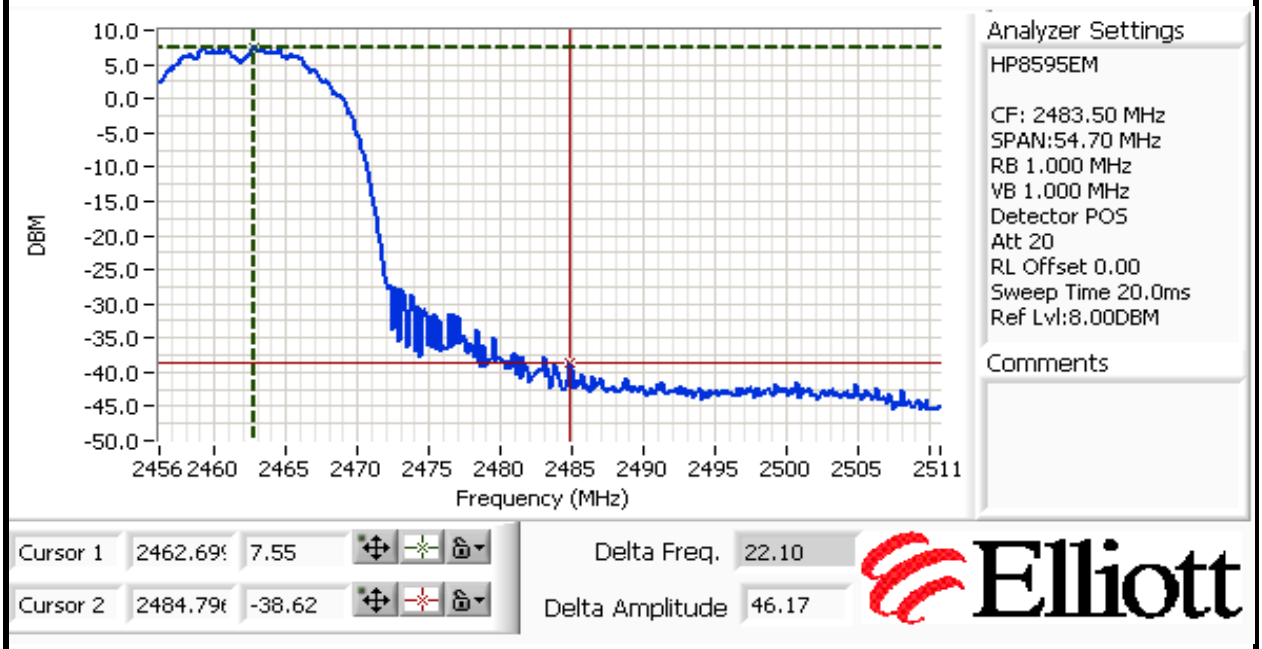
Delta Marker - Peak	46.2 dB
Delta Marker - Average	56.1 dB

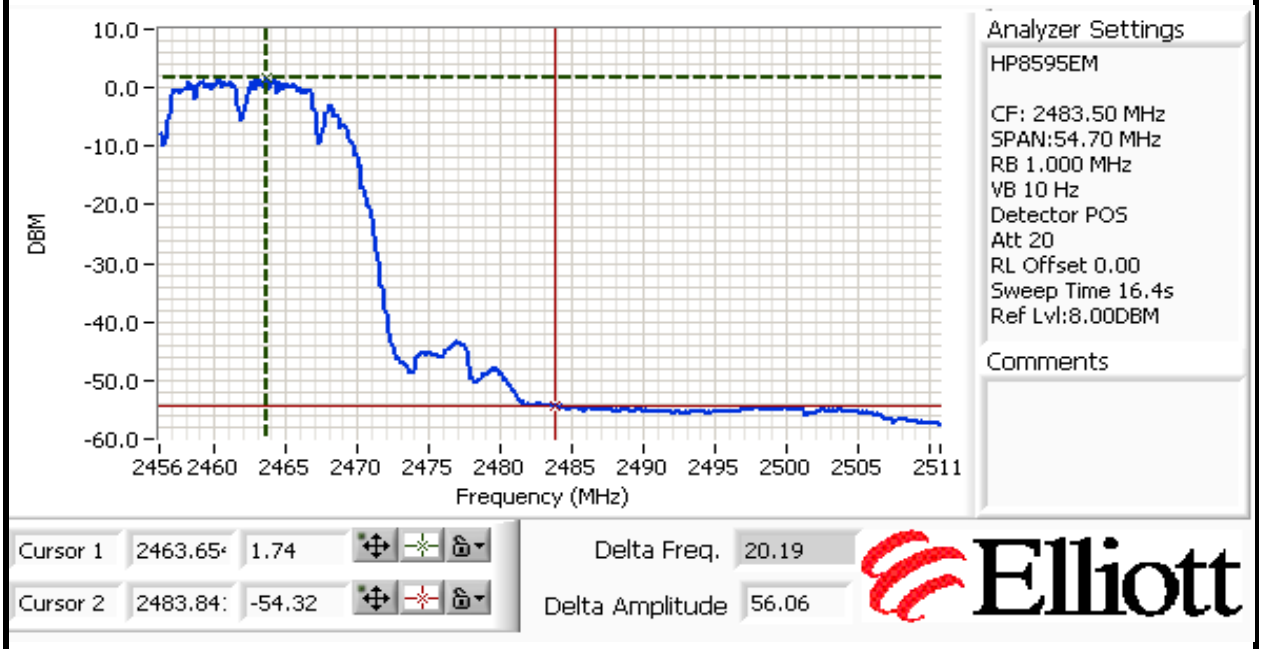
Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	60.7	v	74.0	-13.3	Pk	49	1.0	
2483.500	48.4	v	54.0	-5.6	Avg	49	1.0	

Note 1:	Calculated by subtracting the marker delta values from the fundamental field strength measurements.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A





Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4923.92	39.8	H	54.0	-14.3	AVG	17	2.1	
12308.63	38.5	H	54.0	-15.5	AVG	360	1.0	Noise Floor
12310.25	38.4	V	54.0	-15.6	AVG	360	1.0	Noise Floor
7386.98	35.7	H	54.0	-18.3	AVG	271	1.0	Noise Floor
7385.71	35.4	V	54.0	-18.6	AVG	360	1.0	Noise Floor
4923.94	31.0	V	54.0	-23.0	AVG	104	1.0	
12310.25	50.8	V	74.0	-23.2	PK	360	1.0	Noise Floor
12308.63	49.8	H	74.0	-24.2	PK	360	1.0	Noise Floor
7385.71	46.9	V	74.0	-27.1	PK	360	1.0	Noise Floor
7386.98	46.9	H	74.0	-27.1	PK	271	1.0	Noise Floor
4923.92	45.7	H	74.0	-28.3	PK	17	2.1	
4923.94	41.2	V	74.0	-32.8	PK	104	1.0	

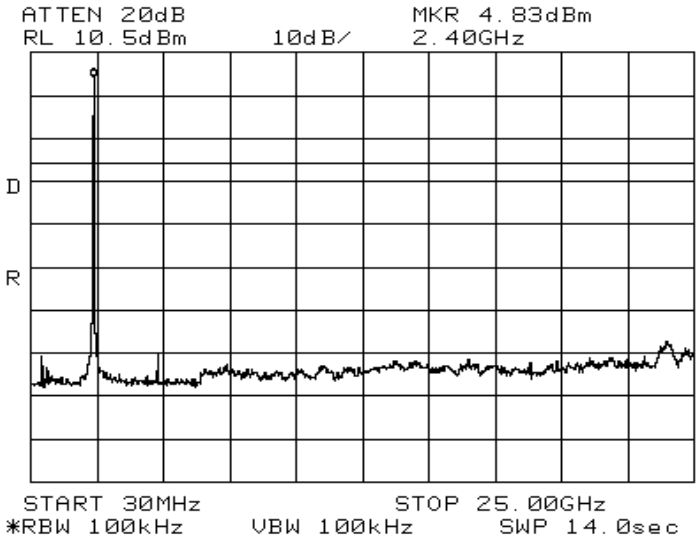
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

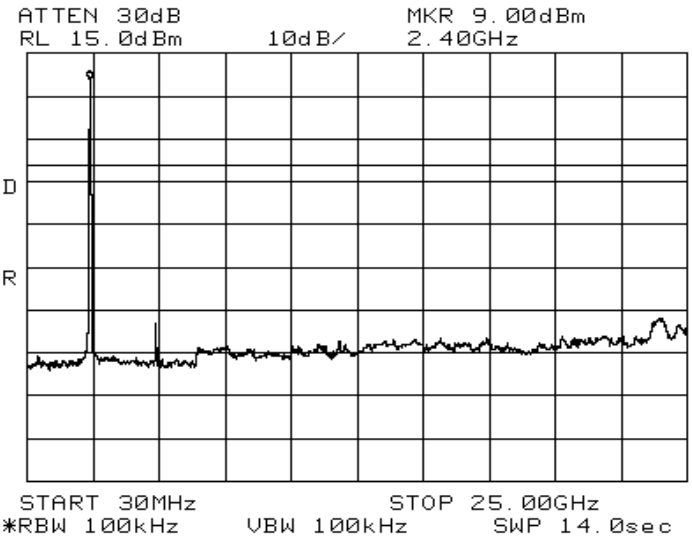
Run #1d: Antenna Conducted Spurious Emissions, 30 - 25000 MHz.

Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level.

2412MHz



2437MHz

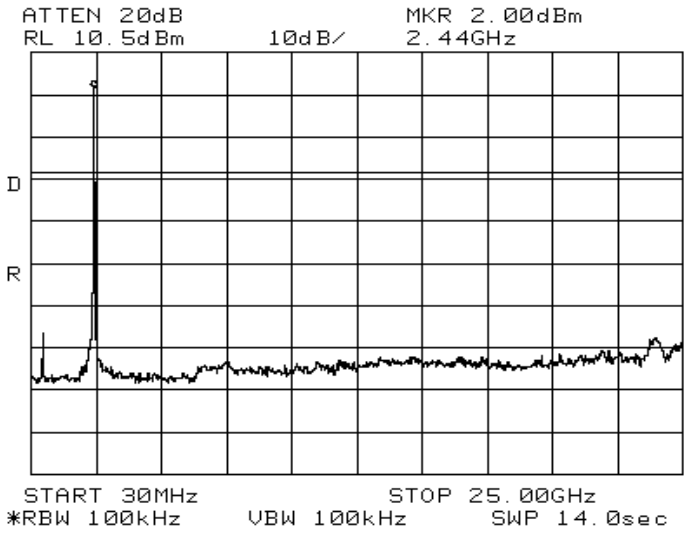


Run #1d continued on next page

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #1d continued

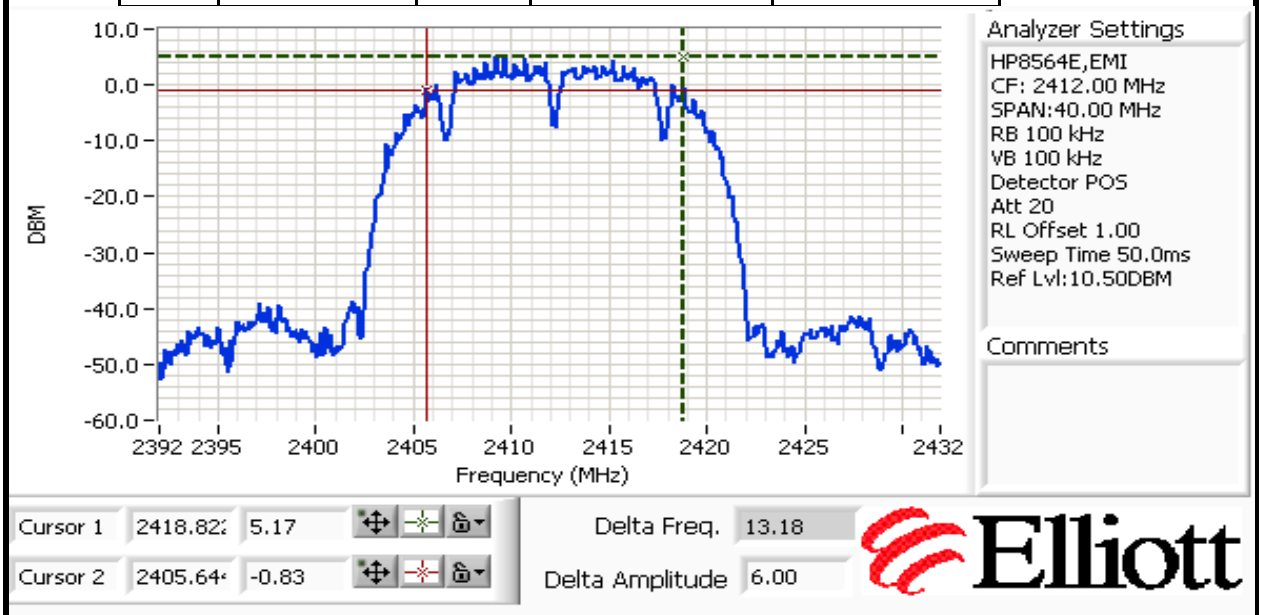
2462MHz

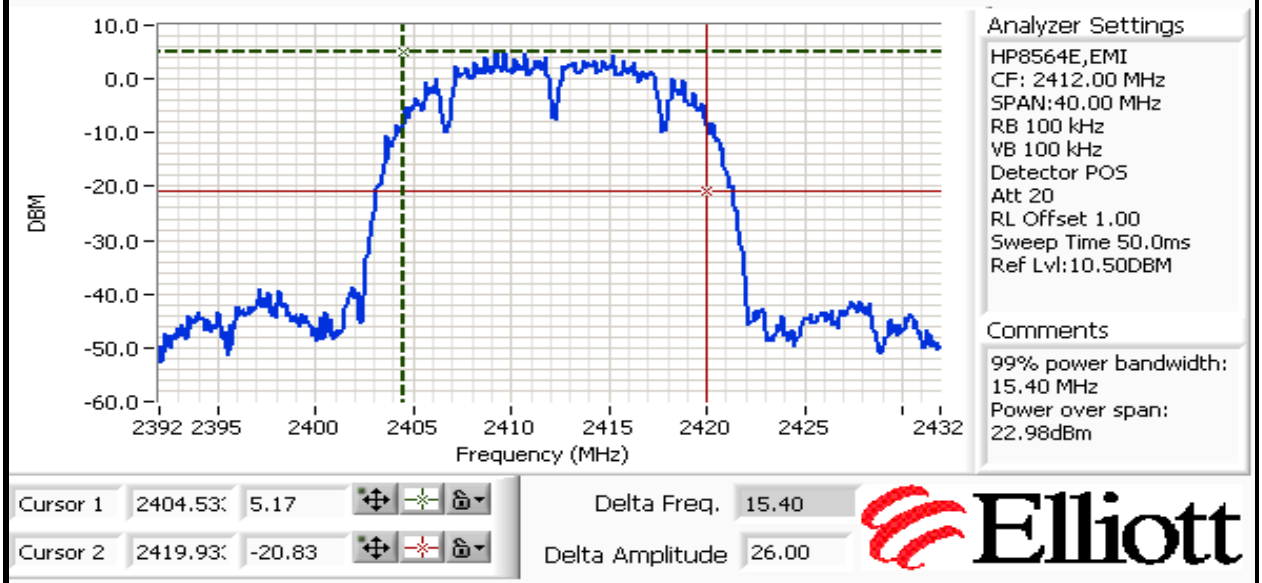


Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #2: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	99% Signal Bandwidth
	2412	100kHz	13.18 dB	15.4
	2437	100kHz	12.18 dB	15.5
	2462	100kHz	11.12 dB	15.7

