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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to

Industry Canada RSS-Gen Issue 1 / RSS 210 Issue 6
FCC Part 15, Subpart C Section 15.247(DTS)

Manufacturer: Skypilot Networks

Model: SkyExtender DualBand

FCC ID:	RV7-DBE1010
UPN:	5550A-DBE1010
GRANTEE:	Skypilot Networks 1301 Shoreway Rd. Belmont, CA 94002
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	March 16, 2006
FINAL TEST DATE:	November 18 and December 22, 2005 and March 1, 2006
AUTHORIZED SIGNATORY:	Mark Briggs Principal Engineer

ACCREDITED
2016-01

DECLARATIONS OF COMPLIANCE

Equipment Name and Model:
SkyExtender DualBand

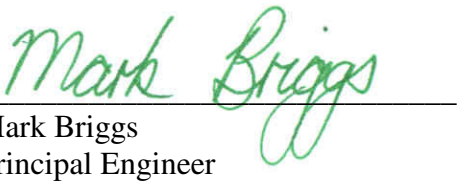
Manufacturer:
Skypilot Networks
1301 Shoreway Rd.
Belmont, CA 94002

Tested to applicable standards:
Industry Canada RSS-Gen Issue 1
RSS 210 Issue 6 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
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 5); and that the equipment performed in accordance with the data submitted in this report.



Signature	
Name	Mark Briggs
Title	Principal Engineer
Company	Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA
Date:	March 16, 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 Skypilot Networks model SkyExtender DualBand pursuant to:

Industry Canada RSS-Gen Issue 1
RSS 210 Issue 6 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15, Subpart C requirements for DTS devices

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

ANSI C63.4:2003
RSS-212 Issue 1 Test Facilities and Test Methods for Radio Equipment

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.

The test results recorded herein are based on a single type test of the Skypilot Networks model SkyExtender DualBand and therefore apply only to the tested sample. The sample was selected and prepared by Jim Barbera of Skypilot Networks

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

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Part 15 Reference	RSS Reference	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses both OFDM and DSSS techniques	-	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth		>500kHz	Complies
	RSP100	99% Bandwidth	16.6MHz	Information only	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (802.11b)	22.5 dBm (0.18 Watts) EIRP = 1.0 W	1Watt, EIRP limited to 4 Watts.	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (802.11g)	27.3 dBm (0.54 Watts) EIRP = 3.0 W	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	-1.2 dBm / 3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All spurious emissions < -20dBc	< -20dBc	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.1dBµV/m (452.4µV/m) @ 2389.9MHz	15.207 in restricted bands, all others < -20dBc	Complies (-0.9dB)

DIGITAL TRANSMISSION SYSTEMS (5725 –5850 MHz)

FCC Part 15 Reference	RSS Reference	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	15.8 MHz	>500kHz	Complies
	RSP100	99% Bandwidth	18.0 MHz	Information only	Complies
15.247 (b) (3) 15.247 (b) (4) (ii)	RSS 210 A8.2 (4)	Output Power (point-point systems)	17.8 dBm (0.06 Watts) EIRP = 2.4 W Note 1	1Watt, unlimited EIRP.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	-12.5 dBm /3kHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions – 30MHz – 40 GHz	All spurious emissions < -20dBc	< -20dBc	Complies
15.247(c) / 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 40 GHz	51.5dBµV/m (375.8µV/m) @ 11488.9MHz	15.207 in restricted bands, all others < -20dBc	Complies (-2.5dB)

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Part 15 Section	RSS 210 Section	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	5GHz antenna is integral, 2.4 GHz antenna connector		Complies
	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	36.8dBµV/m (69.2µV/m) @ 1620.0MHz (-17.2dB)	RSS GEN Table 1	Complies (- 17.2dB)
15.207	RSS GEN Table 2	AC Conducted Emissions	41.0dBµV @ 0.434MHz	Refer to standard	Complies (-6.2dB)
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies

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 Skypilot Networks model SkyExtender DualBand is a dual band radio repeater that is designed to extend wireless networks. Since the EUT would be placed on a pole during operation, the EUT was mounted on a pole and treated as floor standing equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 24 Vdc Amps.

The sample was received on November 18, 2005 and tested on November 18 and December 22, 2005 and March 1, 2006. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
SkyPilot Networks	SkyExtender DualBand	Network extender	-	RV7-DBE1010

OTHER EUT DETAILS

The AP Ethernet port is internally connected to the 5.7 GHz radio. The AP operates in the 2.4 GHz band over two antennas with diversity.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic . It measures approximately 24 cm wide by 29 cm deep by 50 cm high.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with the emission specifications.

SUPPORT EQUIPMENT

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

Manufacturer	Model	Description	Serial Number
Unifive	UIB336-24	AC/DC Adapter	-
SkyPilot Networks	640-00009-01	POE Injector	-

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

Manufacturer	Model	Description	Serial Number
IBM		Laptop	

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)
POE DC input	AC/DC Adapter	Two wire	Unshielded	2.0
Ethernet	Laptop	CAT 5	Unshielded	30.0
AC/DC Adapter	Mains	Three wire	Unshielded	2.0

Note: The console port was not connected during testing. The manufacturer stated that this port is for configuration purposes and therefore would not normally be connected.

EUT OPERATION DURING TESTING

During emissions testing the EUT was set to transmit on both the 5.7 and 2.4 GHz bands.

ANTENNA REQUIREMENTS

The 2.4 GHz antennas are omnis (7.5dBi).
The 5.7 GHz antenna is integral to the device (16 dBi).
The GPS receiver antenna is integral to the device.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on November 18 and December 22, 2005 and March 1, 2006 at 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:

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

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.

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 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 the limits for all emissions for a low power device operating under the general rules of RSS 210, FCC Part 15 Subpart C.

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

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

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

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 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (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.

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands are those specified in the general limits sections of FCC Part 15 and RSS 210. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r = C$$

and

$$C - S = M$$

where:

R_r = Receiver Reading in dBuV

C = Corrected 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, 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, 30 - 2,000 MHz, 18-Nov-05
Engineer: Peter Sales

Manufacturer	Description	Model #	Asset #	Cal Due
Rohde & Schwarz	Test Receiver, 20-1300MHz	ESVP	273	31-Jan-07
Elliott Laboratories	Biconical Antenna, 30-300 MHz	DM-105-T1	382	25-Oct-06
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	780	26-May-06
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	26-Apr-06
Filtek	High Pass Filter, 1GHz	HP12/1000-5BA	955	31-Mar-06
EMCO	Horn antenna, D. Ridge 1-18GHz (SA40 system antenna)30Hz sunnyvale	3115	1142	11-Jun-06
EMCO	Log Periodic Antenna, 0.2-1 GHz	3146	1294	22-Apr-06

Conducted Emissions - AC Power Ports, 18-Nov-05
Engineer: Peter Sales

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	FCC / CISPR LISN	LISN-4, OATS	362	07-Jul-06
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	372	06-Sep-06
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595EM	780	26-May-06
Rohde & Schwarz	Test Receiver, 0.009-30 MHz	ESH3	1316	31-Jan-06

Radiated Emissions, 30 - 26,500 MHz, 03-Jan-06
Engineer: Chris Byleckie

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-06
Hewlett Packard	High Pass filter, 3.5GHz	P/N 84300-80038	1157	28-Apr-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
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	23-May-06
EMCO	Horn Antenna D. Ridge 1-18 GHz (SA40 horn)	3115	1386	07-Jul-06
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 40 GHz, Fremont (SA40) Blue	8564E (84125C)	1393	10-Nov-06

Radiated Emissions, 1000 - 40000MHz, 01-Mar-06
Engineer: Chris Byleckie

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	26-Apr-06
Hewlett Packard	EMC Spectrum Analyzer 30Hz - 40GHz, Sunnyvale (SA40) Red	8564E (84125C)	1148	09-Sep-06
Hewlett Packard	High Pass filter, 8.2GHz	P/N 84300-80039	1156	09-Jun-06
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	1242	19-Oct-06

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T61851 41 Pages

Elliott

EMC Test Data

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	Test-Log Number:	T61851
		Project Manager:	Esther Zhu
Contact:	Jim Barbera		
Emissions Spec:	FCC	Class:	B
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Skypilot Networks

Model

SkyExtender DualBand

Date of Last Test: 3/2/2006

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	Test-Log Number:	T61851
		Project Manager:	Esther Zhu
Contact:	Jim Barbera		
Emissions Spec:	FCC	Class:	B
Immunity Spec:	-	Environment:	-

EUT INFORMATION

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

General Description

The EUT is a dual band radio repeater that is designed to extend wireless networks. Since the EUT would be placed on a pole during operation, the EUT was mounted on a pole and treated as floor standing equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 24 Vdc Amps.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
SkyPilot Networks	SkyExtender DualBand	Network extender	-	-

Other EUT Details

The following EUT details should be noted: The AP Ethernet port is connected to the 5.7 GHz radio. The AP operates in the 2.4 GHz band over two antennas with diversity.

EUT Antenna (Intentional Radiators Only)

The 2.4 GHz antennas are omnis (7.5dBi).
The 5.7 GHz antenna is integral to the device (16 dBi).
The GPS receiver antenna is integral to the device.

EUT Enclosure

The EUT enclosure is primarily constructed of plastic . It measures approximately 24 cm wide by 29 cm deep by 50 cm high.

Modification History

Mod. #	Test	Date	Modification
1	-	-	None

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Project Manager:	Esther Zhu
Contact:	Jim Barbera		
Emissions Spec:	FCC	Class:	B
Immunity Spec:	-	Environment:	-

Test Configuration #2

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

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Unifive	UIB336-24	AC/DC Adapter	-	-
SkyPilot Networks	640-00009-01	POE Injector	-	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
iBM		Laptop		

Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
POE DC input	AC/DC Adapter	Two wire	Unshielded	2.0
Ethernet	Laptop	CAT 5	Unshielded	30.0
AC/DC Adapter	Mains	Three wire	Unshielded	2.0

Note: The console port was not connected during testing. The manufacturer stated that this port is for configuration purposes and therefore would not normally be connected.

EUT Operation During Emissions Tests

During emissions testing the EUT was set to transmit on both the 5.7 and 2.4 GHz bands.

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61295
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	EN 300 328; EN 301 893	Class:	N/A

Receive Mode Radiated Spurious Emissions
RSS 210

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.

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.

The measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Receive Mode Radiated Spurious Emissions, 30 - 26,500 MHz	RSS 210	Pass	36.8dBµV/m (69.2µV/m) @ 1620.0MHz (-17.2dB)

Modifications Made During Testing:

The internal ethernet cable to the 802.11bg transceiver during the preliminary scans was not a shielded cable. Production units will use a shielded cable, so the cable was switched to a shielded cable for the final measurements. Also a ribbon cable used to configure the system for test purposes was removed (this cable would not be installed in a production sample) between the preliminary scans and final measurements.

Deviations From The Standard

No deviations were made from the requirements of the standard.

Elliott

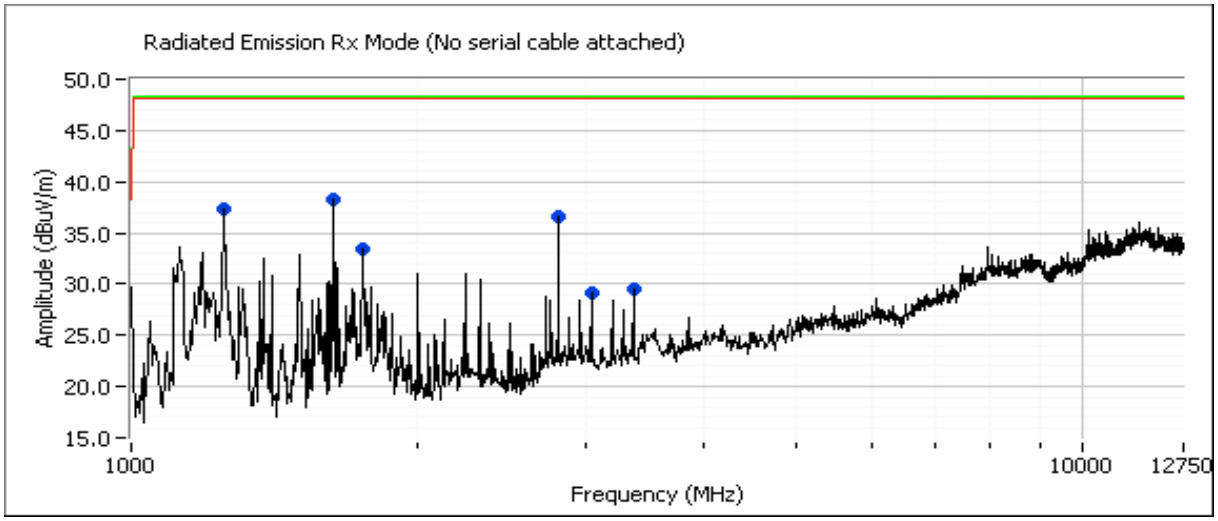
EMC Test Data

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61295
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	EN 300 328; EN 301 893	Class:	N/A

Run #1: Preliminary Radiated Receive Mode Spurious Emissions (Anechoic Chamber) 30 - 26500 MHz

Date of Test: 1/16/2006
Test Engineer: Mehran Birgani
Test Location: Chamber #2

Config. Used: 1
Config Change: None
EUT Voltage: 230V/50Hz



Frequency	Level	Pol	RSS 210		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1251.750	37.4	V	54.0	-16.6	Peak	297	1.7	
1627.000	38.3	H	54.0	-15.7	Peak	199	1.7	
1750.500	33.4	H	54.0	-20.6	Peak	108	1.7	
2809.750	36.7	V	54.0	-17.3	Peak	105	1.7	
3044.000	29.2	H	54.0	-24.8	Peak	72	1.7	
3368.000	29.6	H	54.0	-24.4	Peak	360	1.7	
13607.50	39.1	H	54.0	-14.9	Peak	117	1.7	

Run #2: Radiated Spurious Emissions, Receive Mode: Final Field Strength and Substitution Measurements

Frequency	Level	Pol	EN 300 328 Note 1		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1620.000	36.8	H	54.0	-17.2	Peak	0	1.0	Peak reading average limit
1620.000	36.4	V	54.0	-17.6	Peak	59	1.0	Peak reading average limit
13607.50	36.0	H	54.0	-18.0	Peak	0	1.0	Peak reading average limit

