



**FCC Part 15, Subpart E, UNII (Part 15.401)
Certification Application**

**Industrie Canada RSS-210
Certification Application**

**EMI Test Report
on
IEEE 802.11 Access Point.
Series: 2332
Model: 2332-A1**

**FCC ID: RVW2332
IC ID: 332R-2332
Report # NORT_2332_UNII**

Prepared by:
David Waitt
21565 Mary Alice Way
Los Gatos, CA 95033
david@waitt.us
(408) 832 7053

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General Information

Unit(s) Under Test: Nortel Access Point
Model: 2332-A1
Product Description: IEEE 802.11A / B / G Access point

FCC ID: RVW2332
IC ID: 337R-2332

Tested For: Nortel Networks
4655 Great America Parkway
Santa Clara, CA 95054

Tested At: Elliott Laboratories
41039 Boyce Road
Fremont, CA 94538

Tested By: R Veralas, J Martinez, Test Engineer, Elliott Laboratories
David Waitt, (Independent Consultant)

Tested To: FCC CFR 47, Part Subpart E, (15 401 UNII)
IC RSS-210 Issue 7, Appdx 8
Per ANSI C63.4 (2003)

Tested On: April / May 2007

Requested Certification: FCC Part 15 Subpart E Certification
Industrie Canada RSS-210 / issue 7

Detailed Product Information / Operational Description

The 2332 series access point radio is an IEEE 802.11 A / B /G access point is intended to be professionally installed and configured in corporate and industrial environments.

The device does not include a “Turbo” mode.

The device DOES NOT INCORPORATE DFS FUNCTIONALITY

As such, the device will only operate within the 5.15 - 5.25 GHz UNII band. It will NOT operate in the 5.25 - 5.35 GHz or the 5.47 - 5.725 GHz UNII bands. Operation in these bands is prohibited by the device software.

(The device will also operate in the 2.4 and 5.8 GHz ISM bands. Operation in those bands is covered in the accompanying report)

The access point is powered via -48 VDC power over Ethernet (POE)

Additionally, the device has been tested for compliance to the FCC Part 15 Class B limits. A report has been prepared and is on with the manufacturer.

The access point has two internal 5 GHz antennas. The access point also incorporates antenna diversity in which it switches rapidly between the two antennas and uses the antenna that provided the best communication link to a particular client. There is only one of the internal 5 GHz antennas in use at any one time.

The access point allows the connection of an external 5 GHz antenna. This option can be selected by the configuration software. The external antenna connectors use reverse sex SMA connectors to meet the FCC 15.203 unique antenna requirements.

Note that in contrast to the internal antennas; only ONE external 5 GHz antenna can be used. The configuration software cannot be configured to rapidly switch between the internal and external antenna.

This certification application follows FCC policy that allows use of antennas of the same type of equal or lesser gain to be used with the product from various manufacturers. All of the antennas listed below were actually tested with the unit, however only the data associated with the highest gain antenna of each type is presented in this report for brevity. **The highest gain antenna of each type presented in this report for the 5.15 - 5.25 GHz band is highlighted in GREEN.**

The last column indicates the maximum power setting that is allowed to be used with the particular type of antenna in order to ensure compliance with FCC rules. The combination with the highest EIRP (based on power setting and antenna PK gain is highlighted in **RED text**.

NOTE: The actual RF Transmit power is LOWER than the power setting implies

Antenna	Freq Band [GHz]	Peak Gain (dBi)	Net Gain (dBi)	Type	Comment	Power Setting
5.0 GHz Antennas						L - M - H
SQ5153WPN36RSM	5.15 - 5.25	3.5	3.2	Monopole	Monopole pattern similar to SQ2403	21
	5.725 - 5.85	0.1	0.1			
S5153WBPN36RSM	5.15 - 5.25	4.9	4.5	Dipole	Co-linear Omni, 2 co-located dipoles,	21
	5.725 - 5.85	4.4	4.4			
S4901790PN36RS	5.15 - 5.25	15.6	15.7	Panel	90 degree directional antenna	6
	5.725 - 5.85	16.1	15.8			
SR49120DAN36RS	5.15 - 5.25	10.1	10	Panel	120 degree , directional antenna	12
	5.725 - 5.85	10	9.5			
S51514WPN36RSM	5.15 - 5.25	13.4	13.1	Panel	60 degree , directional antenna	9
	5.725 - 5.85	12.9	12.9			
Internal	5.15 - 5.25	2		Dipole	Omni Pattern,	
	5.725 - 5.85	0.65				

Report Organization and Results Summary

This report presents the results of the tests that verify compliance with FCC Part 15.401 and Industrie Canada RSS-210 Issue 7. Though this product must comply with FCC Part 15.247 (for 802.11 B/G) as well, only the 15.401 (UNII) results are contained in this report. The compliance information for Part 15.247 is contained in a separate report.