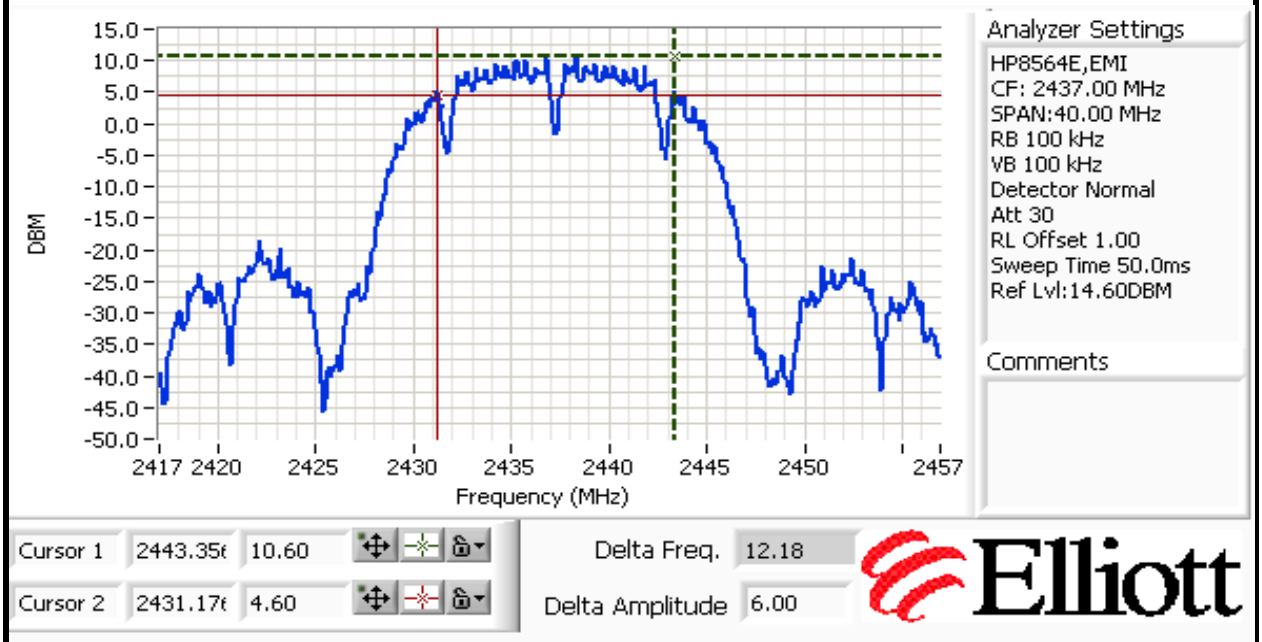


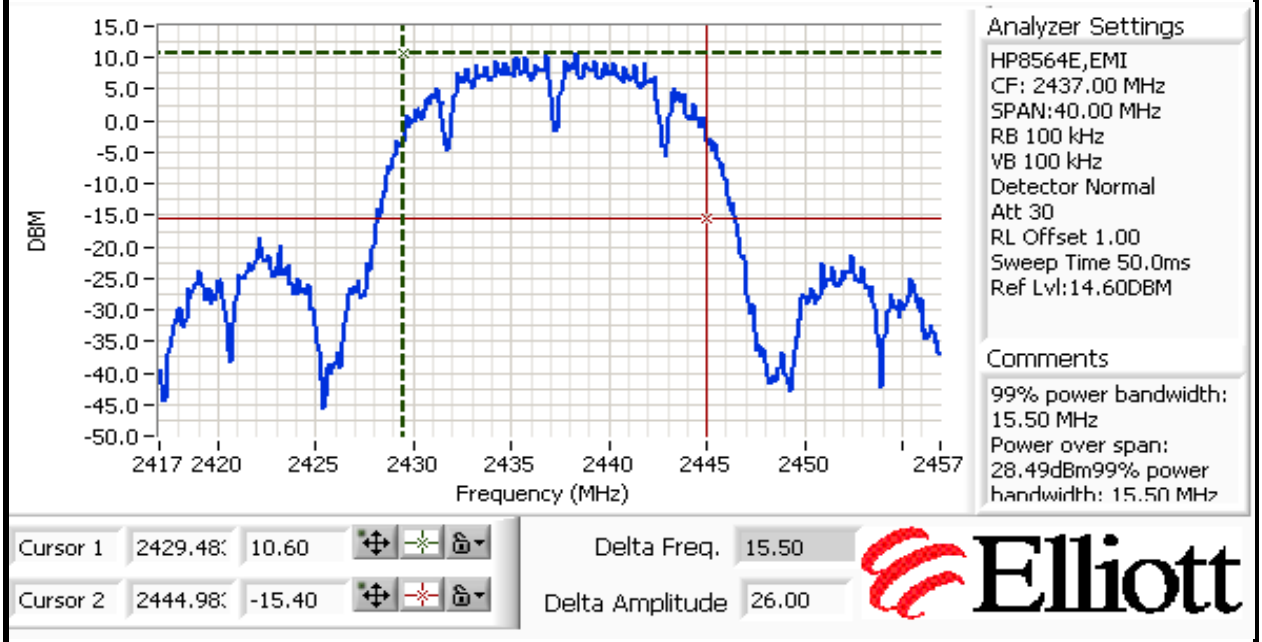


Run #2 continued on next page

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #2 continued

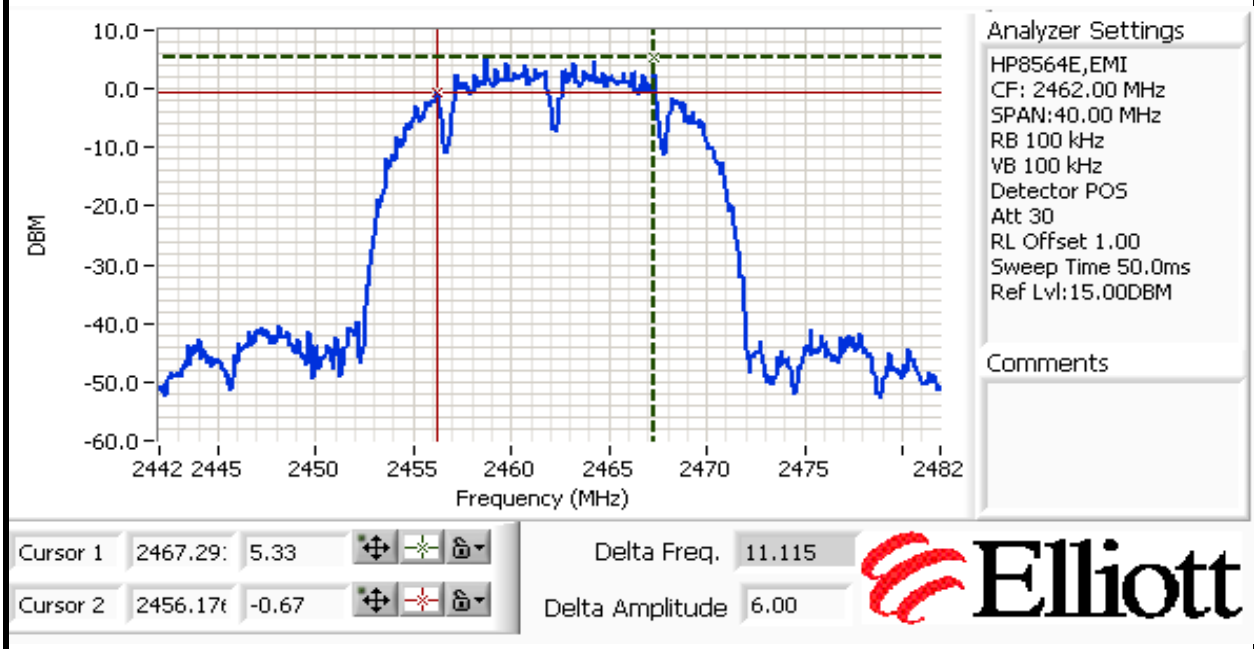


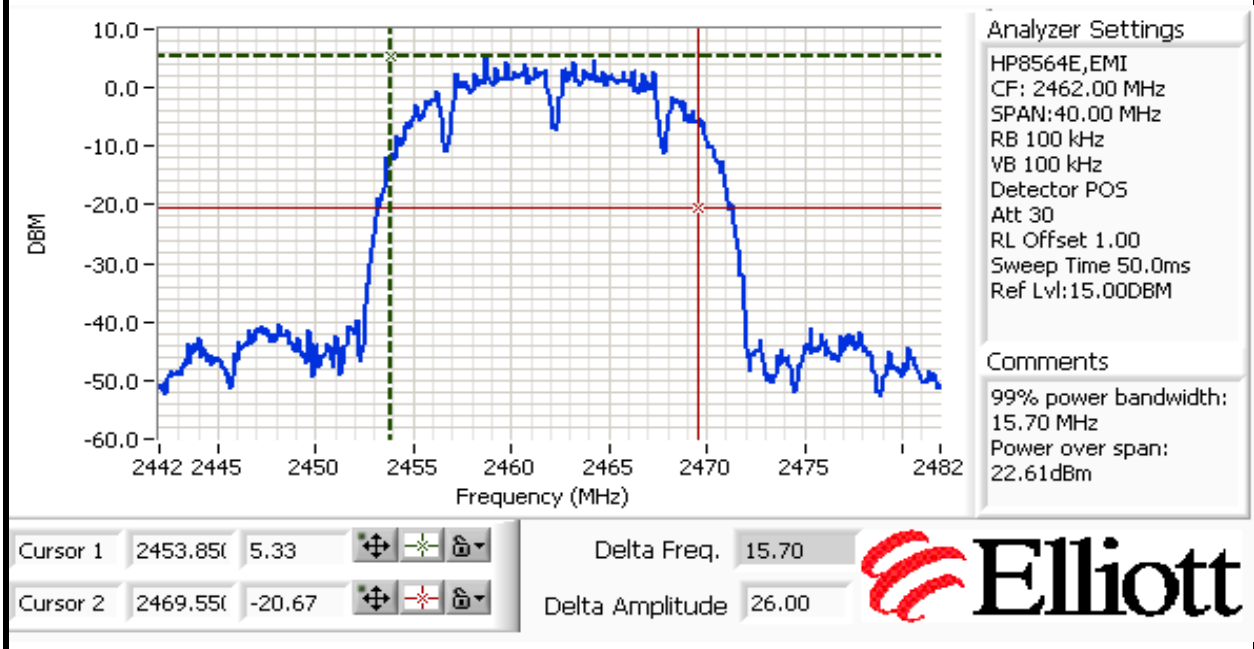


Run #2 continued on next page

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #2 continued





Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #3: Output Power

Maximum antenna gain: 2 dBi

Data rate 6Mbps

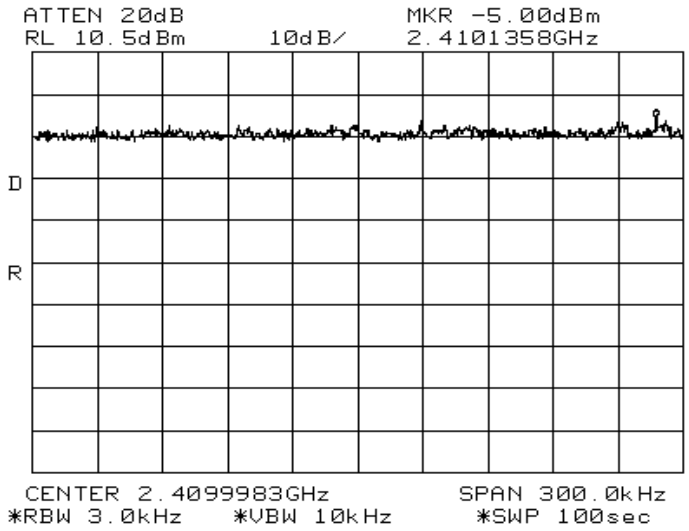
Power Setting	Frequency (MHz)	Output Power Note 1		EIRP	Average Power Note 2	
		dBm	W	W	dBm	W
	2412	18.4	0.069	0.110	16.9	
	2437	24.0	0.250	0.250	21.9	
	2462	18.5	0.071	0.071	16.7	

Note 1:	Output power measured using a peak power meter
Note 2:	Output power measured using an average power sensor - this value is for reference purposes only.