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions (802.11a, 5725 - 5850 MHz)

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: 3/1/2006
Test Engineer: Chris Byleckie
Test Location: SVOATS #2

Config. Used: 2
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 or routed in overhead in the GR-1089 test configuration.
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: 11 °C
Rel. Humidity: 80 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Radiated Spurious Emissions 30 - 40,000 MHz	FCC Part 15.209 / 15.247(c)	Pass	51.5dBµV/m (375.8µV/m) @ 11488.9MHz (-2.5dB)
1	Antenna Port Conducted Emissions 30 - 40,000 MHz	FCC Part 15.209 / 15.247(c)	Pass	All emissions more than -20dBc
2	6dB Bandwidth	15.247(a)	Pass	15.8 MHz
2	99% Bandwidth	15.247(a)	Pass	17.4 MHz
3	Output Power	15.247(b)	Pass	17.8dBm (0.06W)
4	Power Spectral Density (PSD)	15.247(d)	Pass	-12.5dBm/3kHz

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:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Echosorb added to inside of radio shield

Run #1a: Radiated Spurious Emissions, 1000 - 40000 MHz. Low Channel @ 5745 MHz

Power setting - 45 80% duty cycle

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11488.90	51.5	H	54.0	-2.5	AVG	175	1.0	Note 2
11496.77	42.9	V	54.0	-11.1	AVG	115	1.0	Note 2
11488.90	62.7	H	74.0	-11.3	PK	175	1.0	
17235.20	42.1	V	54.0	-11.9	AVG	41	1.9	Noise Floor
17234.88	41.1	H	54.0	-13.0	AVG	170	1.0	Noise Floor
17235.20	55.0	V	74.0	-19.0	PK	41	1.9	Noise Floor
17234.88	52.9	H	74.0	-21.1	PK	170	1.0	Noise Floor
11496.77	52.3	V	74.0	-21.7	PK	115	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.
Note 2:	Emission measured using RBW=1MHz, VBW=300Hz to avoid pulse desenitasation due to the 80% duty cycle of the emission

Run #1b: Radiated Spurious Emissions, 1000 - 40000 MHz. Center Channel @ 5875 MHz

Power setting - 45 80% duty cycle

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
17354.39	41.9	V	54.0	-12.1	AVG	313	1.0	Noise floor
17354.18	41.7	H	54.0	-12.3	AVG	95	1.0	Noise floor
11570.83	41.3	H	54.0	-12.7	Avg	195	1.0	Note 2
11568.64	34.8	V	54.0	-19.2	AVg	311	1.5	Note 2
11568.54	53.9	H	74.0	-20.1	PK	195	1.0	
17354.18	52.7	H	74.0	-21.3	PK	95	1.0	Noise floor
17354.39	52.7	V	74.0	-21.3	PK	313	1.0	Noise floor
11570.60	46.1	V	74.0	-27.9	PK	311	1.5	

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.
Note 2:	Emission measured using RBW=1MHz, VBW=300Hz to avoid pulse desenitasation due to the 80% duty cycle of the emission

Elliott

EMC Test Data

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Run #1c: Radiated Spurious Emissions, 1000 - 40000 MHz. High Channel @ 5835 MHz
Power setting - 45 80% duty cycle

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
11671.63	44.1	V	54.0	-9.9	AVG	41	1.0	Note 2
11667.77	43.6	H	54.0	-10.4	AVG	285	1.0	Note 2
17503.70	43.5	V	54.0	-10.5	AVG	337	1.0	Noise floor
17505.30	43.3	H	54.0	-10.7	AVG	207	2.2	Noise floor
17505.30	55.1	H	74.0	-19.0	PK	207	2.2	Noise floor
17503.70	54.9	V	74.0	-19.1	PK	337	1.0	Noise floor
11671.63	53.1	V	74.0	-20.9	PK	41	1.0	
11667.77	50.3	H	74.0	-23.7	PK	285	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.
Note 2:	Emission measured using RBW=1MHz, VBW=300Hz to avoid pulse desenitasation due to the 80% duty cycle of the emission

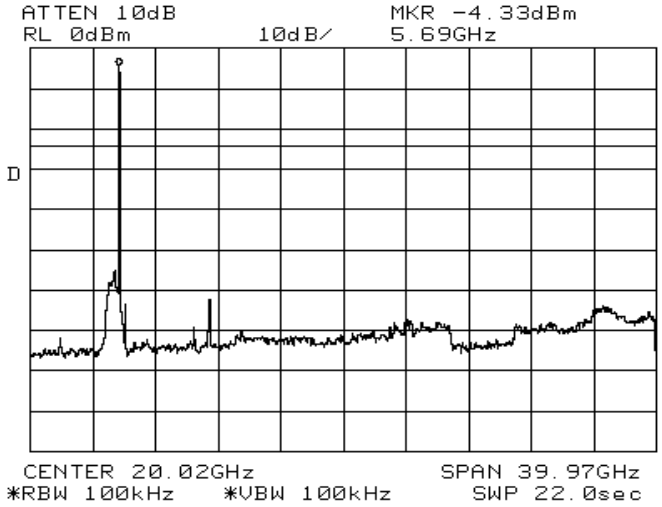
Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

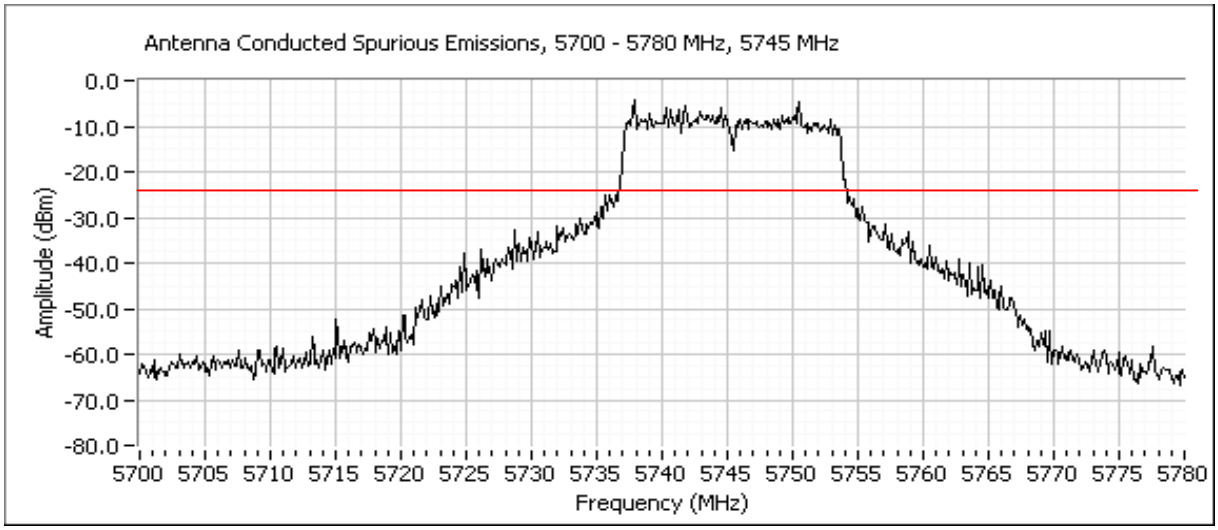
Run #1d: Antenna Conducted Spurious Emissions, 30 - 40000 MHz.

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.

If the device operates in the 5725 - 5850 band plots of 5700 - 5780 MHz for the lowest channel and 5820 - 5900 for the highest channel are provided to show that the signal is at least **-20dBc** below 5725 MHz and above 5850 MHz.

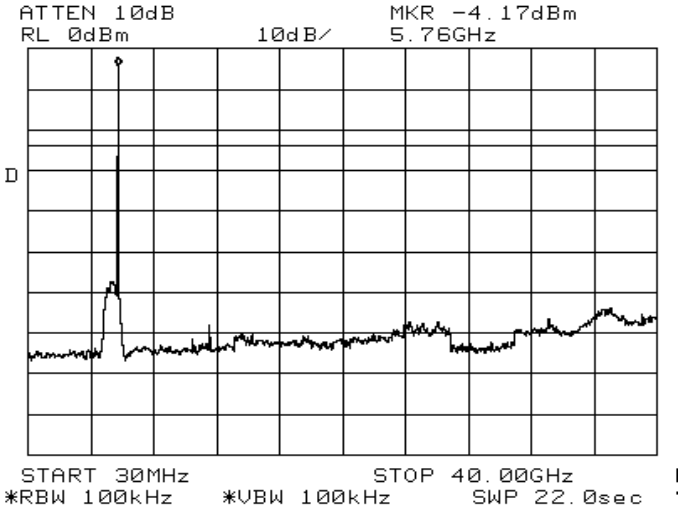
5745MHz





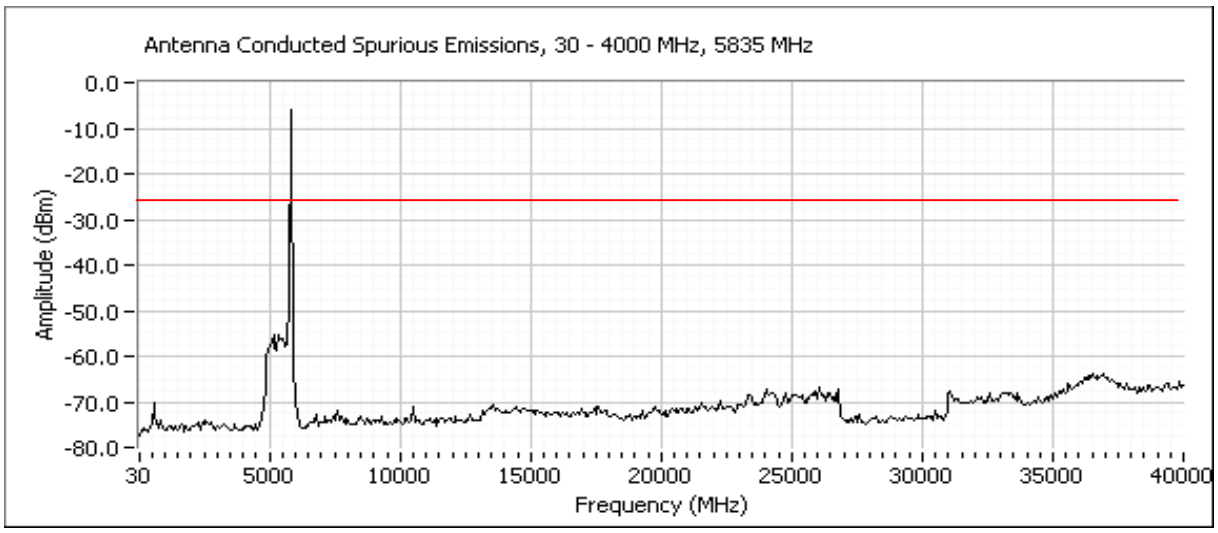
Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