A brief results summary of all the in this report is below.

Part 15 Paragraph	Test	Results
15.407(a)(5)	Power Spectral Density (5.15 - 5.25)	3.16 dBm/1MHz @5180
15.407(b)(1)	Out of Band Emissions	48.9dBuV @5005MHz
15.407(a)	26dB Bandwidth	31 MHz
15.407(a)(1)	Transmit Power (5.15 - 5.25)	13.62 dBm MAX
15.407(a)(6)	Peak Excursion	11.41 dB MAX

Test Facilities

The tests were performed at:

Elliott Laboratories
41039 Boyce Road
Fremont, CA 94538

The tests performed at Elliott include:

- All radiated emissions tests required in FCC Part 15.407
- RF Conducted Tests. (BW, Pout, PSD,...)

General:

Final 802.11 B/G/A radiated test measurements were taken at Elliott Laboratories Chambers #4 & #5.

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 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.

OATS:

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated emissions 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 Guidelines.

Antenna, Antenna Mast and Turntable

The Horn antennas that are used to measure radiated emissions above 1000MHz 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 the ground plane shall be 80cm unless the equipment is intended to be floor mounted. During the radiated emissions tests the equipment is positioned on a motorized turntable in conformance with the ANSI requirement.

Equipment Lists

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.

The following test equipment was used to perform the testing

Elliott Test Equipment (Test Dates 19 April - 24 May 2007)

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	16-Mar-08
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	11-Jul-08
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	11-Jan-08
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1731	09-Jun-07
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	1771	11-Jul-07

Test Methods

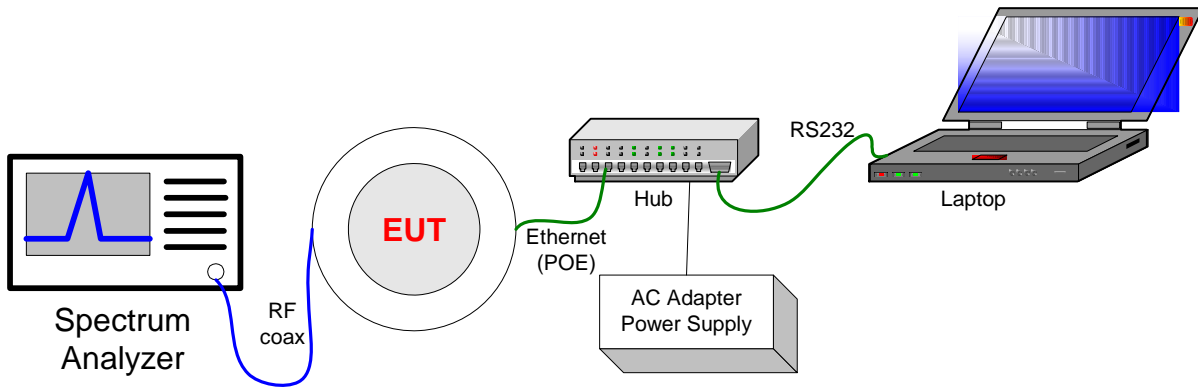
Many of the tests are performed at a low, middle and high channel of the applicable band. The typical frequencies used for the test for each band are listed below.

UNII 802.11 A 5.15 – 5.25 GHz	
Channel	Freq(MHz)
Low	5180
Mid	5220
High	5240

There are several different antennas that will be used with the access point. (See antenna list) In order to comply with the maximum allowable RF power requirement in the 5.15 - 5.25 GHz band, the power setting (and thus the transmit power) is adjusted depending on the external antenna used with the access point. The maximum power setting that yielded compliance will be programmed into the configuration firmware of the access point to ensure the maximum possible power setting will be correct for each antenna.

The following tests are performed using the basic test setup shown below. In several cases, the EUT was running special diagnostic firmware to allow it to transmit random data on a particular channel indefinitely.

Part 15	Test
15.407(a)(5)	Power Spectral Density
15.407(b)(1)	Out of Band Emissions (5.15 – 5.25)
15.407(a)	26dB Bandwidth
15.407(a)(1)	Transmit Power (5.15 – 5.25)
15.407(a)(6)	Peak Excursion



Basic Conducted RF Bench Test Setup

Unless otherwise noted, the support equipment for the bench tests is listed below.