Run #4: Power Spectral Density

Power Setting	Operating Frequency (MHz)	Freq. @ PPSD	Res BW	P.S.D. (dBm/3kHz)
	2412	2410MHz	3kHz	-5.00
	2437	2440Mhz	3kHz	-1.83
	2462	2461MHz	3kHz	-6.33

2412MHz

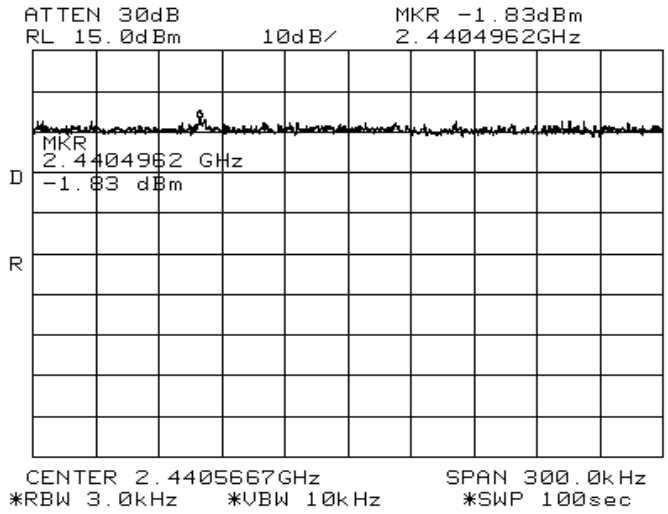


Run #4 continued on next page

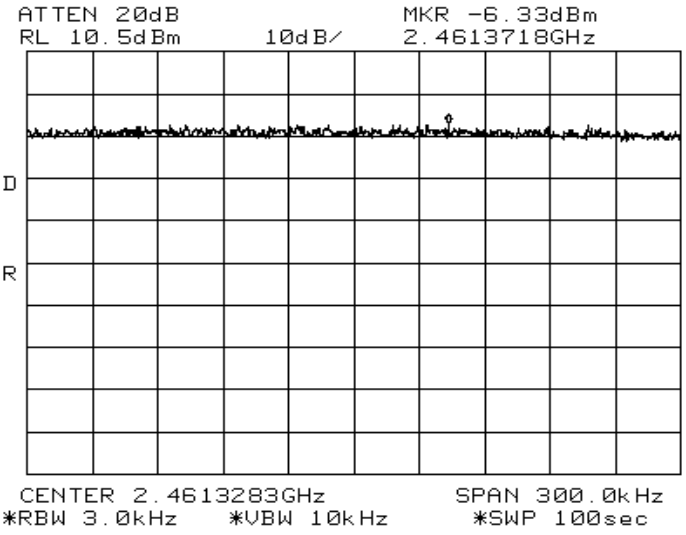
Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #4 continued

2437MHz



2462MHz



Note 1:	Freq. @ PPSD: Frequency of the Peak Power Spectral Density (PPSD)
Note 2:	Power spectral density measured using RB=3 kHz, VB=10kHz with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions

Test Specifics

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: 1/31/2006 Config. Used: 1
Test Engineer: Chris Byleckie Config Change: None
Test Location: SVOATS #3 EUT Voltage: 120V/60Hz

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.

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

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 used.

Ambient Conditions: Temperature: 12 °C
Rel. Humidity: 69 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 30 - 25000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	66.6dBµV/m (2125.7µV/m) @ 2390.0MHz (-7.5dB)
2	6dB Bandwidth	15.247(a)	Pass	16.6 MHz
3	Output Power	15.247(b)	Pass	26dBm
4	Power Spectral Density (PSD)	15.247(d)	Pass	-3dBm/kHz

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:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

The lowest data rate supported by the EUT in g mode is 18 Mbps
Run #1a: Radiated Spurious Emissions, 30 - 25000 MHz. Low Channel @ 2412 MHz
Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2406.566	105.8	v	-	-	Pk	43	1.3	RB = VB = 1MHz
2406.566	93.2	v	-	-	Avg	43	1.3	RB = 1MHz, VB = 10Hz
2410.534	96.4	v	-	-	Pk	43	1.3	RB = VB = 100kHz
2412.639	103.6	h	-	-	Pk	261	1.4	RB = VB = 1MHz
2412.639	90.3	h	-	-	Avg	261	1.4	RB = 1MHz, VB = 10Hz
2413.310	94.9	h	-	-	Pk	261	1.4	RB = VB = 100kHz

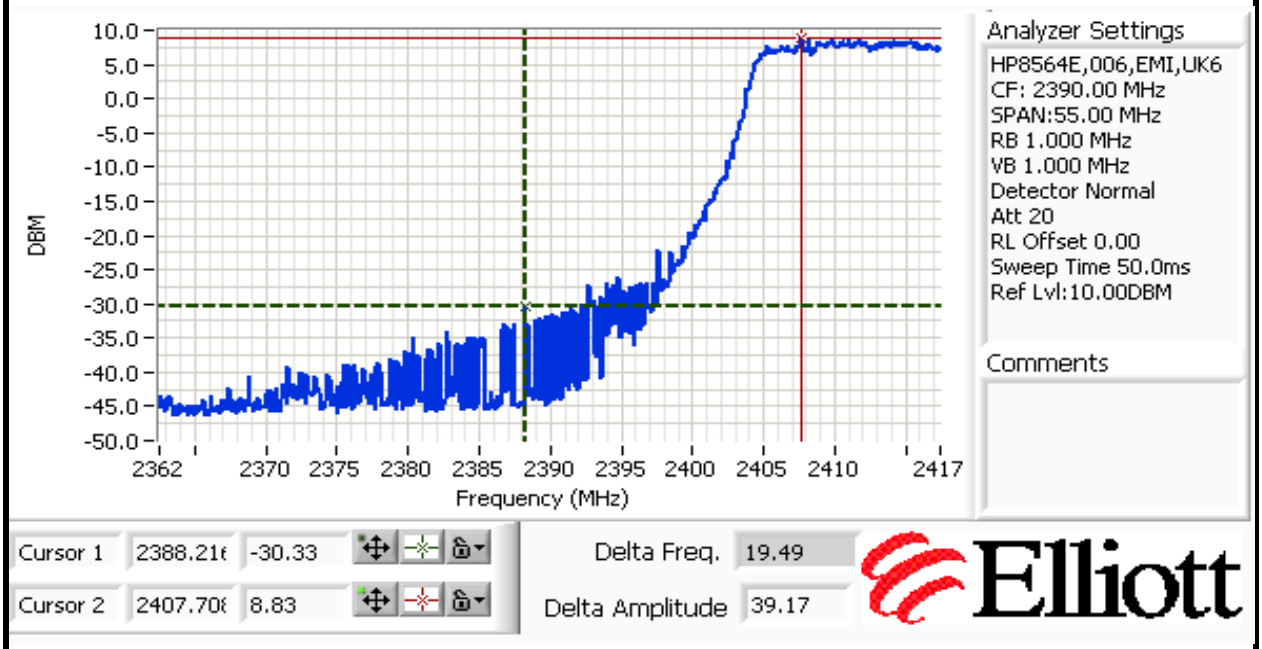
Delta Marker - Peak	39.2 dB
Delta Marker - Average	51.8 dB

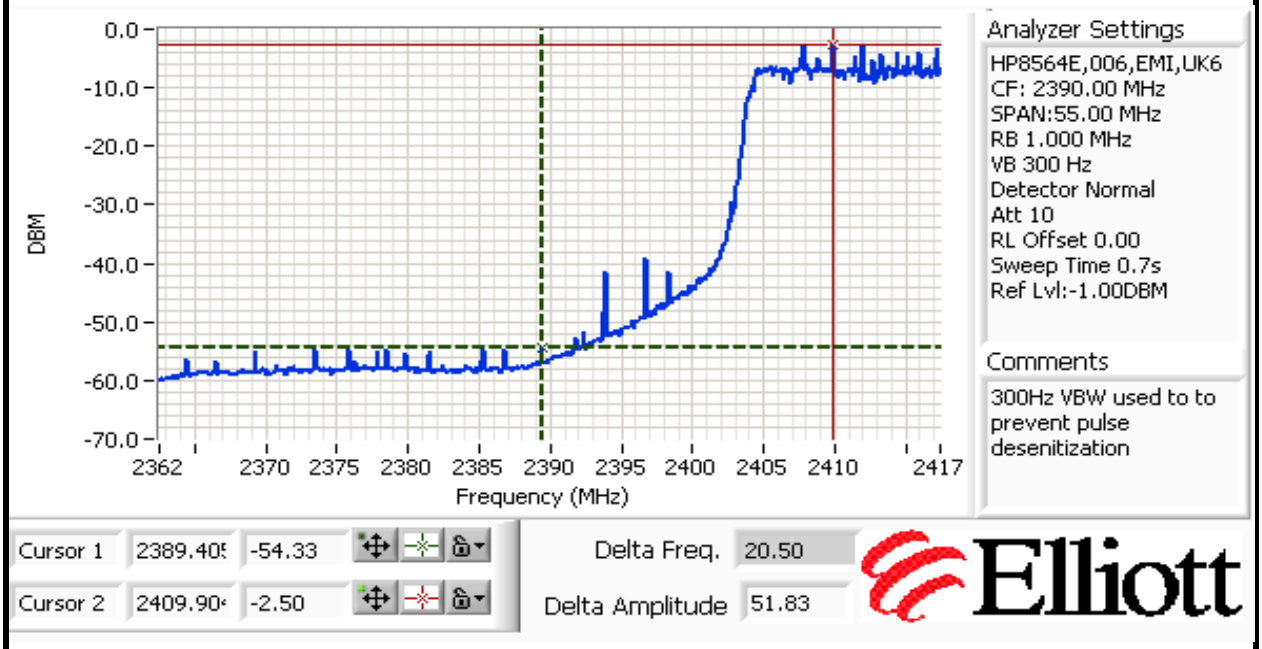
Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2390.000	66.6	v	74.0	-7.5	Pk	43	1.3	
2390.000	41.4	v	54.0	-12.6	Avg	43	1.3	