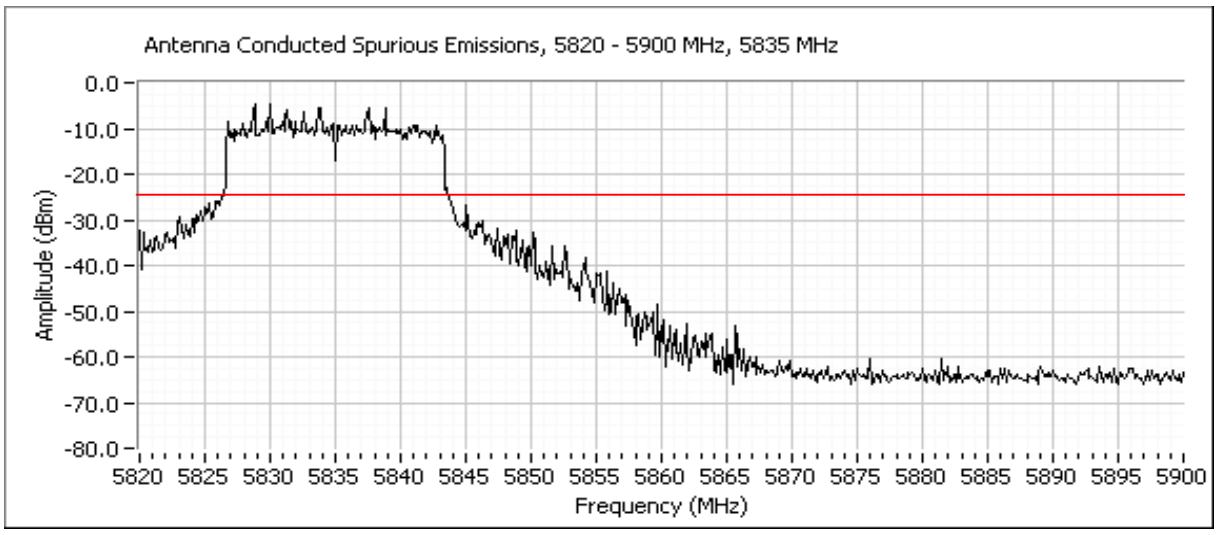
5785MHz



Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

5835MHz

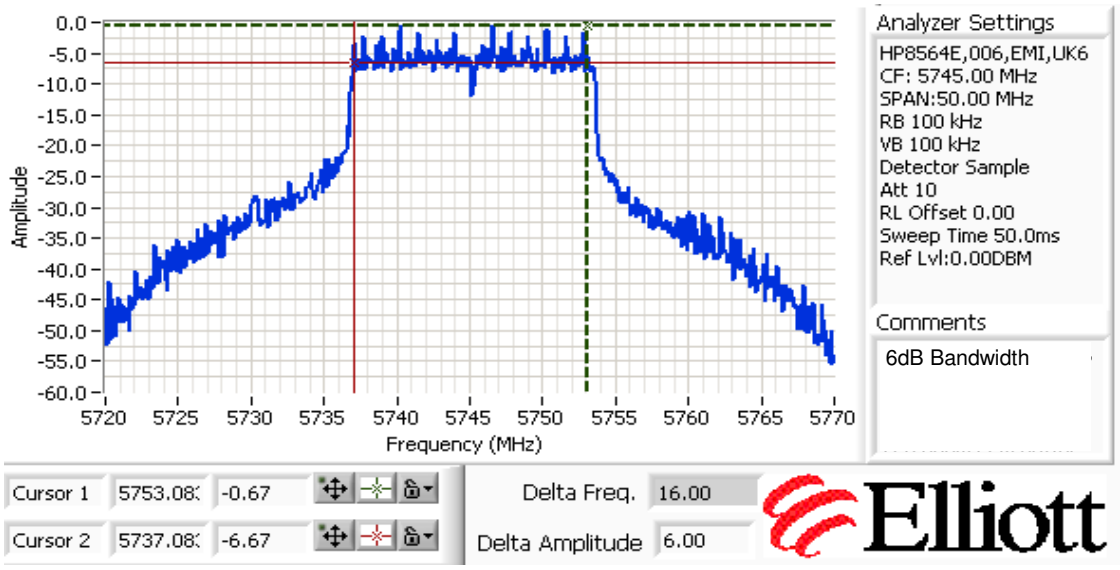


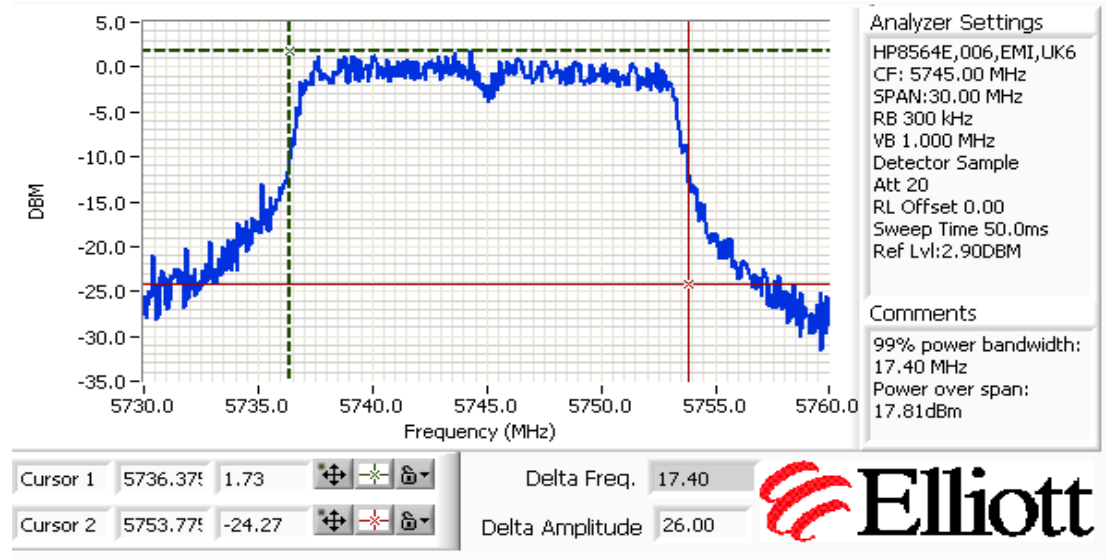


Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

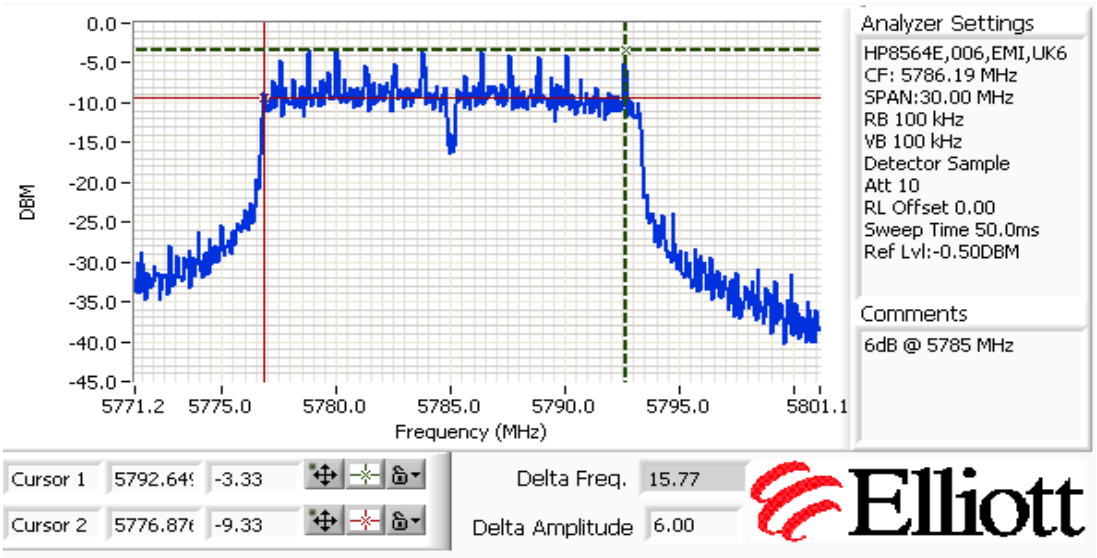
Run #2: Signal Bandwidth

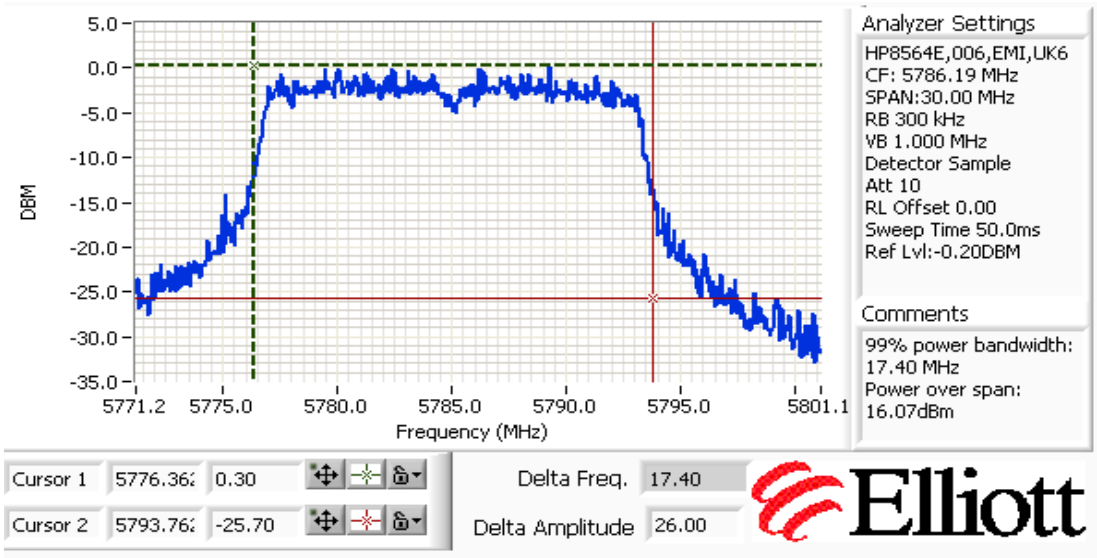
Power Setting	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	99% Signal Bandwidth
45	5745	See Plot	16.0	17.4
45	5785	See Plot	15.8	17.4
45	5835	See Plot	16.0	18.0



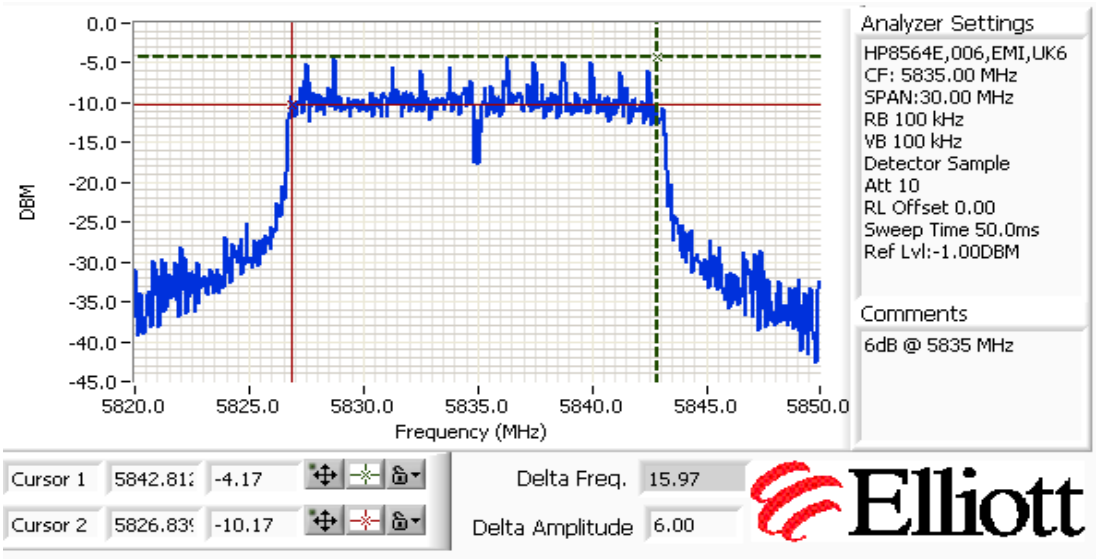


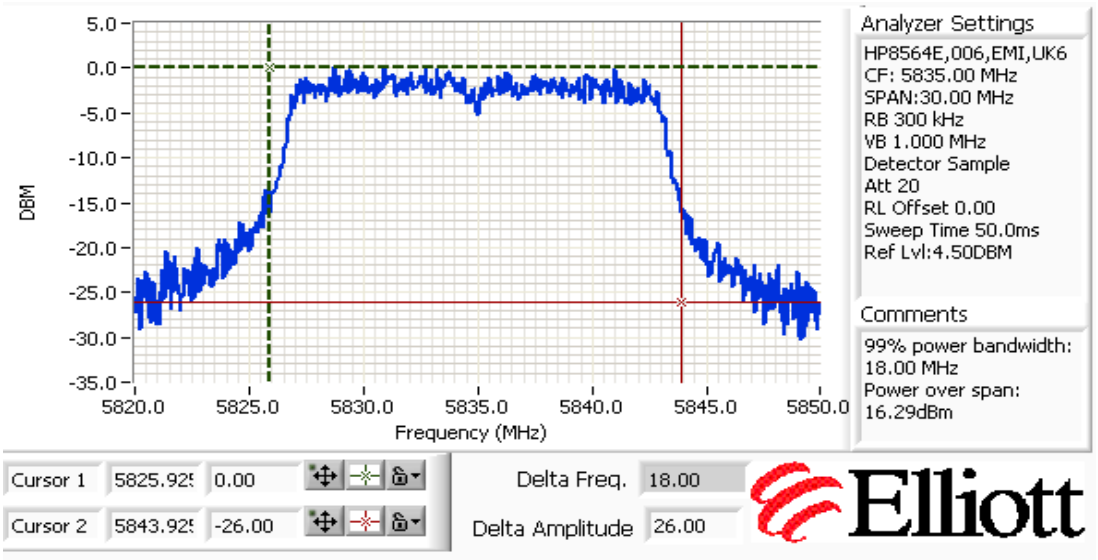
Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A





Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A





Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Run #3: Output Power

Maximum antenna gain: 16 dBi

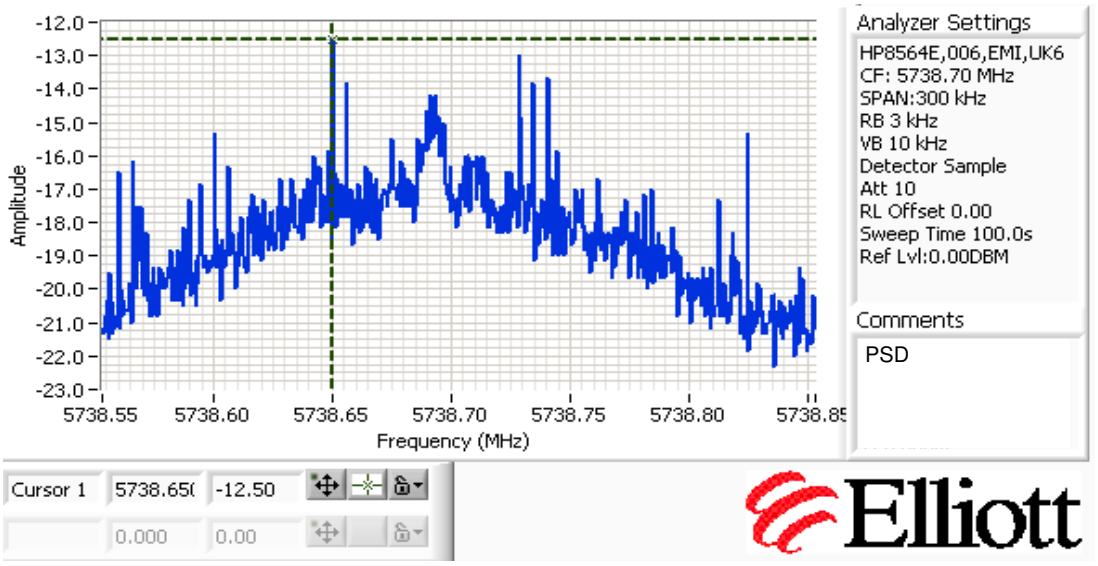
Power Setting	Frequency (MHz)	Res BW MHz	Output Power Note 1 dBm	Output Power Note 1 W	EIRP W	Average Power Note 2 dBm	Average Power Note 2 W
45	5745	-	17.8	0.060	2.399	10.25	
45	5785	-	16.1	0.041	1.622	9.3	
45	5835	-	16.3	0.043	1.698	8.6	

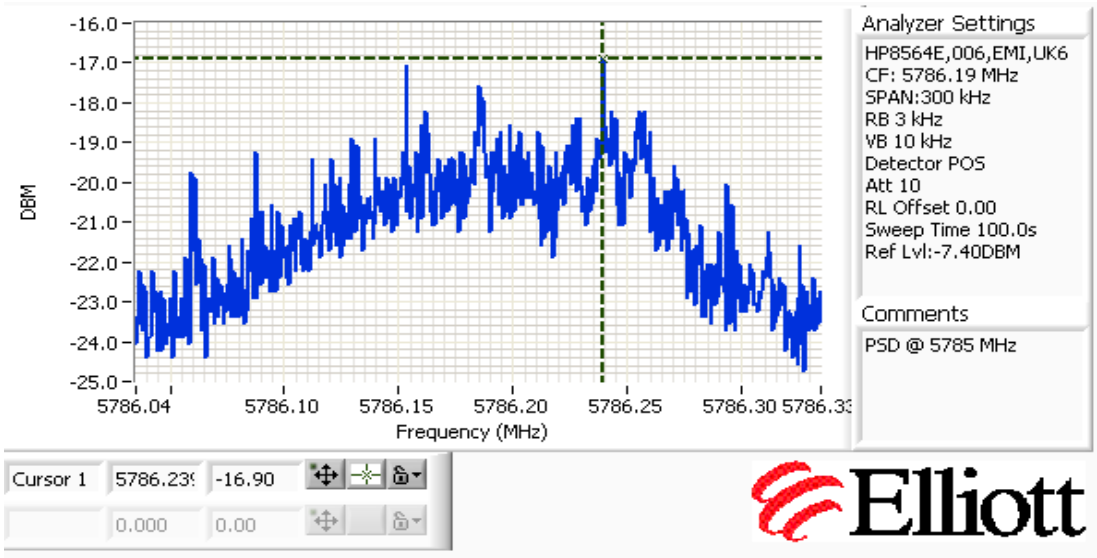
Note 1:	Output power measured using a spectrum analyzer with: RBW=1MHz, VB=1 MHz, sample detector, max hold (60 seconds) and power integration over 50 MHz.
Note 2:	Output power measured using an average power sensor - this value is for reference purposes only.