Support Equipment				
Description	Model number	FCC ID or SN	Manufacturer	Power Cable
Laptop	Satellite	DOC	Toshiba	Laptop PS
Ethernet Switch	2350	DoC	Nortel	48 VDC Adapter below
48VDC AC adapter	Generic		Generic	CAT 5 Ethernet cable

Test Results

Detailed test procedures and test results are contained in the following sections. In cases where the test setup differs from the Conducted RF test setup shown above, the test setup is also presented.

Test Conditions			
Temperature	23 C	Humidity:	61%
ATM pressure	1021 mBar	Grounding:	None
Tested By	David Waitt ,R Veralas, Juan Martinez	Date of Test:	April / May 2007
Test Reference	Refer to individual test results		
Tested Range	Test Dependent		
Test Voltage	48 VDC to the access point		
Modifications	No modifications were made to the unit during the tests		

802.11 A Maximum RF Power Output and Power Spectral Density at Antenna Terminals

Specifications:

FCC Specification: Paragraph(s): 15.401(a)(1), 15.401(a)(2), 15.401(a)(3)

IC Specification:RSS210 /7 Sec A9.2(1)

Procedure:

The test setup is configured as shown in the bench test setup diagram. Power measurements were performed with a spectrum analyzer using channel power integration over the 26 dB bandwidth. Output power measured using a spectrum analyzer with: RBW=1MHz, VB=3 MHz, sample detector, power averaging on and power integration over 26-dB BW

RF Transmit power and PSD is measured at each of the four setting that will be used in normal operation. The low power setting is used for the high gain directional antennas. The higher power level is used for the lower gain omni antennas. The PSD limit below is corrected for the difference in antenna gains above 6 dB.

The RF transmit power and power spectral density can be both be determined from each of the spectrum analyzer plots below.

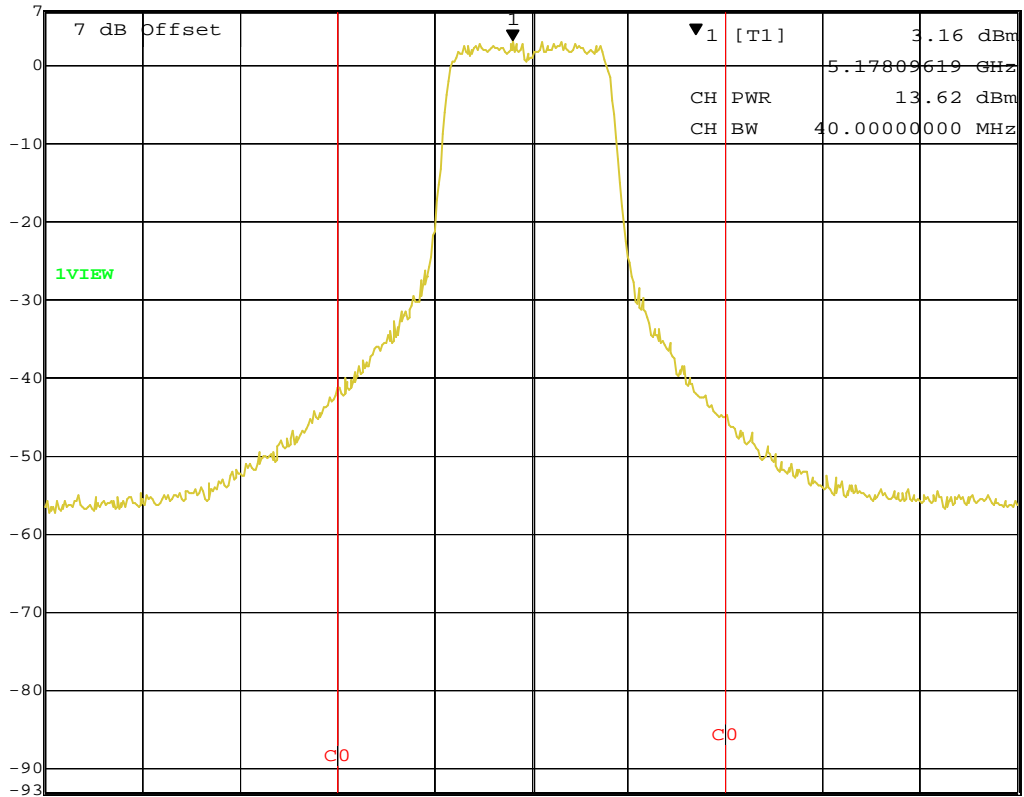
RF Transmit Power Summary Results:

Antenna	Freq (MHz)	Power Setting	Msrd Chan Power (dBm)	Antenna Gain Pk (dBi)	Adjusted PSD Limit (dBm / MHz)	Msrd PSD (dBm / MHz)	Delta PSD Spec (dB)
4901790	5180	6	3.03	15.7	-5.7	-7.90	-2.20
	5220	6	2.31	15.7	-5.7	-8.07	-2.37
	5240	6	2.09	15.7	-5.7	-8.27	-2.57
S51514	5180	9	6.62	13.4	-3.4	-3.84	-0.44
	5220	9	7.23	13.4	-3.4	-3.56	-0.16
	5240	9	7.23	13.4	-3.4	-3.56	-0.16
SR49120	5180	12	9.3	10.1	-0.1	-1.52	-1.42
	5220	12	9.32	10.1	-0.1	-1.38	-1.28
	5240	12	9.43	10.1	-0.1	-1.10	-1.00
Other	5180	21	13.62	<6	4	3.16	-0.84
	5220	21	12.26	<6	4	1.87	-2.13
	5240	21	12.17	<6	4	1.65	-2.35



Marker 1 [T1] RBW 1 MHz RF Att 30 dB
 Ref Lvl 3.16 dBm VBW 3 MHz
 7 dBm 5.17809619 GHz SWT 5 ms Unit dBm

Channel Power, PSD, 5180 MHz (Power Setting 21)