Note 1:	Calculated by subtracting the marker delta values from the fundamental field strength measurements.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A





Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4824.02	27.8	H	54.0	-26.2	AVG	74	1.0	
12058.71	38.4	V	54.0	-15.6	AVG	0	1.0	Noise Floor
12061.05	38.3	H	54.0	-15.7	AVG	359	1.0	Noise Floor
7236.51	34.2	V	54.0	-19.8	AVG	0	1.0	Noise Floor
7236.53	34.1	H	54.0	-19.9	AVG	360	1.0	Noise Floor
4824.19	30.2	V	54.0	-23.8	AVG	173	1.4	
12061.05	49.5	H	74.0	-24.5	PK	359	1.0	Noise Floor
12058.71	49.1	V	74.0	-24.9	PK	0	1.0	Noise Floor
7236.53	45.3	H	74.0	-28.7	PK	360	1.0	Noise Floor
7236.51	45.2	V	74.0	-28.9	PK	0	1.0	Noise Floor
4824.19	41.0	V	74.0	-33.0	PK	173	1.4	
4824.02	39.9	H	74.0	-34.1	PK	74	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Run #1b: Radiated Spurious Emissions, 30 - 25000 MHz. Center Channel @ 2437 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
12184.36	38.4	H	54.0	-15.6	AVG	0	1.0	Noise Floor
12184.68	38.3	V	54.0	-15.7	AVG	0	1.0	Noise Floor
4874.17	37.2	V	54.0	-16.8	AVG	97	1.2	
7312.08	35.1	V	54.0	-18.9	AVG	153	1.0	Noise Floor
7311.74	35.0	H	54.0	-19.0	AVG	0	1.0	Noise Floor
4874.17	52.2	V	74.0	-21.9	PK	97	1.2	
4873.08	30.6	H	54.0	-23.4	AVG	147	2.3	
12184.68	49.7	V	74.0	-24.3	PK	0	1.0	Noise Floor
12184.36	49.7	H	74.0	-24.4	PK	0	1.0	Noise Floor
7311.74	46.8	H	74.0	-27.2	PK	0	1.0	Noise Floor
7312.08	45.9	V	74.0	-28.1	PK	153	1.0	Noise Floor
4873.08	41.3	H	74.0	-32.7	PK	147	2.3	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #1c: Radiated Spurious Emissions, 30 - 25000 MHz. High Channel @ 2462 MHz

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2468.600	105.8	v	-	-	Pk	45	1.0	RB = VB = 1MHz
2468.600	92.1	v	-	-	Avg	45	1.0	RB = 1MHz, VB = 10Hz
2470.000	101.2	v	-	-	Pk	45	1.0	RB = VB = 100kHz
2460.909	96.4	h	-	-	Pk	198	2.4	RB = VB = 1MHz
2460.909	84.2	h	-	-	Avg	198	2.4	RB = 1MHz, VB = 10Hz
2466.100	90.0	h	-	-	Pk	198	2.4	RB = VB = 100kHz

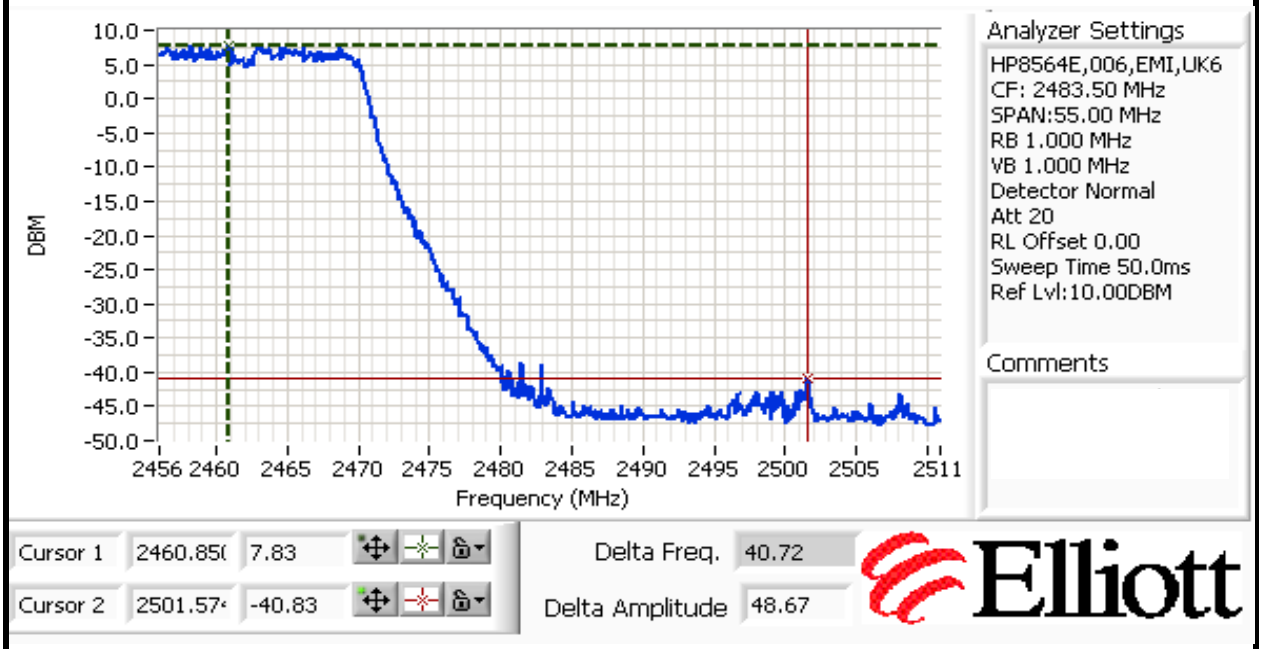
Delta Marker - Peak	48.7 dB
Delta Marker - Average	54.3 dB

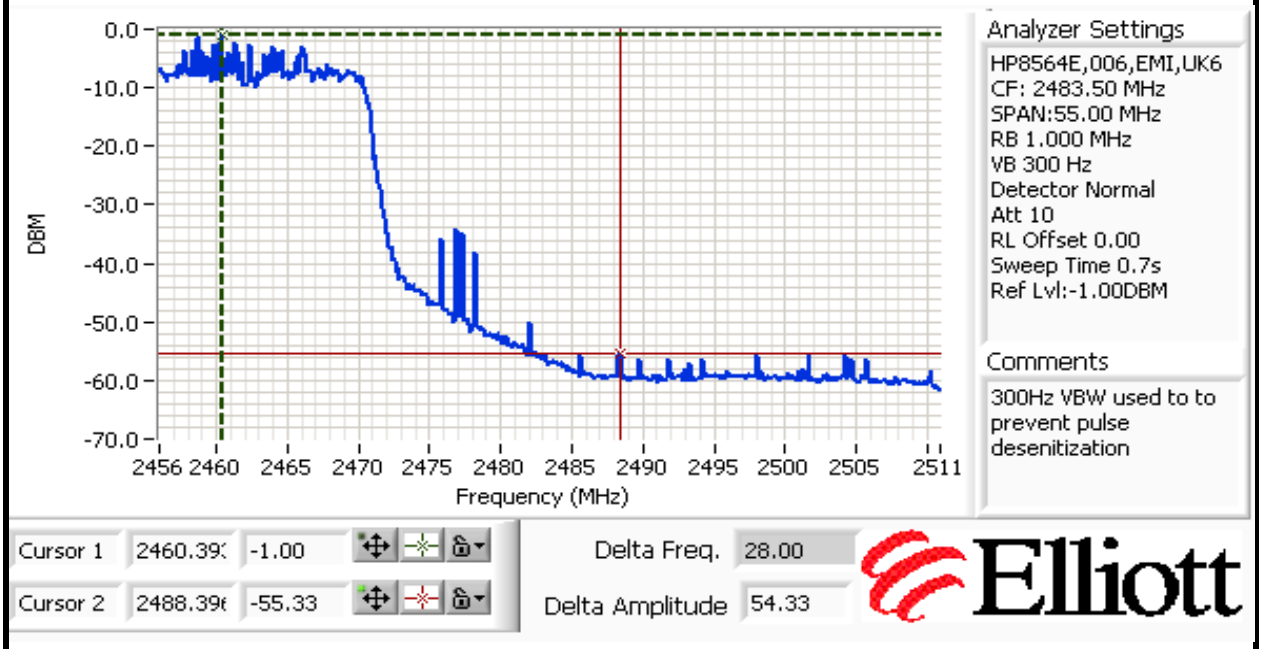
Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	57.1	v	74.0	-16.9	Pk	45	1.0	
2483.500	37.8	v	54.0	-16.3	Avg	45	1.0	