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

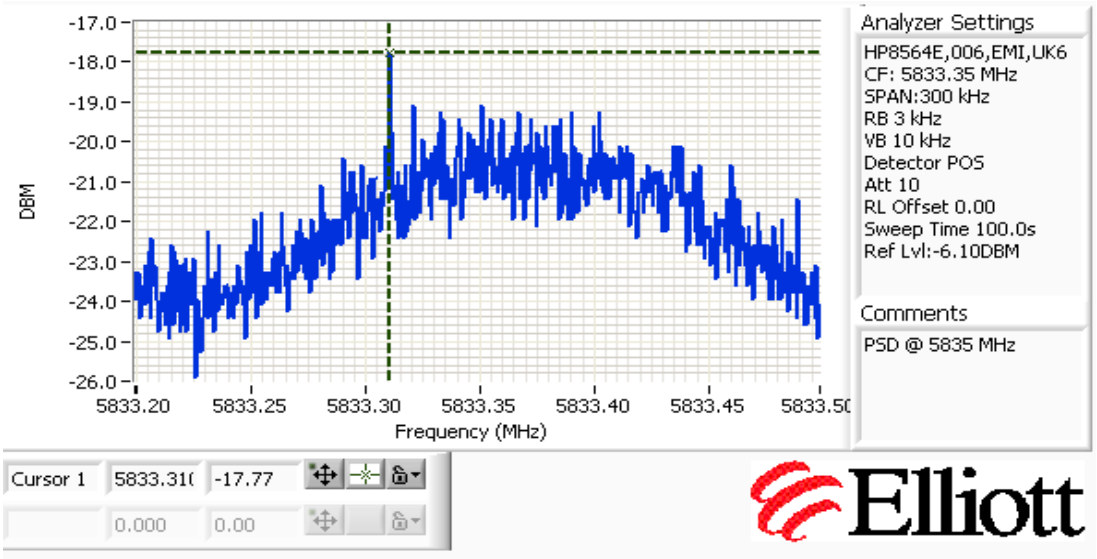
Run #4: Power Spectral Density

Power Setting	Operating Frequency (MHz)	Freq. @ PPSD	Res BW	P.S.D. (dBm/3kHz)
45	5745	5738.7	3kHz	-12.5
45	5785	5786.2	3kHz	-16.9
45	5835	5833.3	3kHz	-17.8





Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A



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:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions 802.11b, 2400 - 2483.5 MHz

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: 12/22/2005 Config. Used: 2
Test Engineer: Chris Byleckie Config Change: None
Test Location: SVOATS #2 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 or routed in overhead in the GR-1089 test configuration.

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: 16 °C
Rel. Humidity: 90 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 30 - 26000 MHz Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	52.1dBµV/m (400.4µV/m) @ 2383.7MHz (-2.0dB)
2	6dB Bandwidth	15.247(a)	Pass	9.2MHz @ 2462MHz
3	Output Power	15.247(b)	Pass	22.5dBm @ 2412MHz
4	Power Spectral Density (PSD)	15.247(d)	Pass	-1.25 @ 2412MHz

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:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Run #1a: Radiated Spurious Emissions, 1000 - 26000 MHz. Low Channel @ 2412 MHz
Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz
Sample #3
Power setting - 23.3dBm

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2412.000	115.2	v	-	-	Pk	78	1.0	RB = VB = 1MHz
2412.000	112.1	v	-	-	Avg	78	1.0	RB = 1MHz, VB = 10Hz
2412.000	111.5	v	-	-	Pk	78	1.0	RB = VB = 100kHz
2410.930	99.1	H	-	-	Pk	222	1.0	RB = VB = 1MHz
2410.930	101.6	H	-	-	Avg	222	1.0	RB = 1MHz, VB = 10Hz
2413.070	97.5	H	-	-	Pk	221	1.0	RB = VB = 100kHz

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	
2383.737	52.1	V	54.0	-2.0	AVG	78	1.0	
2383.737	60.5	V	74.0	-13.5	PK	78	1.0	
2386.211	46.2	H	54.0	-7.9	AVG	222	1.0	
2386.211	56.5	H	74.0	-17.5	PK	222	1.0	

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	
4824.050	48.0	V	54.0	-6.0	AVG	38	1.0	Comet 7.0dBI
4824.050	50.7	V	74.0	-23.3	PK	38	1.0	
4823.992	37.4	H	54.0	-16.6	AVG	37	1.0	
4823.992	44.9	H	74.0	-29.1	PK	37	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.
Note 2:	N0 emissions visible above 5GHz

Elliott **EMC Test Data**

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Run #1b: Radiated Spurious Emissions, 1000 - 26000 MHz. Center Channel @ 2437 MHz
Power setting - 23.1dBm

2435.525	112.3	V	-	-	PK	71	1.0	RB = VB = 100kHz
2436.505	99.3	H	-	-	PK	234	1.0	RB = VB = 100kHz

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	
4874.040	48.7	V	54.0	-5.3	AVG	229	1.0	
4874.040	51.5	V	74.0	-22.5	PK	229	1.0	
4873.985	37.0	H	54.0	-17.0	AVG	232	1.0	
4873.985	44.1	H	74.0	-29.9	PK	232	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.
Note 2:	N0 emissions visible above 5GHz

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Run #1c: Radiated Spurious Emissions, 1000 - 26000 MHz. High Channel @ 2462 MHz
Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz
Power setting - 23dBm

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2460.935	111.1	V	-	-	AVG	72	1.0	RB = VB = 1MHz
2460.935	114.0	V	-	-	PK	72	1.0	RB = 1MHz, VB = 10Hz
2461.025	111.0	V	-	-	PK	72	1.0	RB = VB = 100kHz
2463.367	97.8	H	-	-	AVG	231	1.0	RB = VB = 1MHz
2463.367	100.7	H	-	-	PK	231	1.0	RB = 1MHz, VB = 10Hz
2461.005	98.3	h	-	-	Pk	231	1.0	RB = VB = 100kHz

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	
2487.445	52.7	V	54.0	-1.3	AVG	255	1.0	
2487.445	60.5	V	74.0	-13.5	PK	255	1.0	
2483.358	46.4	H	54.0	-7.6	AVG	231	1.0	
2483.358	57.1	H	74.0	-16.9	PK	231	1.0	

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	
4923.990	51.2	V	54.0	-2.8	AVG	228	1.0	
4923.990	53.5	V	74.0	-20.5	PK	228	1.0	
4924.040	41.0	H	54.0	-13.0	AVG	44	1.0	
4924.040	46.8	H	74.0	-27.2	PK	44	1.0	

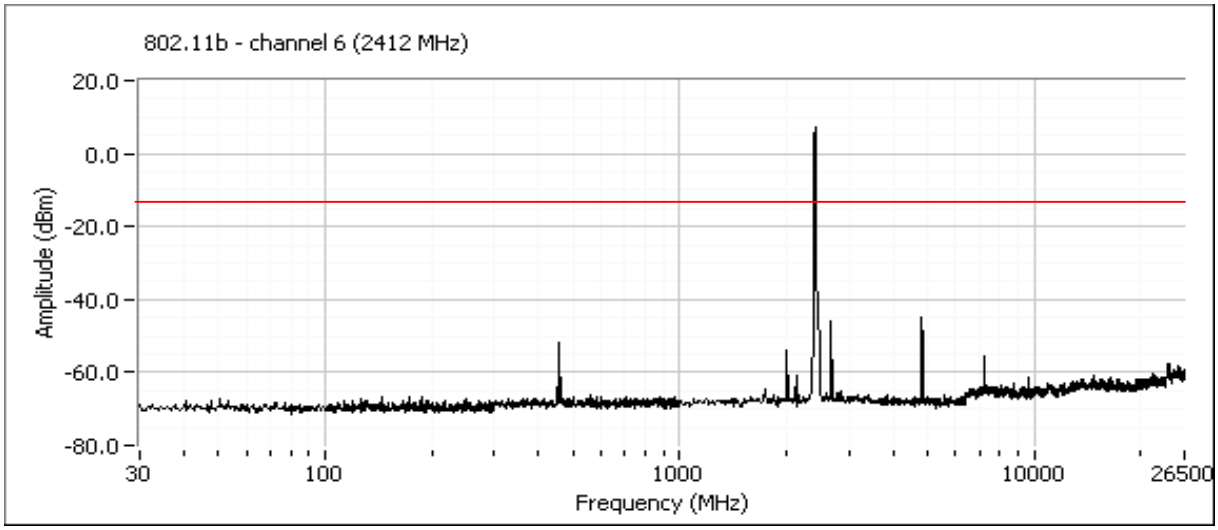
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	No emissions visible above 5GHz

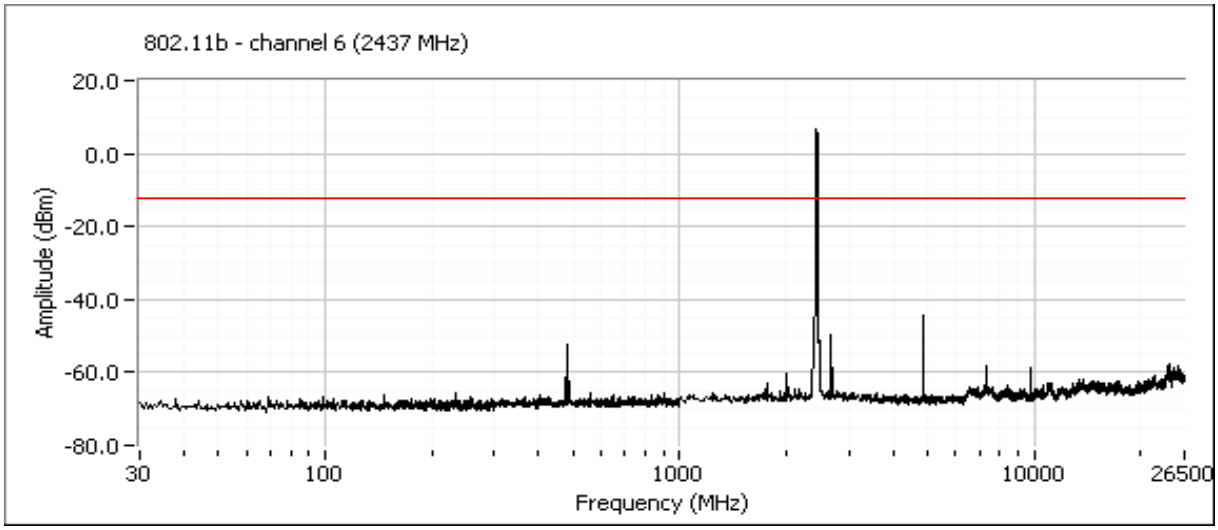
Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

EUT Configuration #2

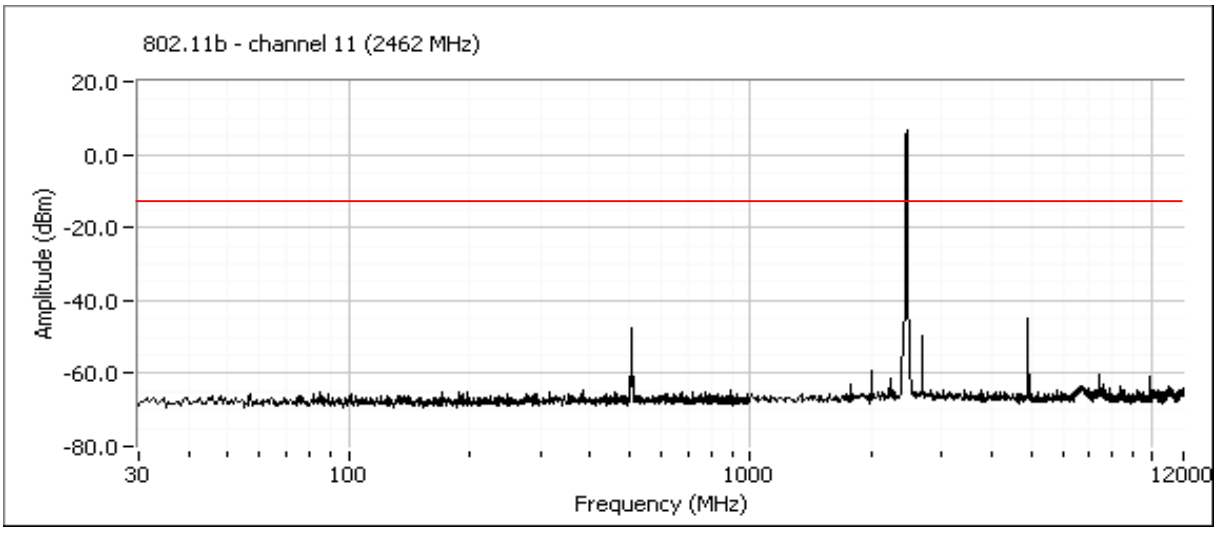
Run #1d: Antenna Conducted Spurious Emissions, 30 - 26000 MHz.