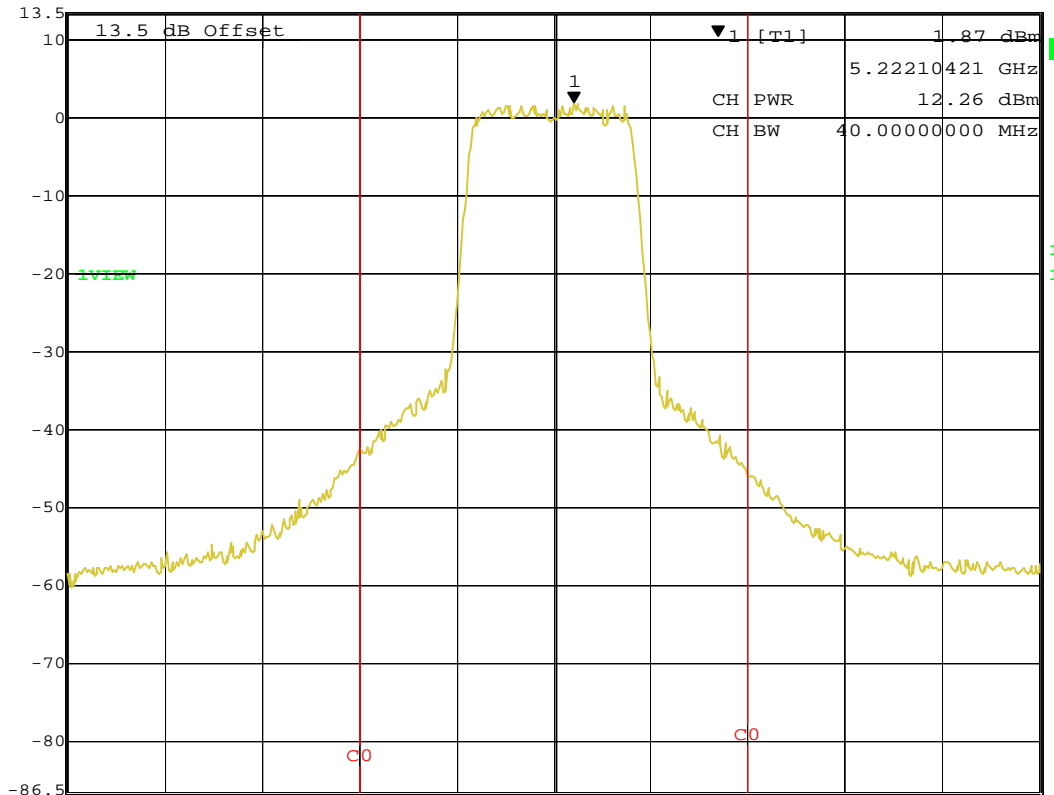


Center 5.18 GHz 10 MHz/ Span 100 MHz




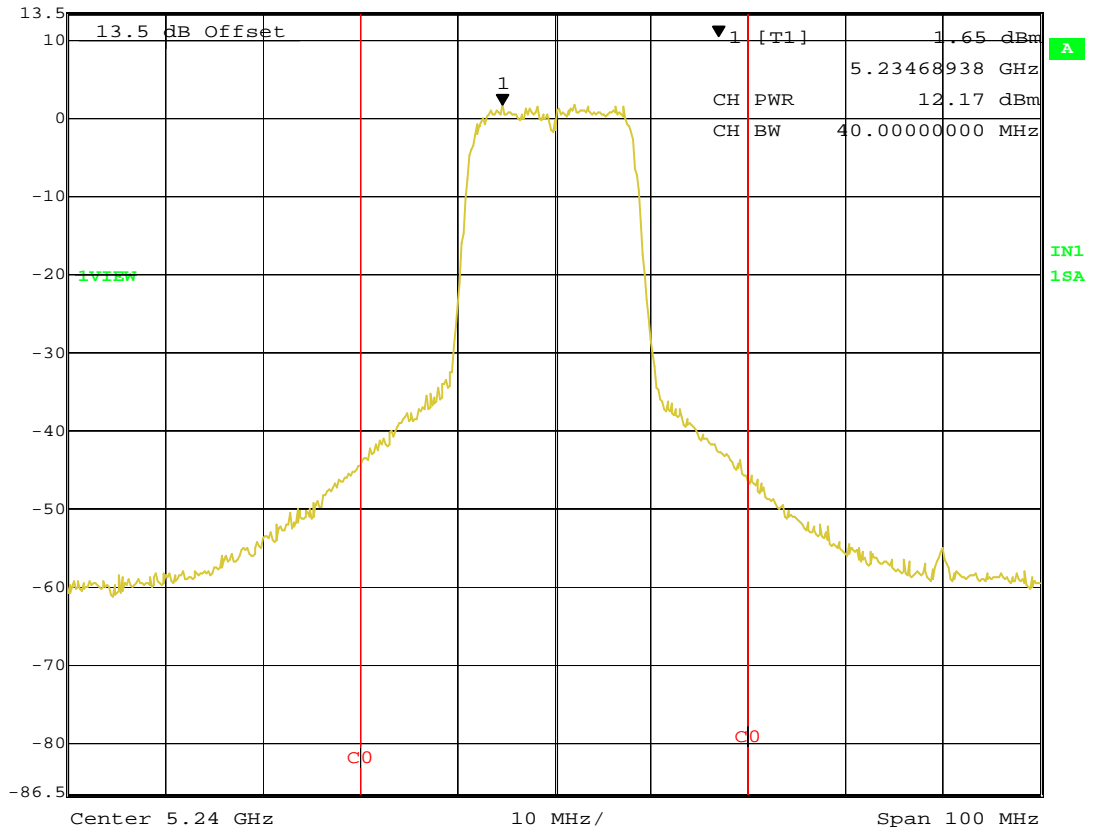
Marker 1 [T1] RBW 1 MHz RF Att 20 dB
 Ref Lvl 1.87 dBm VBW 3 MHz
 13.5 dBm 5.22210421 GHz SWT 5 ms Unit dBm

Channel Power, PSD, 5220 MHz (Power Setting 21)