Note 1: Calculated by subtracting the marker delta values from the fundamental field strength measurements.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A





Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4923.95	32.6	V	54.0	-21.4	AVG	122	1.0	
4923.95	41.8	V	74.0	-32.2	PK	122	1.0	
7387.44	35.3	V	54.0	-18.7	AVG	0	1.0	Noise Floor
7387.44	46.6	V	74.0	-27.4	PK	0	1.0	Noise Floor
12310.38	38.2	V	54.0	-15.8	AVG	0	1.0	Noise Floor
12310.38	49.1	V	74.0	-24.9	PK	0	1.0	Noise Floor
4922.58	29.3	H	54.0	-24.7	AVG	30	1.0	
4922.58	40.7	H	74.0	-33.3	PK	30	1.0	
7385.62	35.4	H	54.0	-18.6	AVG	0	1.0	Noise Floor
7385.62	46.3	H	74.0	-27.7	PK	0	1.0	Noise Floor
12308.74	38.3	H	54.0	-15.7	AVG	0	1.0	Noise Floor
12308.74	48.9	H	74.0	-25.1	PK	0	1.0	Noise Floor

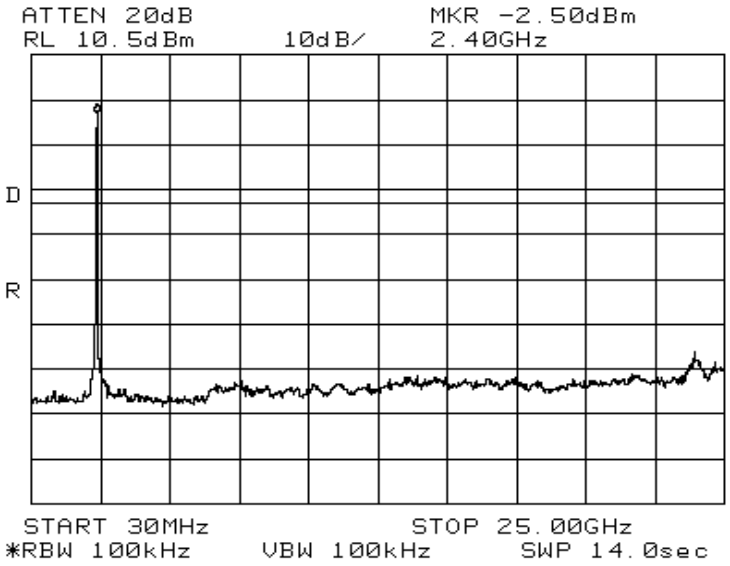
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

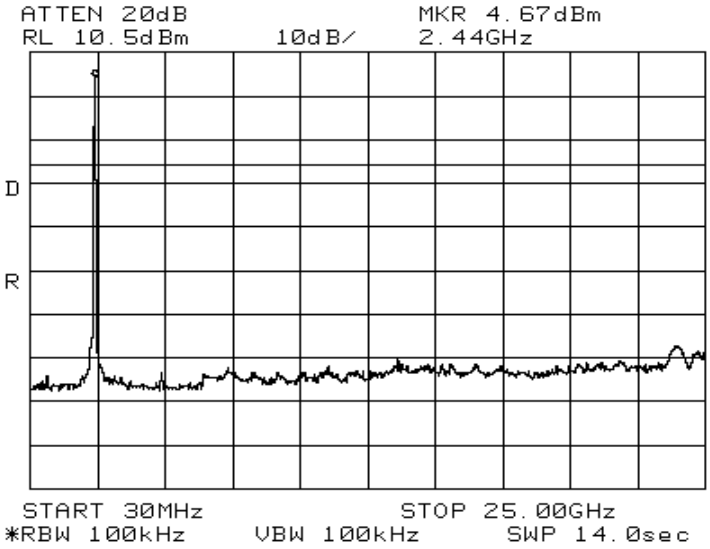
Run #1d: Antenna Conducted Spurious Emissions, 30 - 25000 MHz.

Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level.