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.





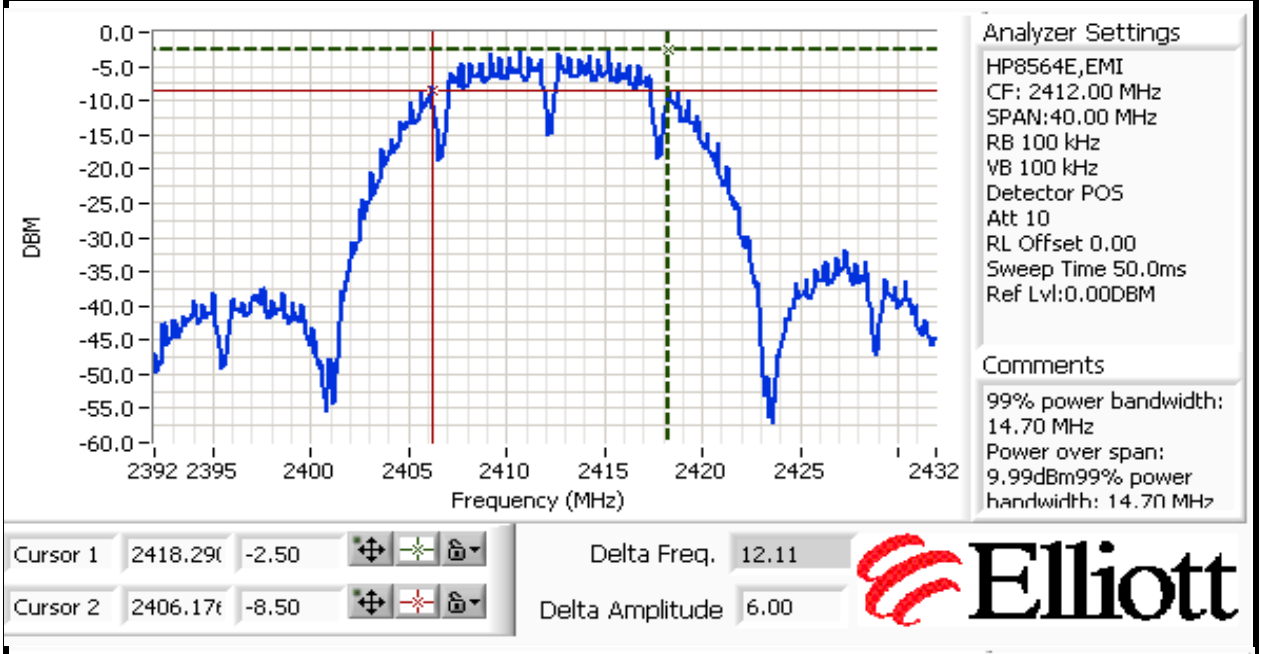
Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

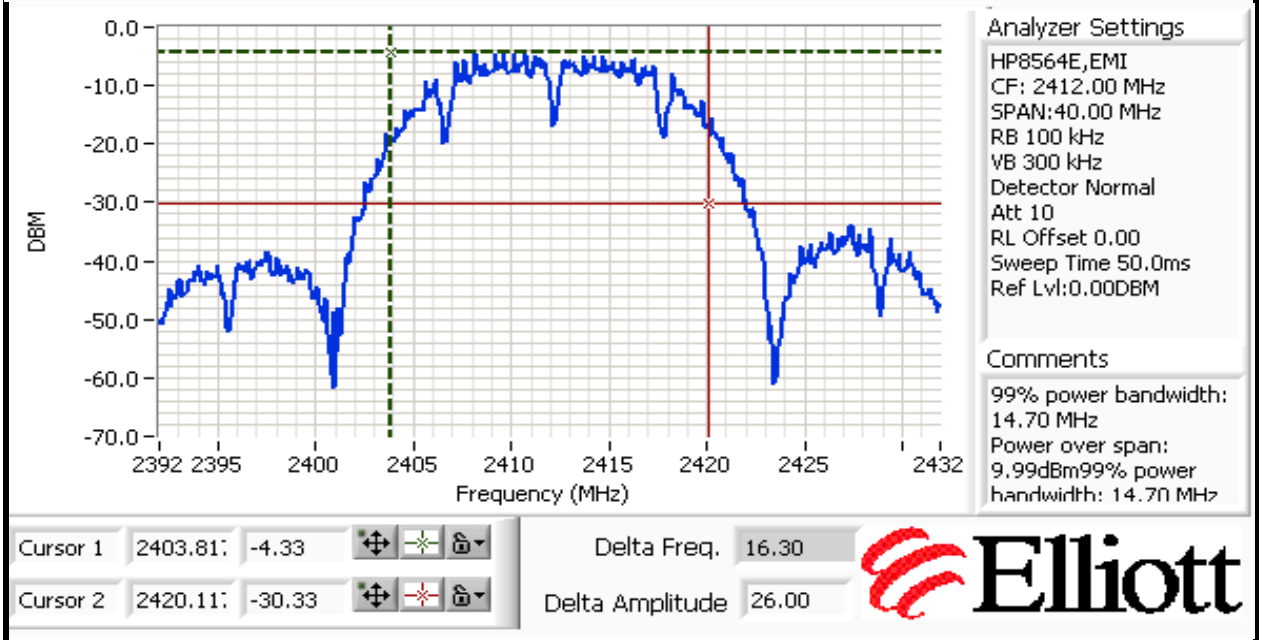


Run #2: Signal Bandwidth

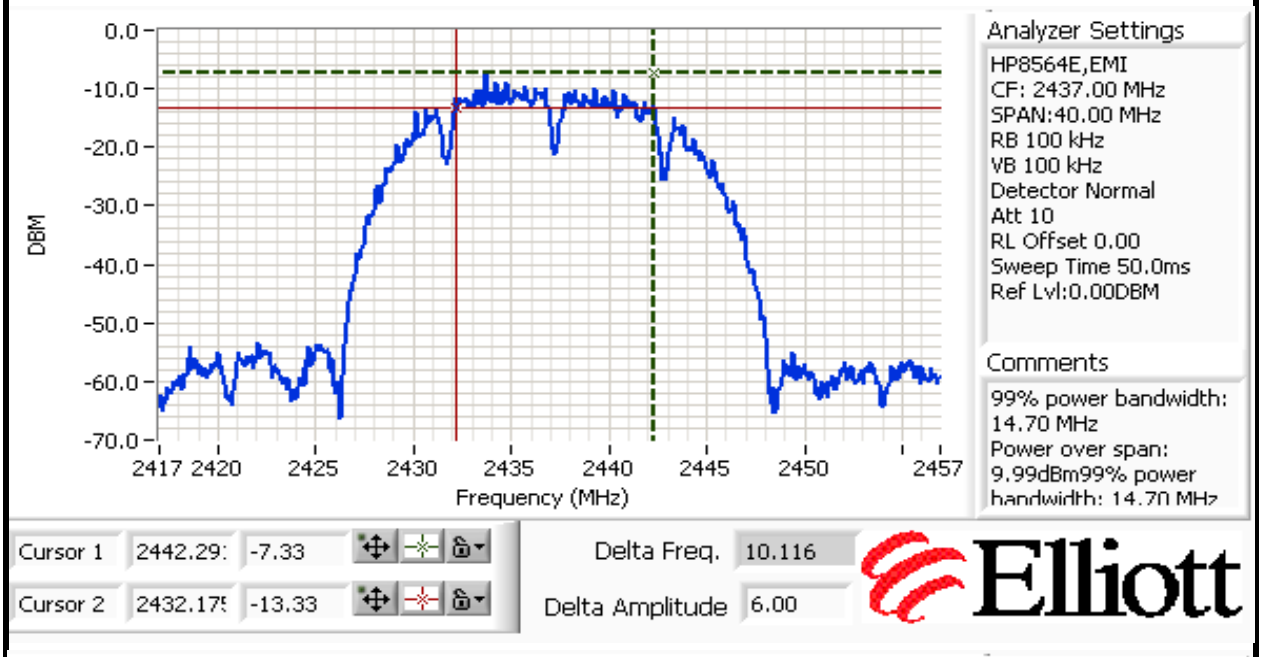
Power Setting	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	99% Signal Bandwidth
-	2412	100kHz	12.1MHz	16.3MHz
-	2437	100kHz	10.1MHz	16.0MHz
-	2462	100kHz	9.2MHz	14.6MHz

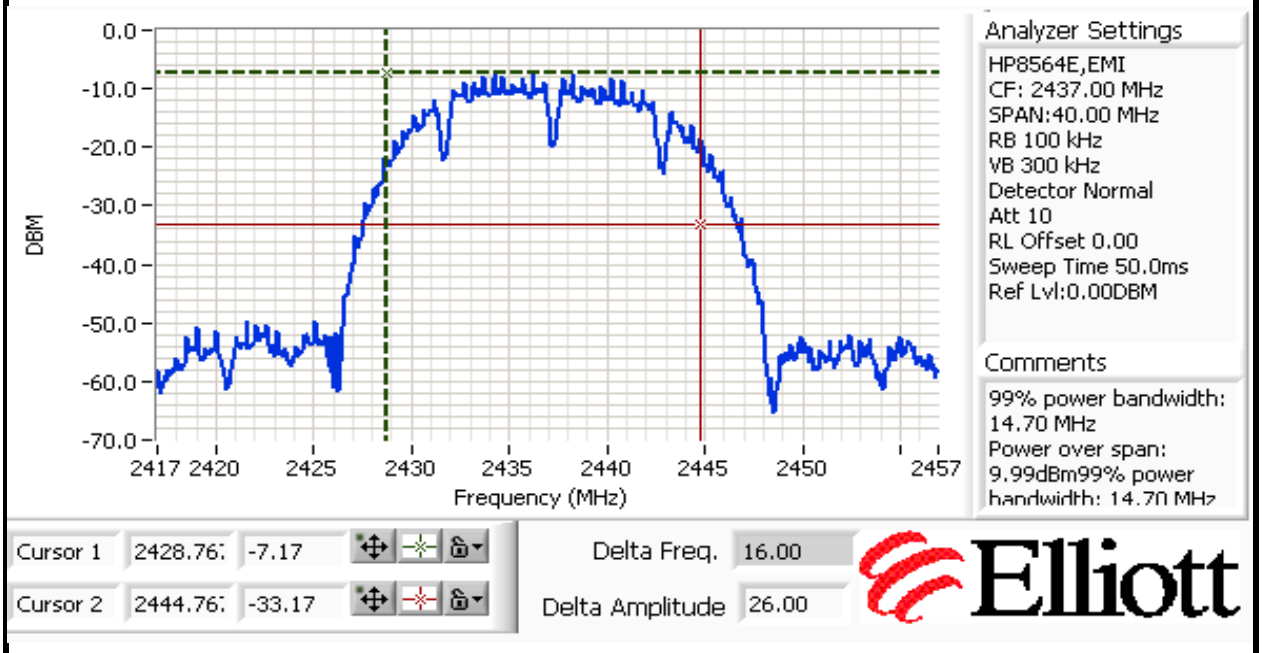
Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A