Center 5.22 GHz 10 MHz/ Span 100 MHz

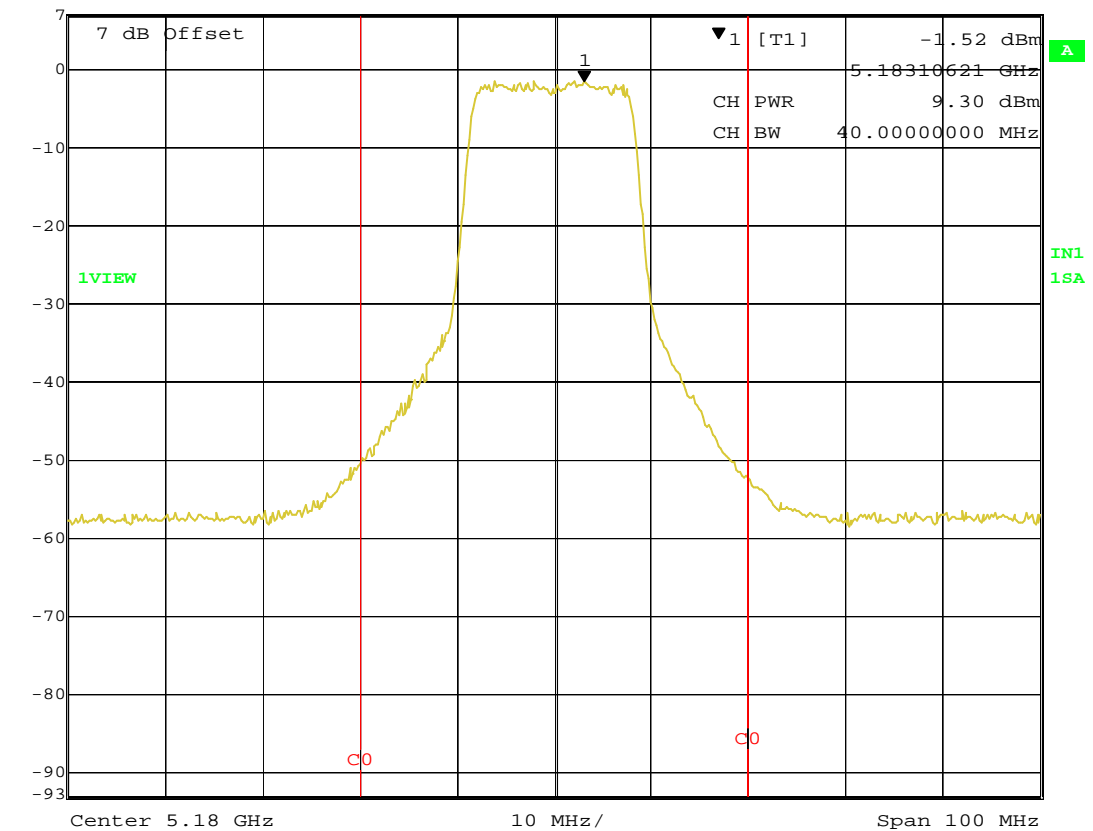

 Marker 1 [T1] RBW 1 MHz RF Att 20 dB
 Ref Lvl 1.65 dBm VBW 3 MHz
 13.5 dBm 5.23468938 GHz SWT 5 ms Unit dBm



Channel Power, PSD, 5420 MHz (Power Setting 21)


Date: 29.AUG.2007 12:48:37

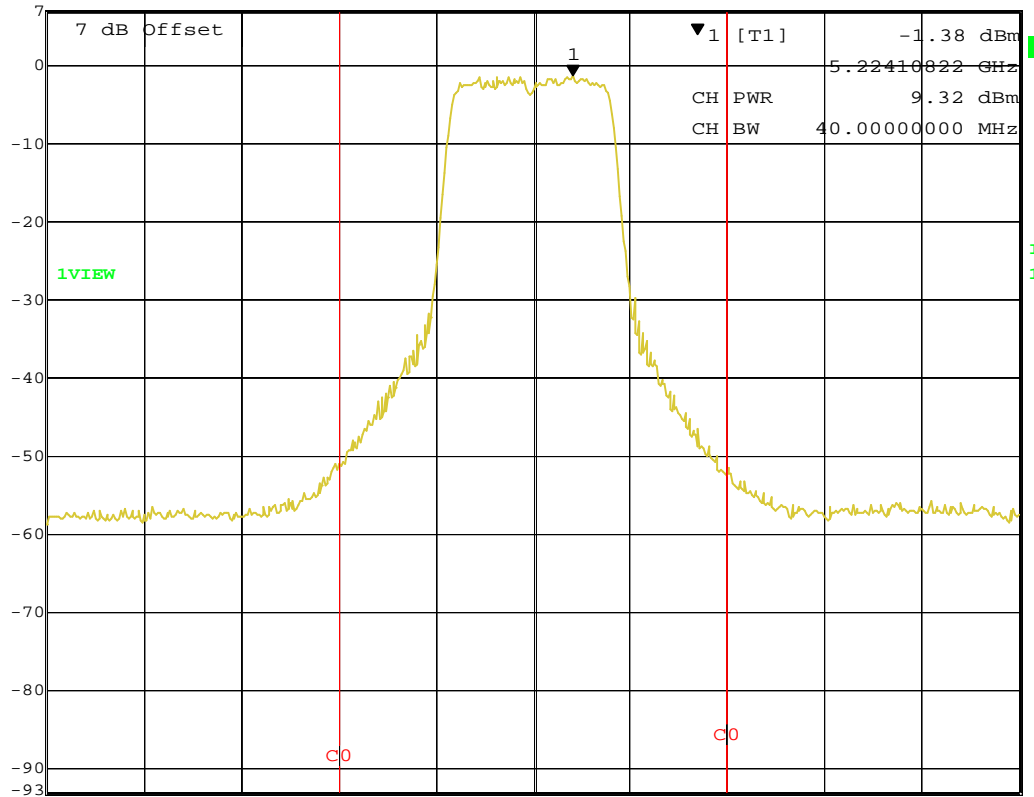

 Marker 1 [T1] RBW 1 MHz RF Att 30 dB
 Ref Lvl -1.52 dBm VBW 3 MHz
 7 dBm 5.18310621 GHz SWT 5 ms Unit dBm



Channel Power, PSD, 5180MHz (Power Setting 12)