2412MHz



2437MHz

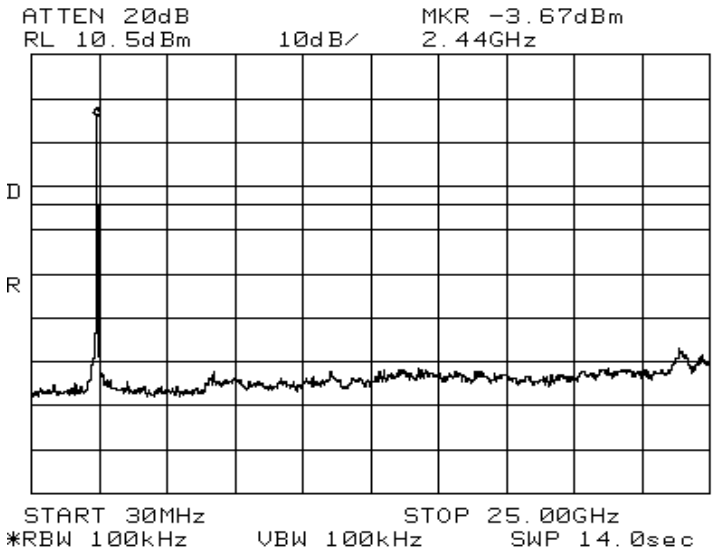


Run #1d continued on next page

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #1d continued

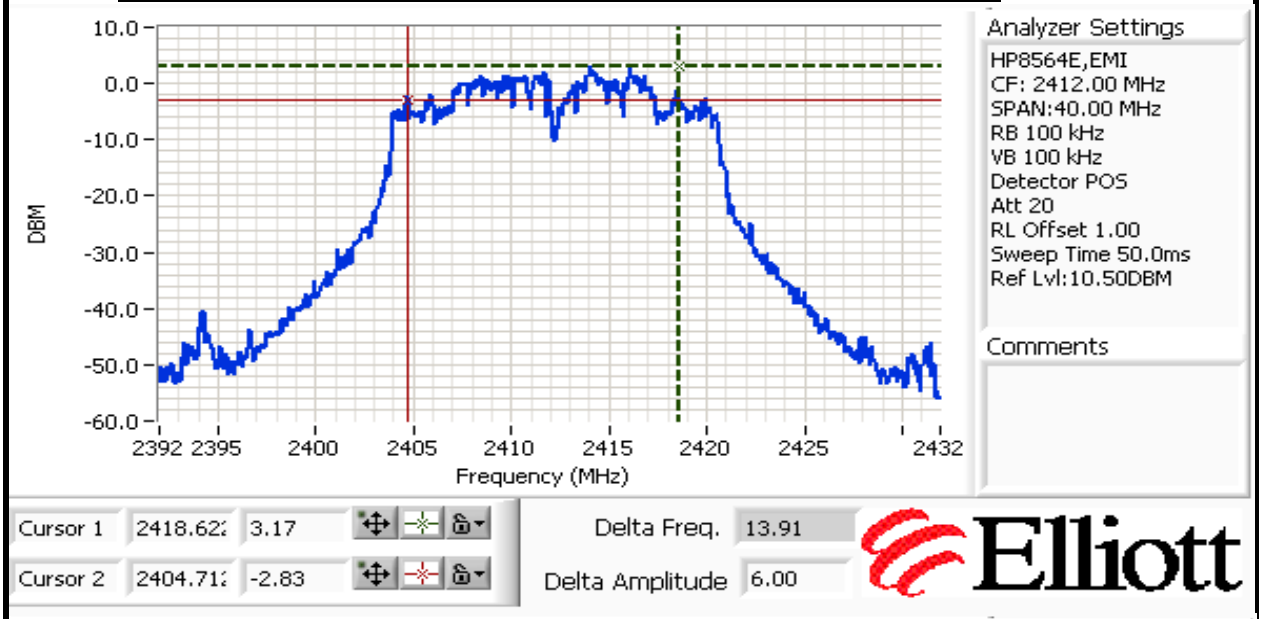
2462MHz

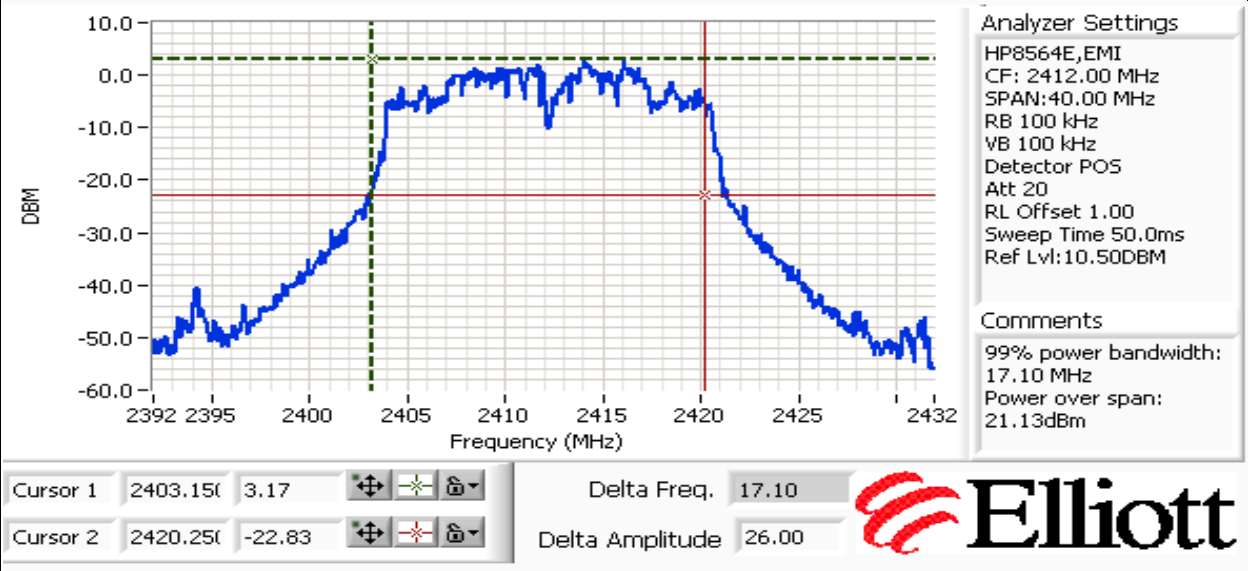


Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #2: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	99% Signal Bandwidth
	2412	100kHz	13.9	17.1
	2437	100kHz	16.6	16.6
	2462	100kHz	12.5	18.5