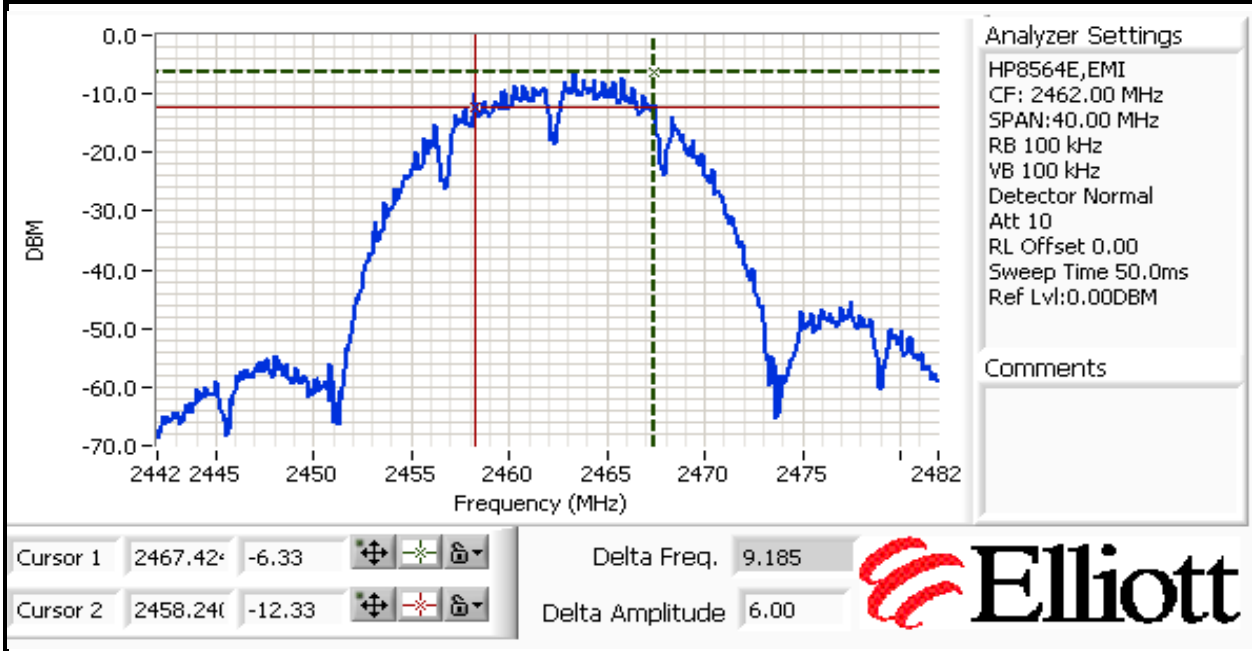


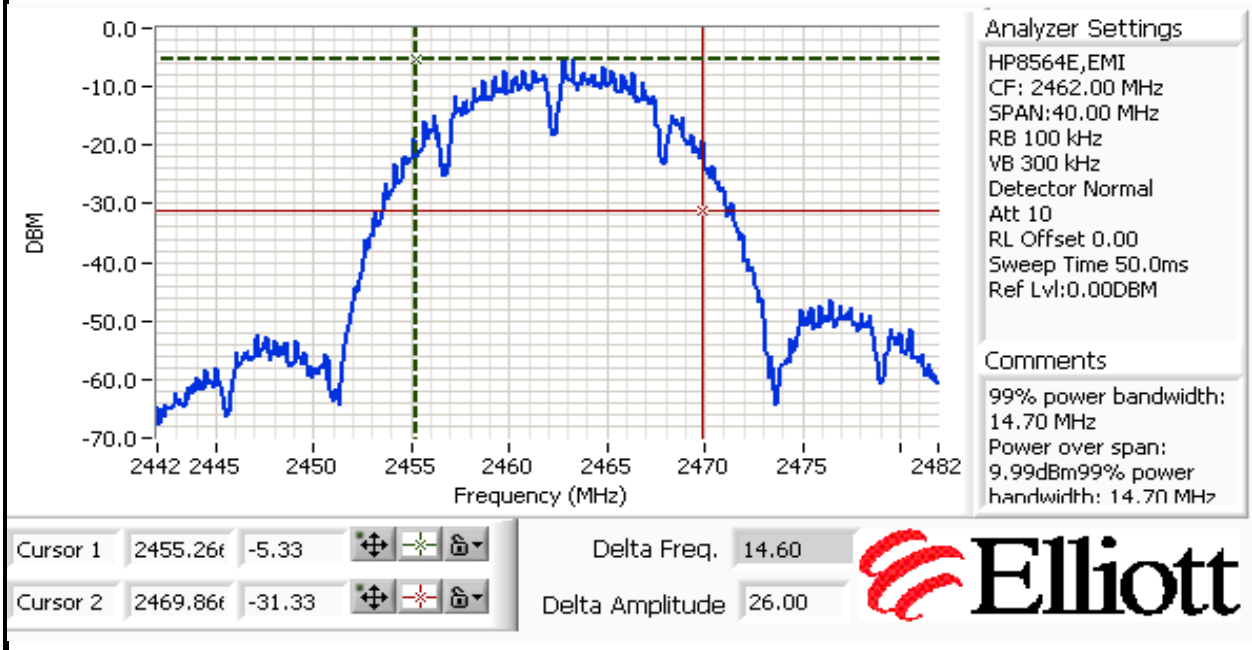
Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A





Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A





Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Run #3: Output Power

Maximum antenna gain: 7.4 dBi

Power Setting	Frequency (MHz)	Output Power Note 1 dBm	Output Power Note 1 W	EIRP W	Average Power Note 2 dBm	Average Power Note 2 W
-	2412	22.53	0.179	0.984		
-	2437	21.8	0.151	0.832		
-	2462	21.4	0.138	0.759		

Note 1: Output power measured using a peak power meter

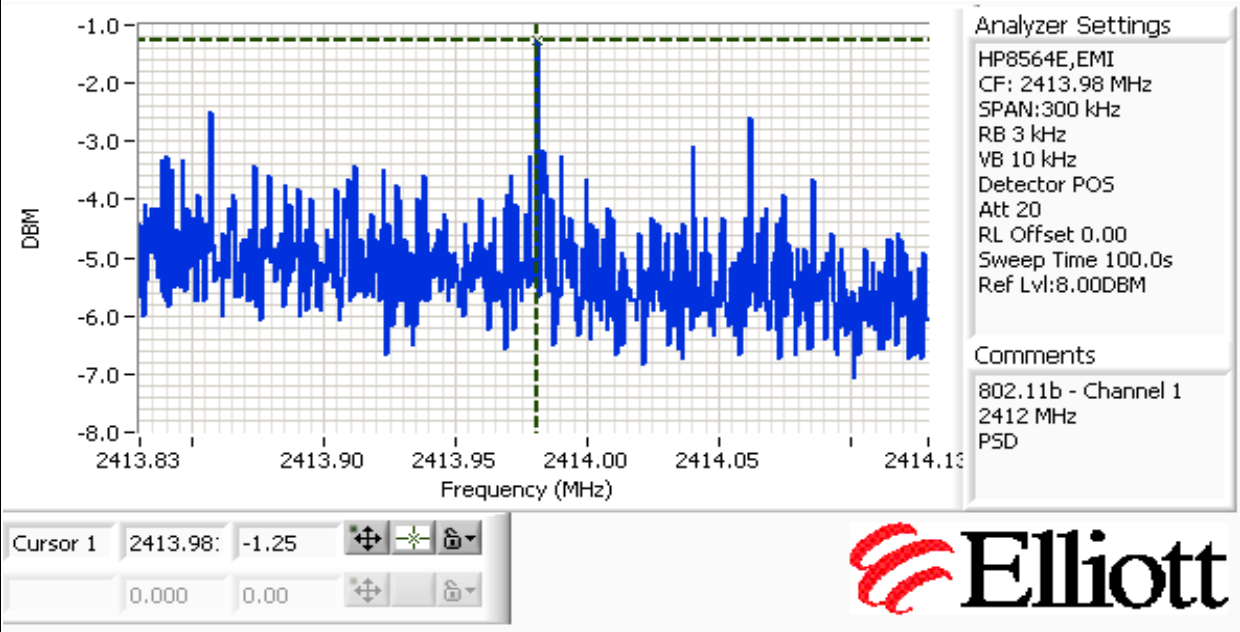
Run #4: Power Spectral Density

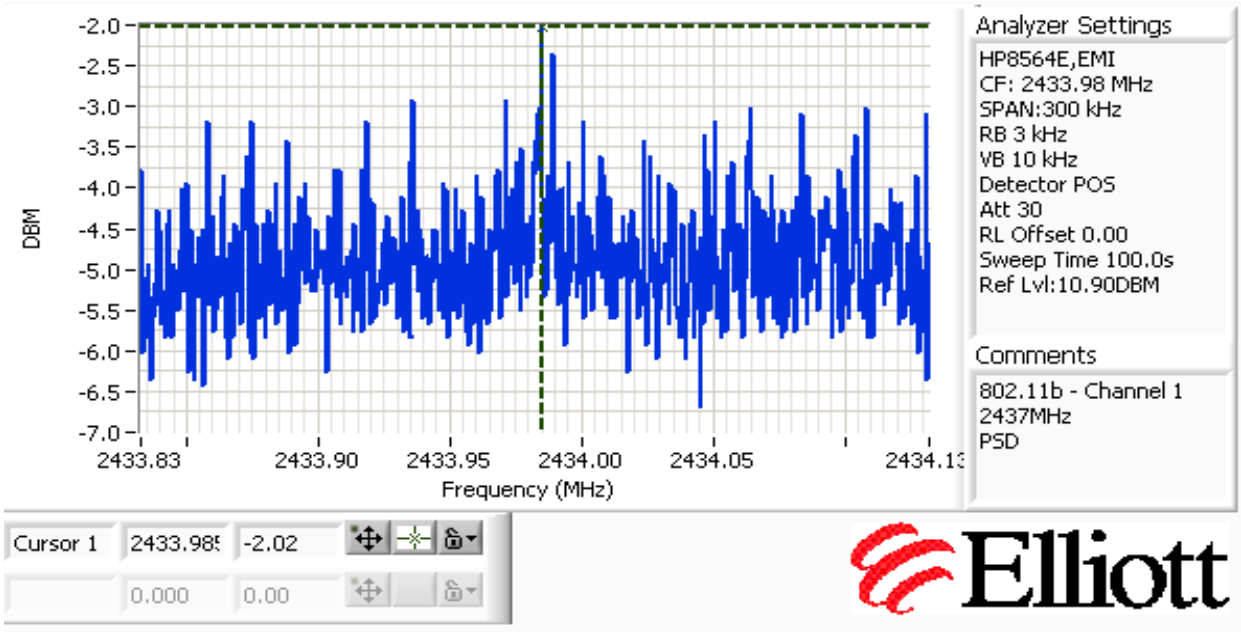
Power Setting	Operating Frequency (MHz)	Freq. @ PPSD	Res BW	P.S.D. (dBm/3kHz)
-	2412	2413.98	3kHz	-1.25
-	2437	2433.98	3kHz	-2.02
-	2462	2462.98	3kHz	-1.93

Note 1: Freq. @ PPSD: Frequency of the Peak Power Spectral Density (PPSD)

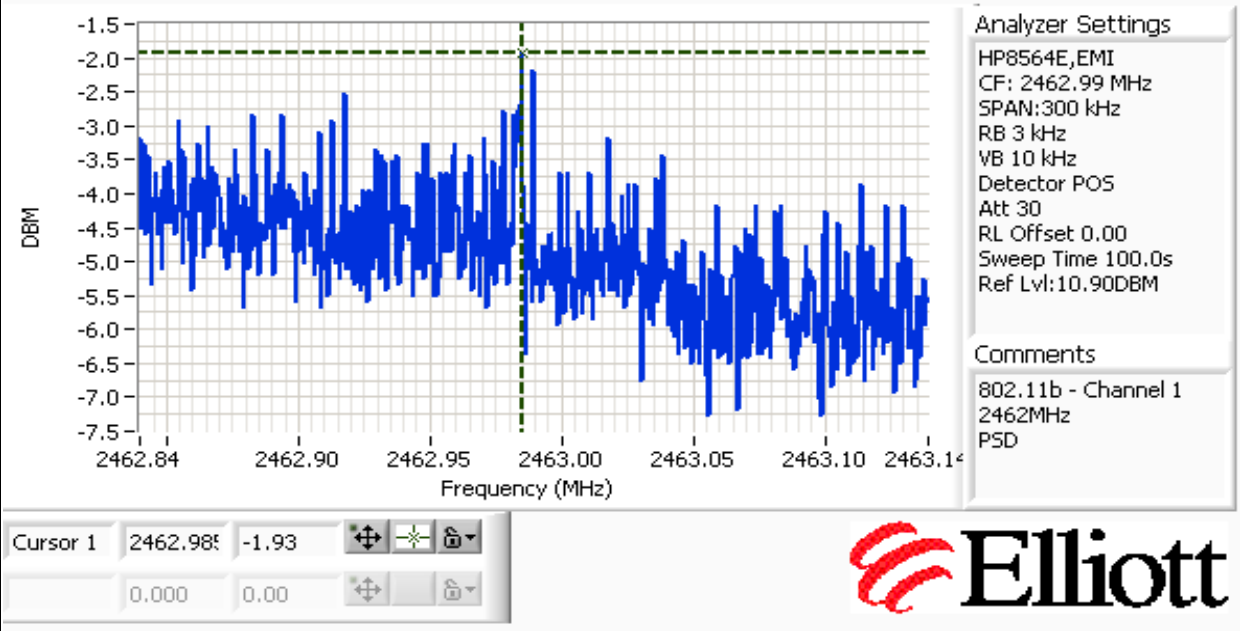
Note 2: Power spectral density measured using RB=3 kHz, VB=10kHz with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of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

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A





Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A



Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

FCC 15.247 DTS - Power, Bandwidth and Spurious Emissions 802.11g, 2400 - 2483.5 MHz

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: 12/22/2005 Config. Used: 2
Test Engineer: Chris Byleckie Config Change: None
Test Location: SVOATS #2 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 or routed in overhead in the GR-1089 test configuration.

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: 16 °C
Rel. Humidity: 90 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	RE, 1000 - 26000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	53.1dBµV/m (452.4µV/m) @ 2389.9MHz (-0.9dB)
2	6dB Bandwidth	15.247(a)	Pass	15.2 MHz
2	99% Bandwidth	15.247(a)	Pass	16.5 MHz
3	Output Power	15.247(b)	Pass	27.3 dBm (0.54W)
4	Power Spectral Density (PSD)	15.247(d)	Pass	-1.5dBm/MHz

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:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Run #1a: Radiated Spurious Emissions, 1000 - 26000 MHz. Low Channel @ 2412 MHz
Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz
Power setting - 19.8dBm average

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2412.000	113.8	v	-	-	Pk	75	1.0	RB = VB = 1MHz
2412.000	103.2	v	-	-	Avg	75	1.0	RB = 1MHz, VB = 10Hz
2412.000	104.2	v	-	-	Pk	75	1.0	RB = VB = 100kHz
2411.433	96.3	H	-	-	Pk	223	1.0	RB = VB = 1MHz
2411.433	103.2	H	-	-	Avg	223	1.0	RB = 1MHz, VB = 10Hz
2410.515	95.8	H	-	-	Pk	223	1.0	RB = VB = 100kHz

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	
2389.912	53.1	V	54.0	-0.9	AVG	75	1.0	
2389.912	68.4	V	74.0	-5.6	PK	75	1.0	
2387.892	44.3	H	54.0	-9.8	AVG	223	1.0	
2387.892	55.0	H	74.0	-19.0	PK	223	1.0	

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	
4823.125	35.2	H	54.0	-18.8	AVG	50	1.0	
4823.125	47.3	H	74.0	-26.7	PK	50	1.0	
4824.003	38.9	V	54.0	-15.1	AVG	256	1.0	
4824.003	50.2	V	74.0	-23.8	PK	256	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.
Note 2:	No emissions visible above 5GHz

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Run #1b: Radiated Spurious Emissions, 1000 - 26000 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	
2434.767	102.9	H	-	-	PK	233	1.0	RB = VB = 100kHz
2438.330	111.4	V	-	-	PK	72	1.0	RB = VB = 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.267	37.1	V	54.0	-16.9	AVG	327	1.0	
4874.267	48.9	V	74.0	-25.1	PK	327	1.0	
4874.055	32.5	H	54.0	-21.5	AVG	237	1.0	
4874.055	44.1	H	74.0	-29.9	PK	237	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.
Note 2:	N0 emissions visible above 5GHz

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Run #1c: Radiated Spurious Emissions, 1000 - 26000 MHz. High Channel @ 2462MHz
Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz
Power setting - 17.8dBm average

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2462.000	109.7	v	-	-	Pk	285	1.0	RB = VB = 1MHz
2462.000	99.5	v	-	-	Avg	285	1.0	RB = 1MHz, VB = 10Hz
2462.000	100.9	v	-	-	Pk	285	1.0	RB = VB = 100kHz
2454.433	89.9	V	-	-	Pk	234	1.0	RB = VB = 1MHz
2454.433	99.1	V	-	-	Avg	234	1.0	RB = 1MHz, VB = 10Hz
2460.760	90.0	V	-	-	Pk	234	1.0	RB = VB = 100kHz