Date: 26.MAY.2007 00:12:26

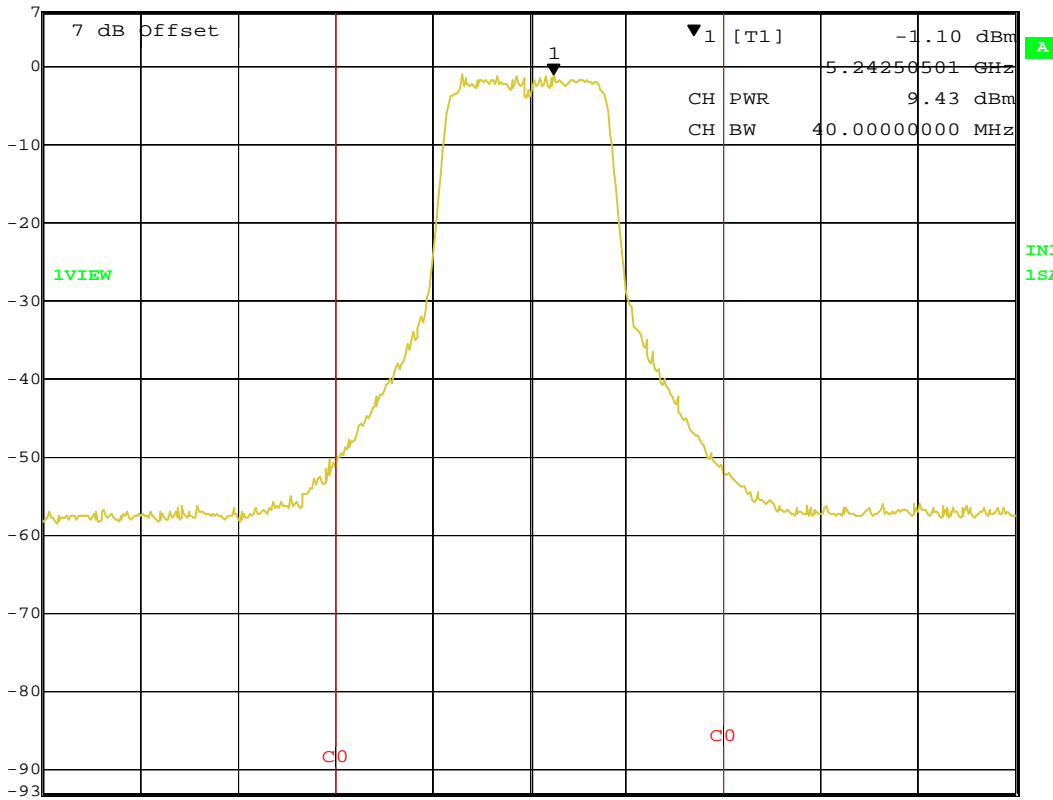

Marker 1 [T1]
RBW 1 MHz RF Att 30 dB
Ref Lvl -1.38 dBm
VBW 3 MHz
7 dBm
5.22410822 GHz
SWT 5 ms Unit dBm



Channel Power,
PSD, 5220 MHz
(Power Setting
12)