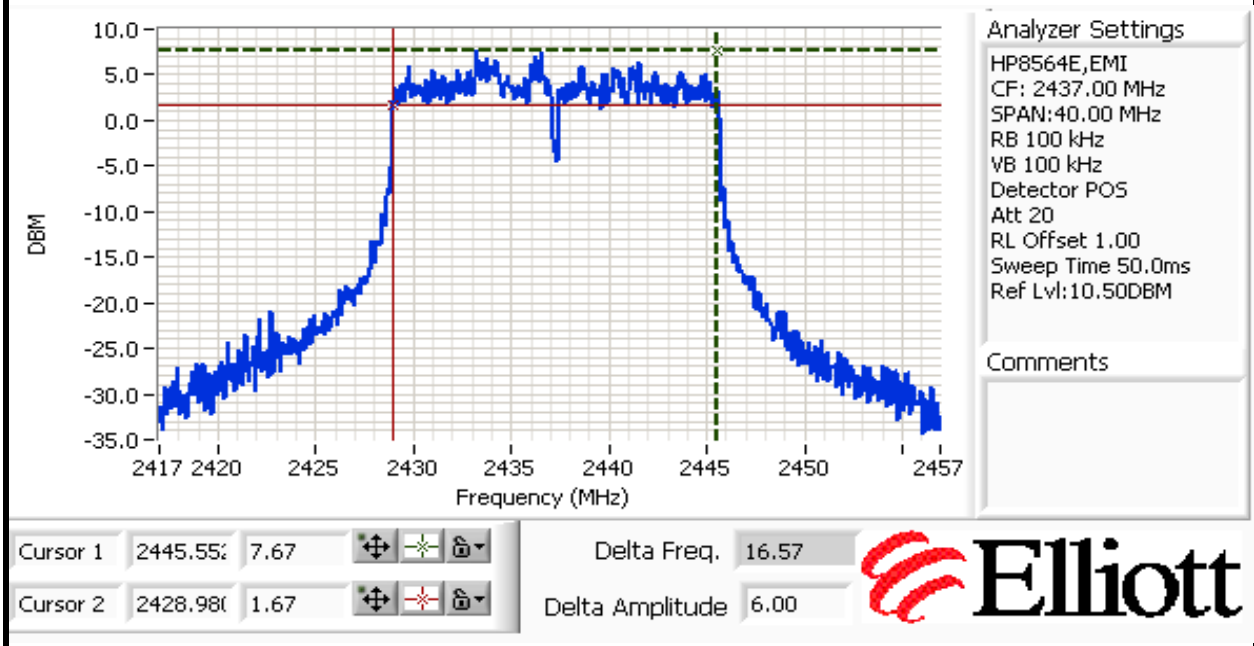


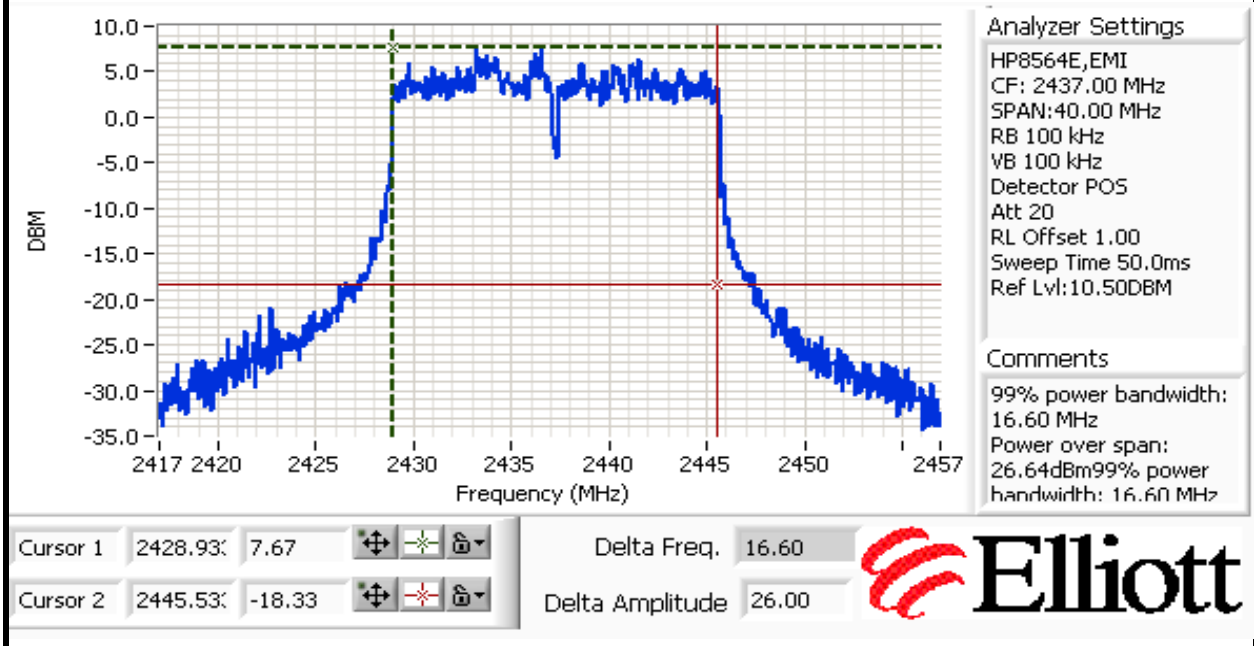


Run #2 continued on next page

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #2 continued

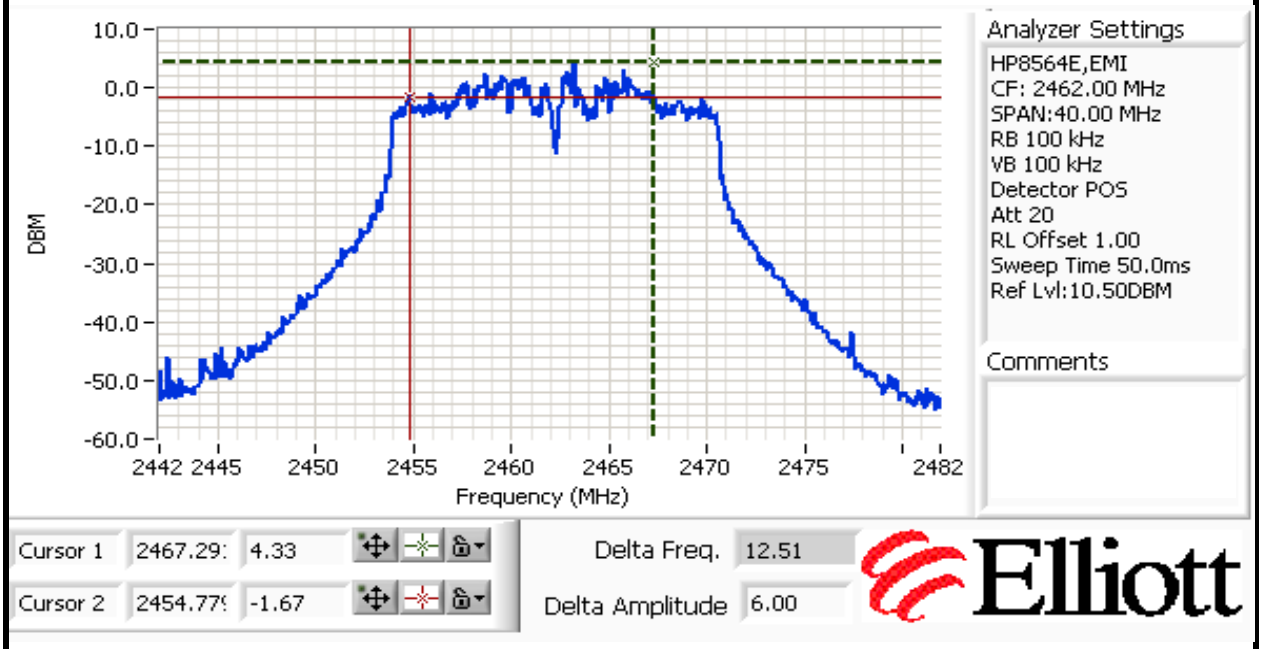


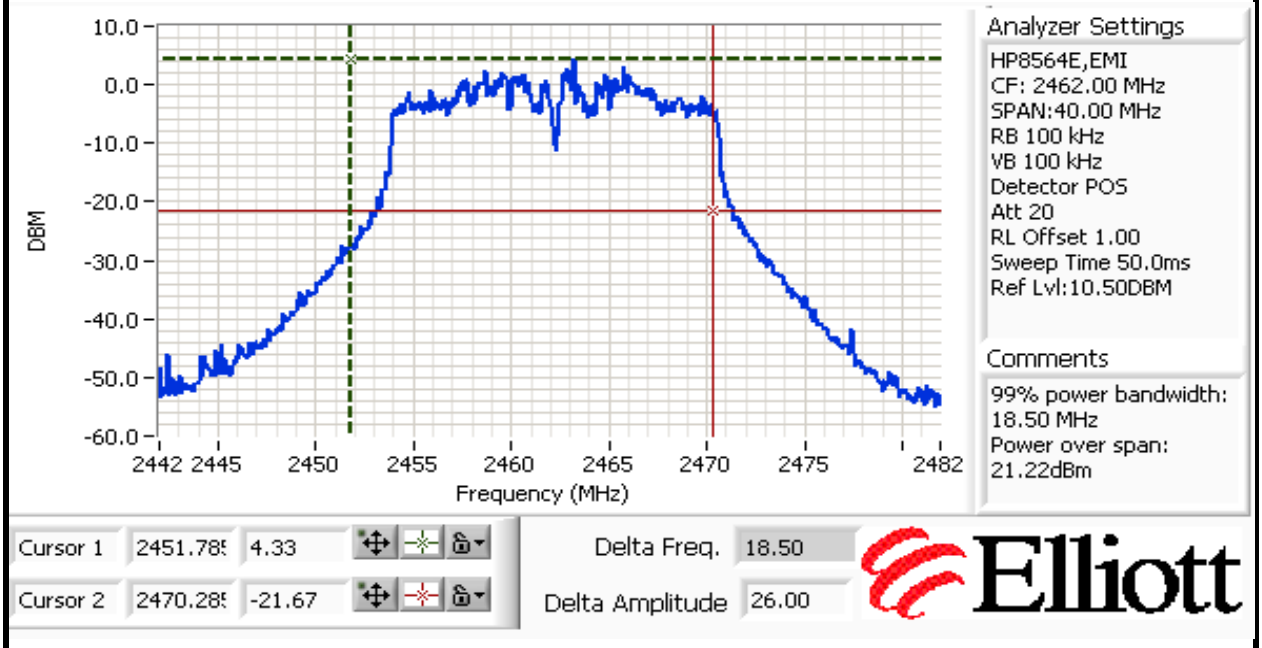


Run #2 continued on next page

Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #2 continued





Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #3: Output Power

Maximum antenna gain: 2 dBi

Data rate 18Mbps

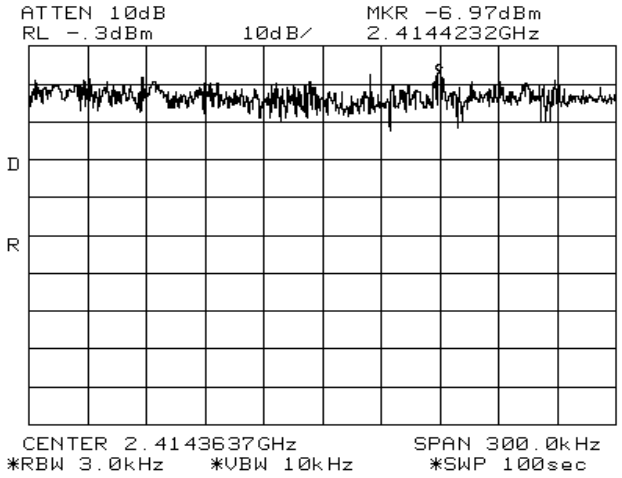
Power Setting	Frequency (MHz)	Output Power Note 1		EIRP	Average Power Note 2	
		dBm	W	W	dBm	W
	2412	20.4	0.110	0.174	10.8	0.012
	2437	26.0	0.398	0.631	17.7	0.059
	2462	20.0	0.100	0.158	10.6	0.011

Note 1:	Output power measured using a peak power meter
Note 2:	Output power measured using an average power sensor - this value is for reference purposes only.

Run #4: Power Spectral Density

Power Setting	Operating Frequency (MHz)	Freq. @ PPSD	Res BW	P.S.D. (dBm/3kHz)
	2412	2414MHz	3.0kHz	-6.97
	2437	2435MHz	3.0kHz	-3.00
	2462	2461Hz	3.0kHz	-8.67

2412MHz

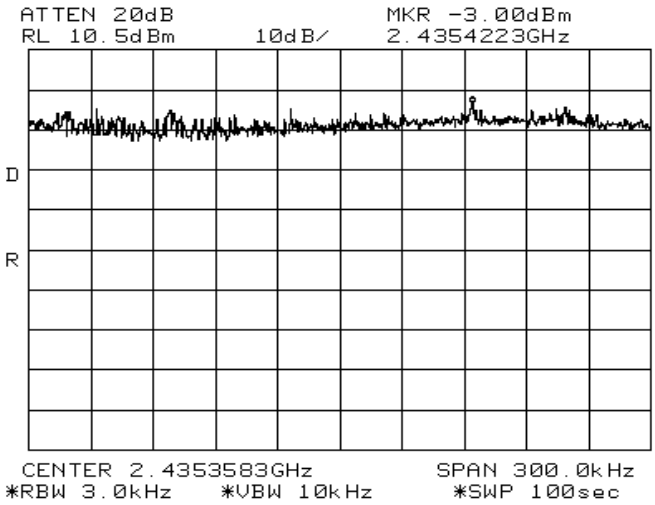


Run #4 continued on next page

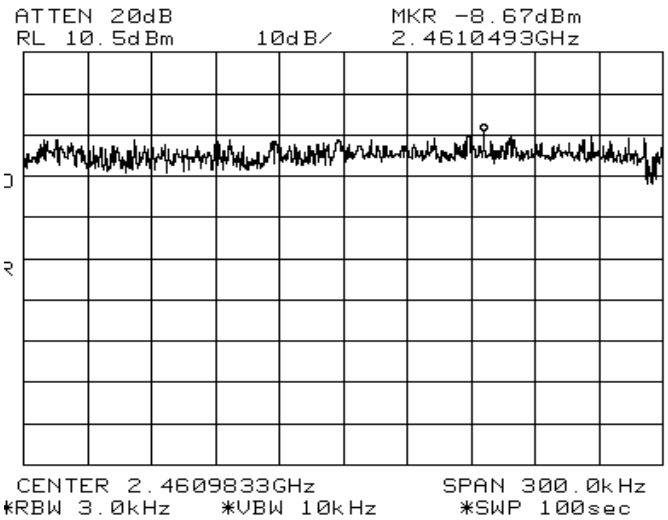
Client:	Westell	Job Number:	J62674
Model:	327W WLAN Access Point	T-Log Number:	T62676
		Account Manager:	Esther Zhu
Contact:	Al Engelkins		
Spec:	FCC 15.247	Class:	N/A

Run #4 continued

2437MHz



2462MHz



Note 1:	Freq. @ PPSD: Frequency of the Peak Power Spectral Density (PPSD)
Note 2:	Power spectral density measured using RB=3 kHz, VB=10kHz with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.

EXHIBIT 3: Test Configuration Photographs

2 Pages

EXHIBIT 4: Proposed FCC ID Label & Label Location

2 Pages

EXHIBIT 5: Detailed Photographs of Westell Tech Inc Model D90-327W30-06Construction

External Photographs 2 Pages
Internal Photographs 8 Pages

EXHIBIT 6: Operator's Manual for Westell Tech Inc Model D90-327W30-06

176 Pages

EXHIBIT 7: Block Diagram of Westell Tech Inc Model D90-327W30-06

1 Page

EXHIBIT 8: Schematic Diagrams for Westell Tech Inc Model D90-327W30-06

4 Pages

EXHIBIT 9: Theory of Operation for Westell Tech Inc Model D90-327W30-06

Theory of Operation	13 Pages
WMTO583_RD_BOM Rev_E10	2 Pages
D90-327W30-06 Main unit bill of material	8 Pages

EXHIBIT 10: RF Exposure Information

2 Pages