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	
2483.528	51.6	V	54.0	-2.4	AVG	285	1.0	
2483.528	63.4	V	74.0	-10.6	PK	285	1.0	
2483.308	45.9	V	54.0	-8.1	AVG	234	1.0	
2483.308	56.9	V	74.0	-17.1	PK	234	1.0	

Other Spurious Emissions

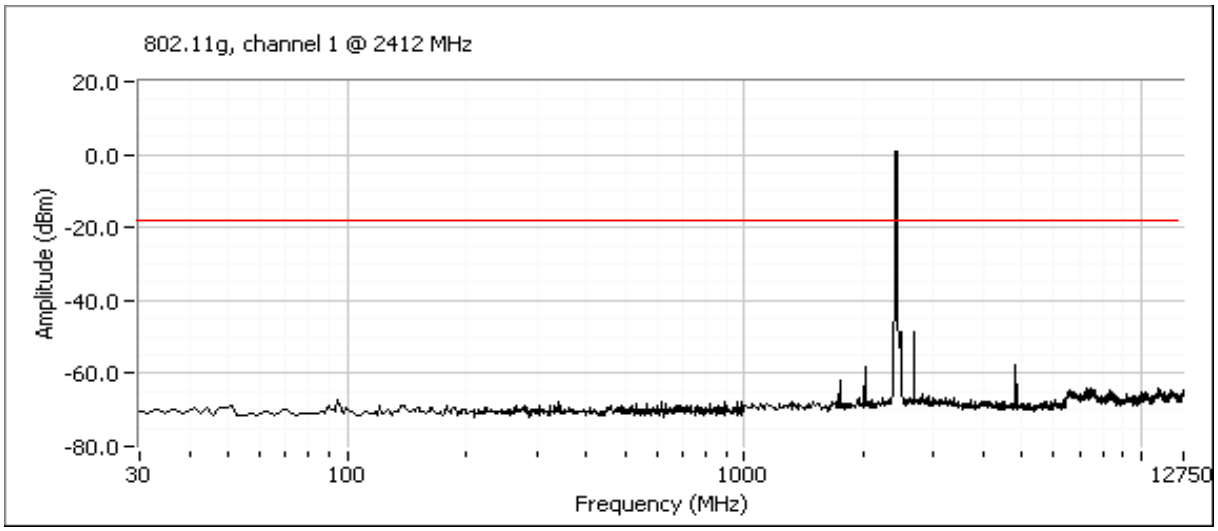
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4924.065	33.9	H	54.0	-20.1	AVG	45	1.0	
4924.065	46.0	H	74.0	-28.0	PK	45	1.0	
4924.025	36.5	V	54.0	-17.6	AVG	288	1.1	
4924.025	48.5	V	74.0	-25.5	PK	288	1.1	

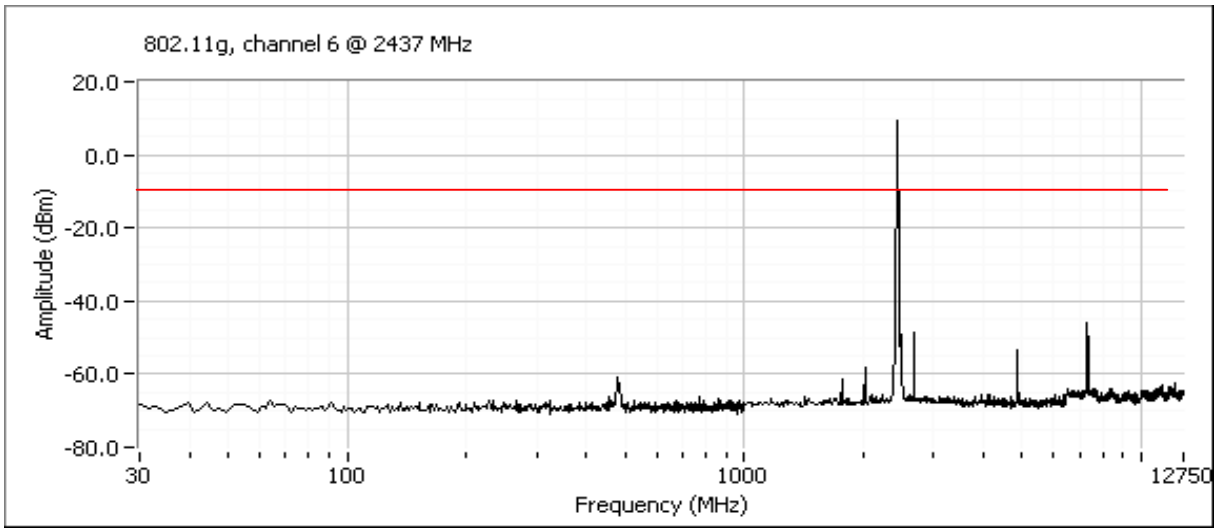
Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	N0 emissions visible above 5GHz

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

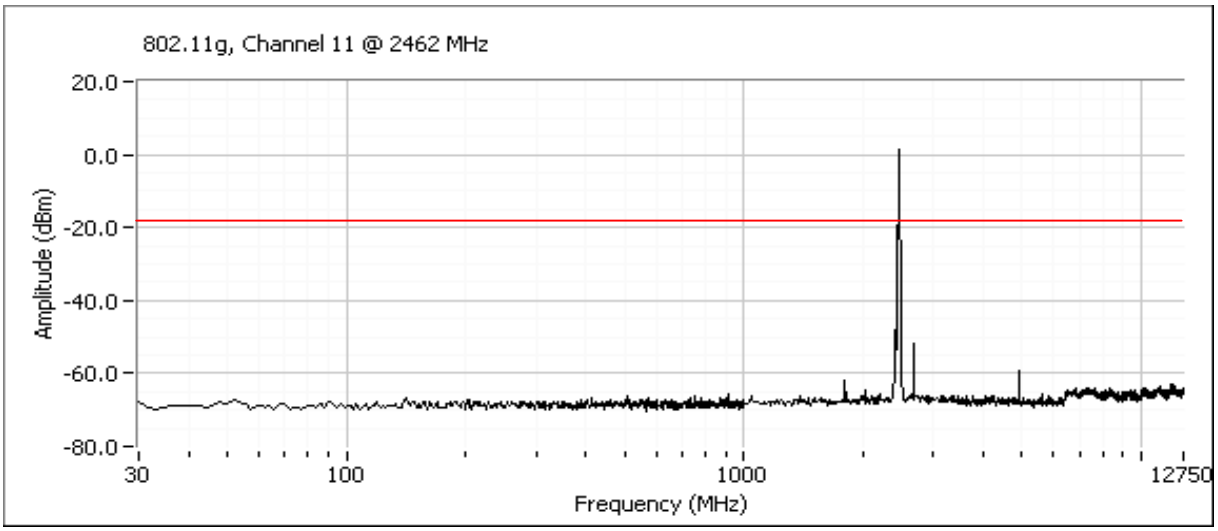
Run #1d: Antenna Conducted Spurious Emissions, 30 - 26,000 MHz.

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.





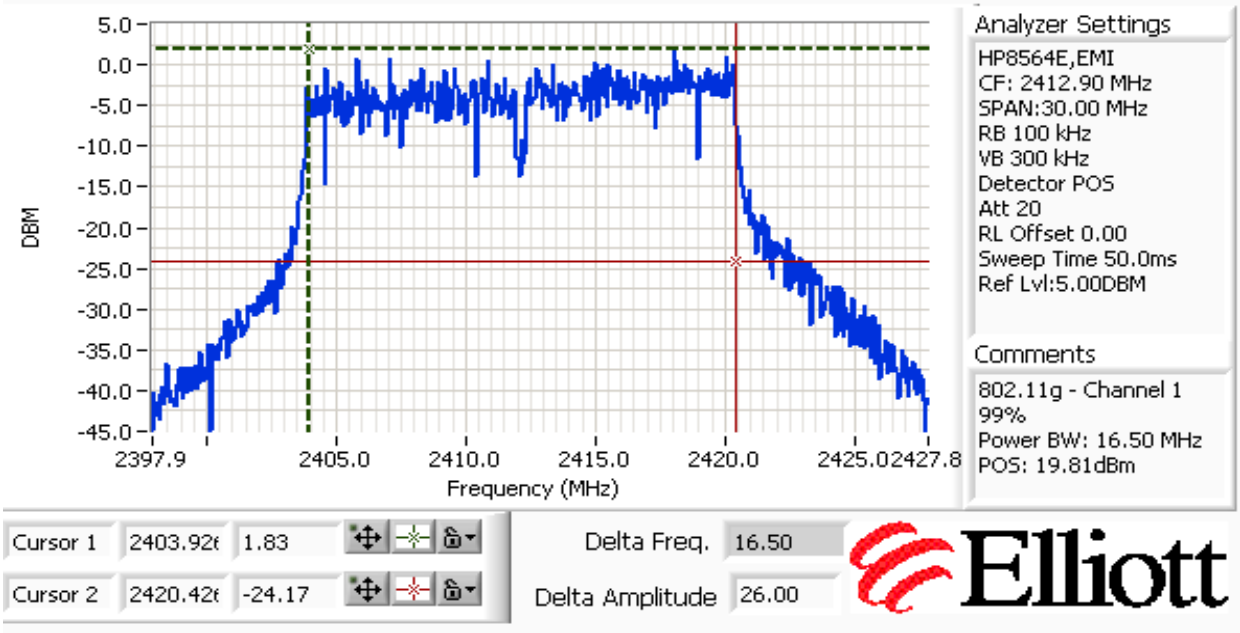
Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

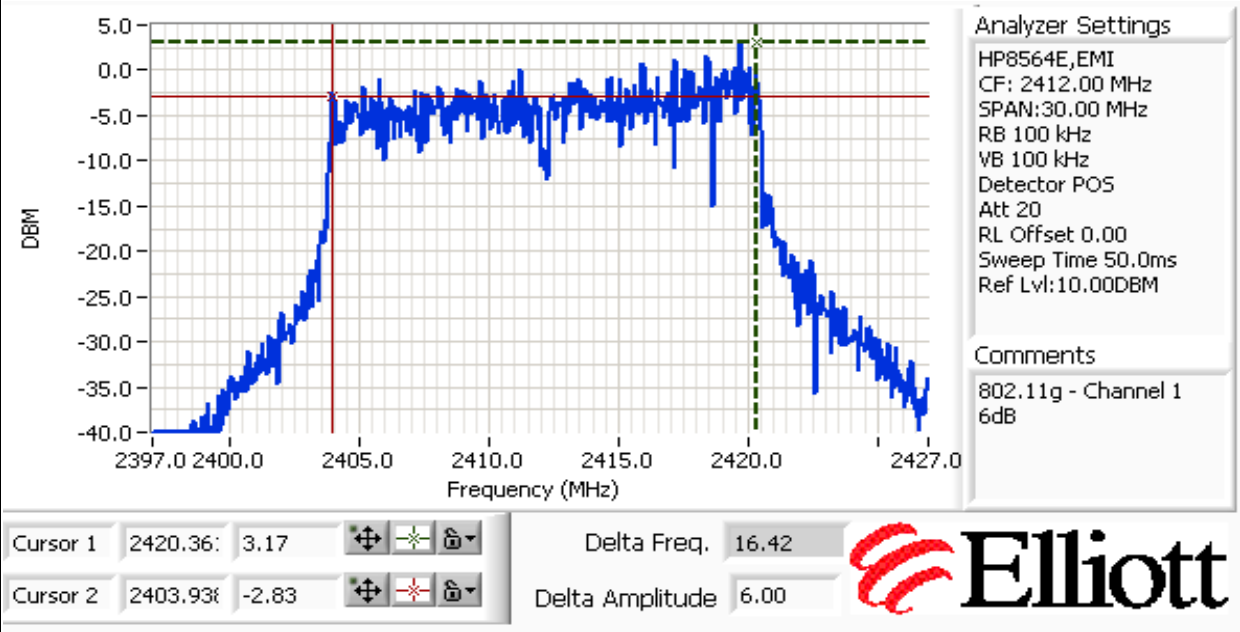


Run #2: Signal Bandwidth

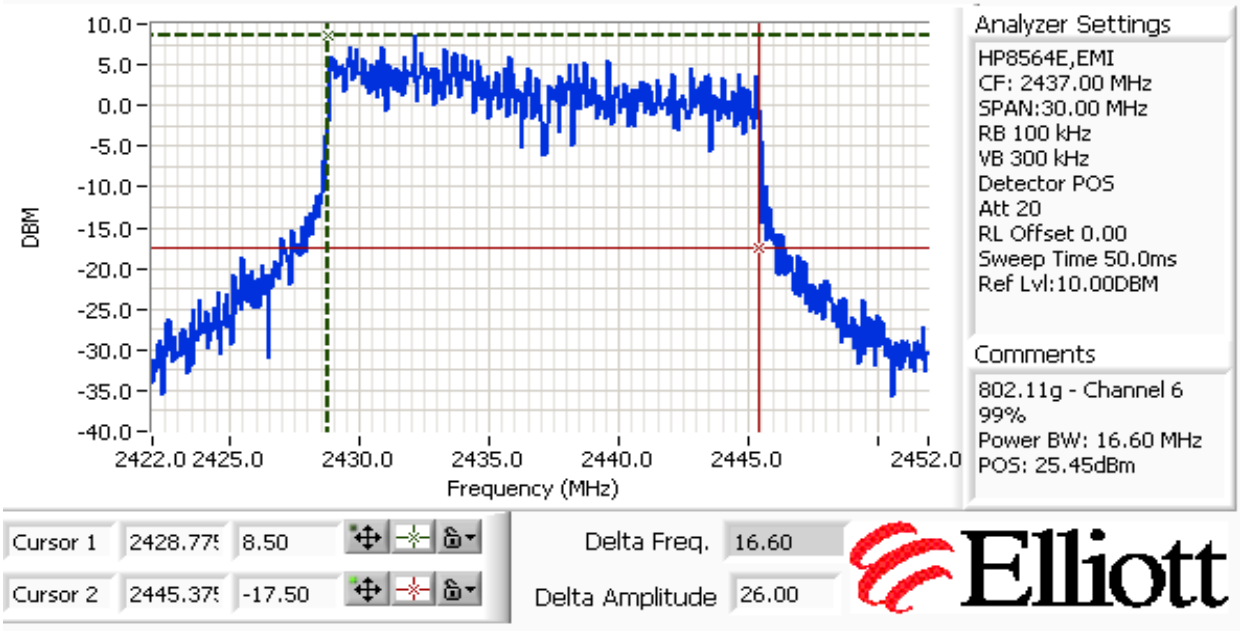
Power Setting	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	99% Signal Bandwidth
-	2412	100 kHz	16.4 MHz	16.5 MHz
-	2437	100 kHz	15.8 MHz	16.6 MHz
-	2462	100 kHz	15.2 MHz	16.3 MHz

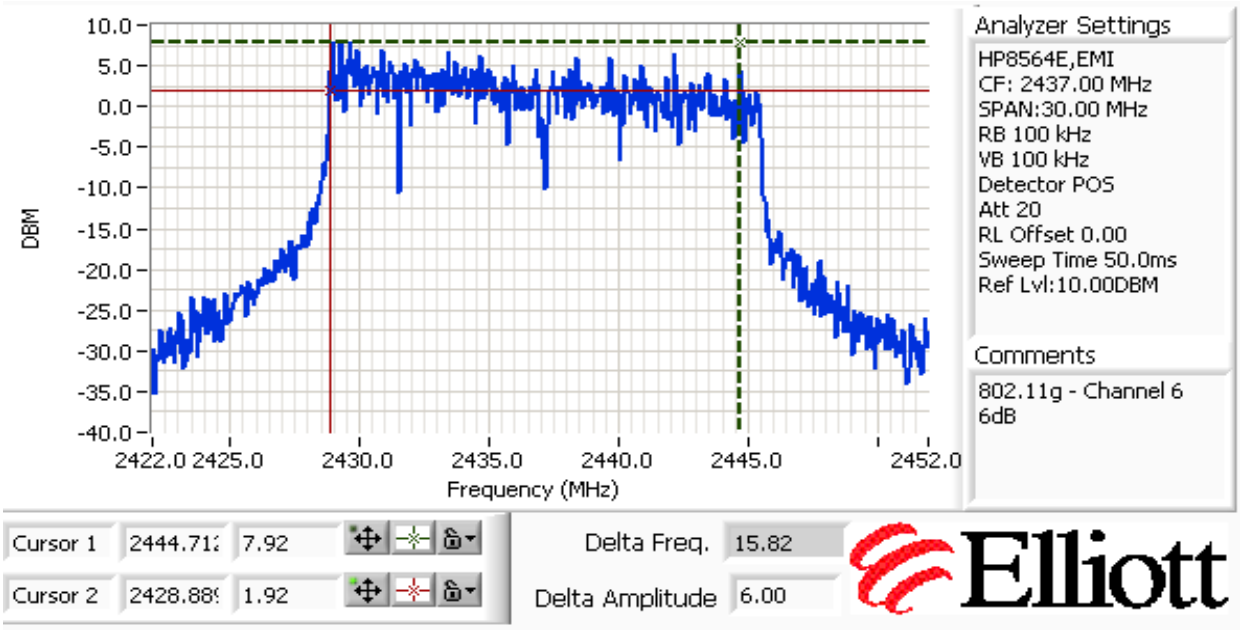
Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A





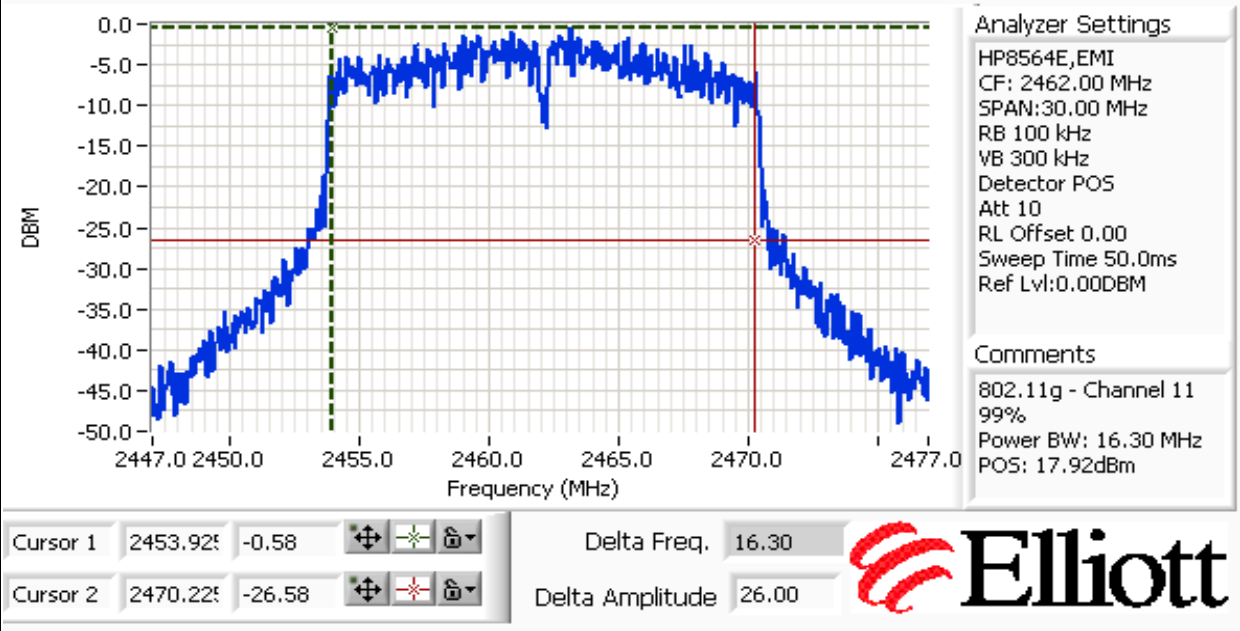
Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

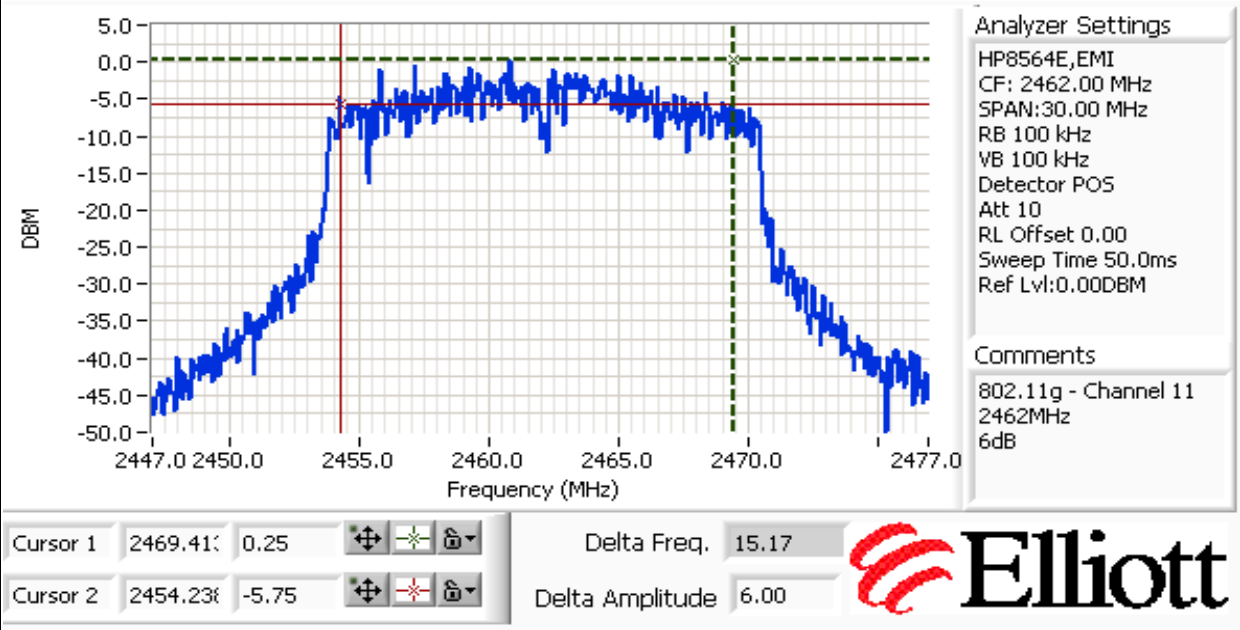




EMC Test Data

Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A





Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A

Run #3: Output Power

Maximum antenna gain: 7.4 dBi

Power Setting	Frequency (MHz)	Output Power Note 1		EIRP
		dBm	W	W
-	2412	22.5	0.178	0.977
-	2437	27.3	0.537	2.951
-	2462	21.5	0.141	0.776

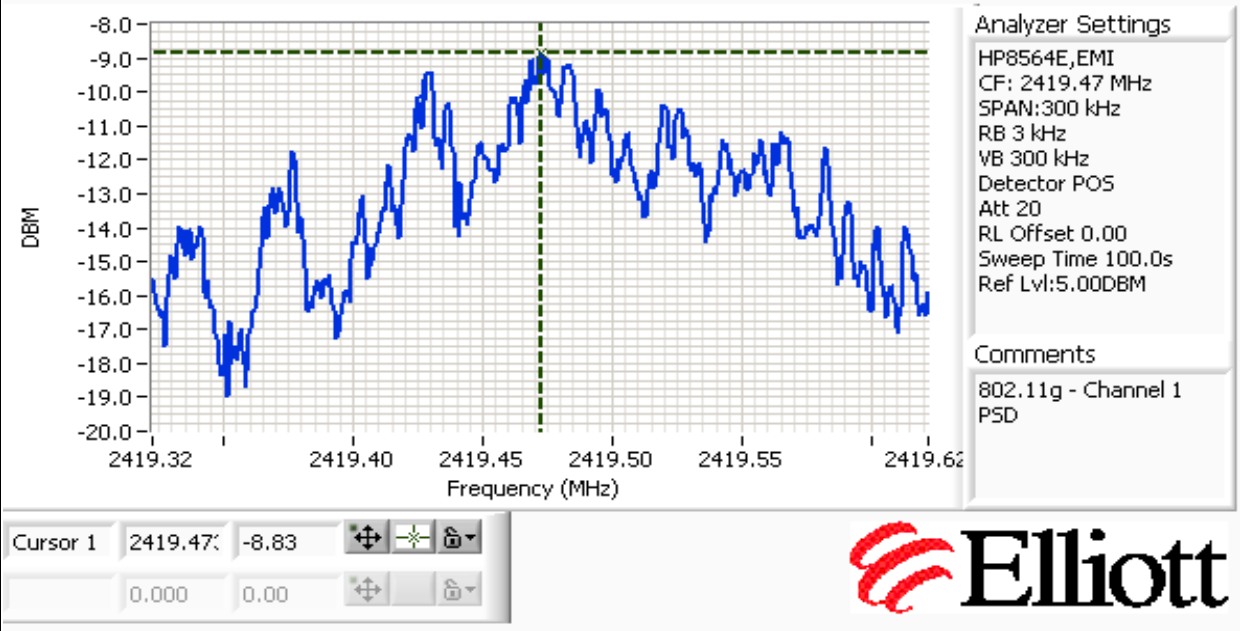
Note 1:	Output power measured using a peak power sensor.

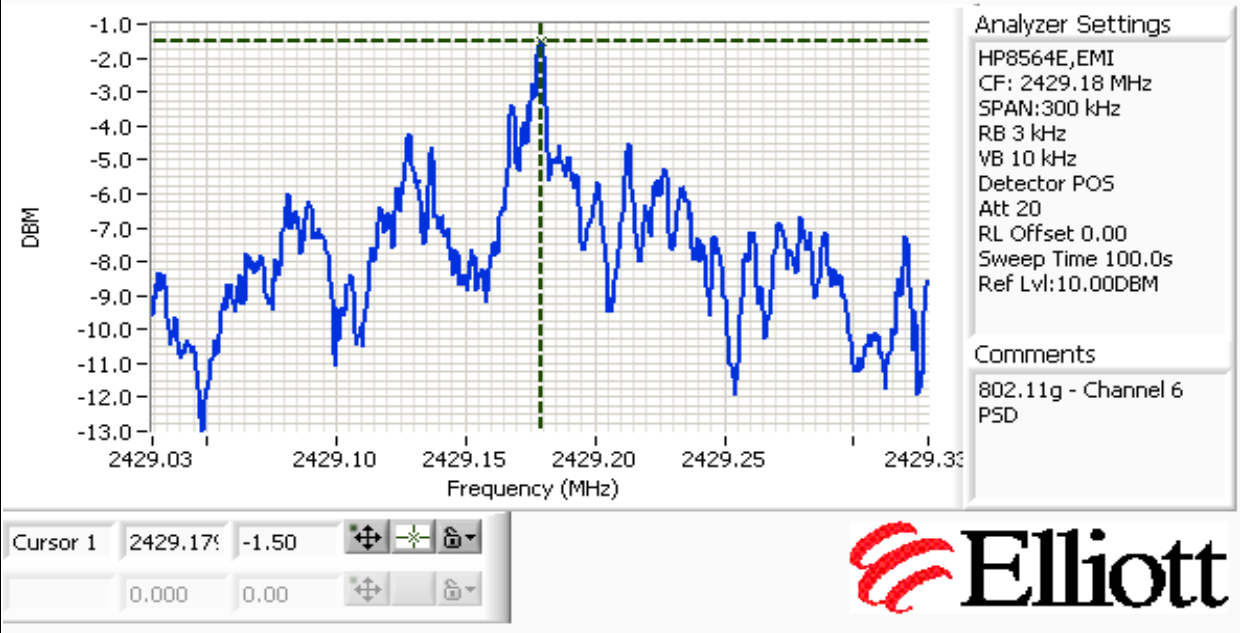
Run #4: Power Spectral Density

Power Setting	Operating Frequency (MHz)	Freq. @ PPSD	Res BW	P.S.D. (dBm/3kHz)
-	2412	2419.47	3kHz	-8.83
-	2437	2429.17	3kHz	-1.50
-	2462	2460.74	3kHz	-9.75

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:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A





Client:	Skypilot Networks	Job Number:	J61725
Model:	SkyExtender DualBand	T-Log Number:	T61851
		Account Manager:	Esther Zhu
Contact:	Jim Barbera		
Spec:	FCC	Class:	N/A