Date: 26.MAY.2007 00:38:28

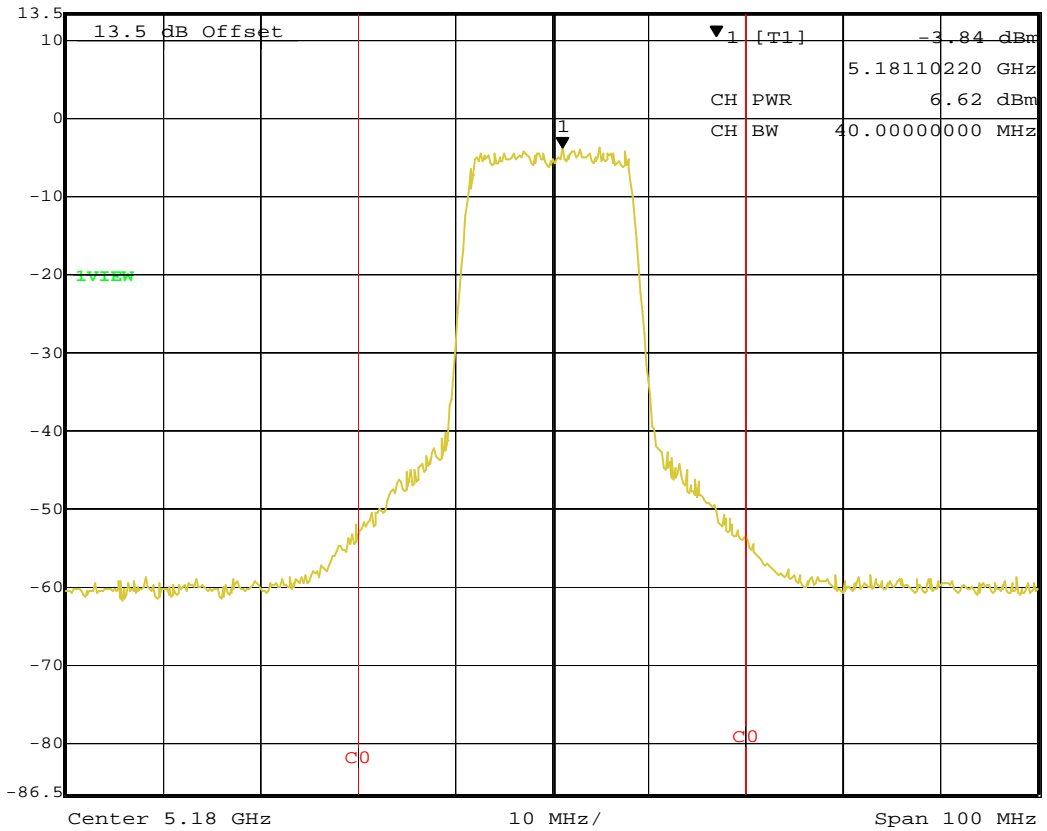

Marker 1 [T1]
RBW 1 MHz RF Att 30 dB
Ref Lvl -1.10 dBm
VBW 3 MHz
7 dBm
5.24250501 GHz
SWT 5 ms Unit dBm



Channel Power,
PSD, 5240 MHz
(Power Setting
12)



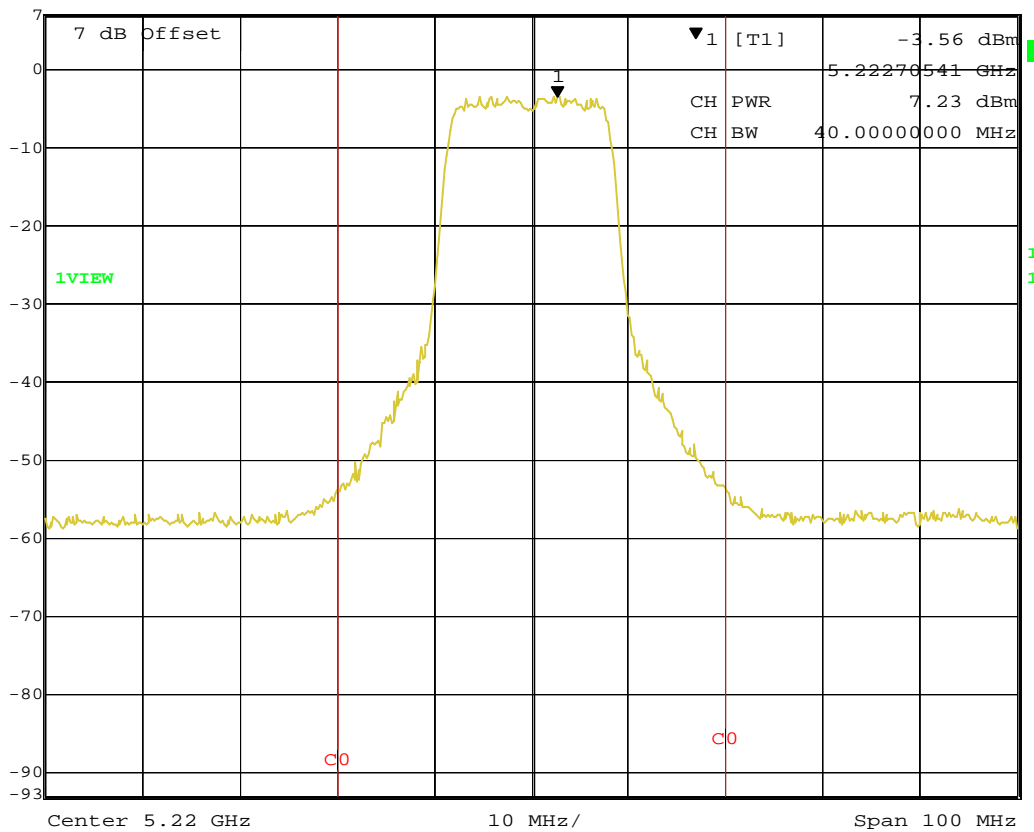
Marker 1 [T1] RBW 1 MHz RF Att 20 dB
 Ref Lvl 13.5 dBm -3.84 dBm VBW 3 MHz
 5.18110220 GHz SWT 5 ms Unit dBm



Channel Power,
 PSD, 5180 MHz
 (Power Setting
 9)

Date: 29.AUG.2007 12:41:37

7 dBm 5.22270541 GHz SWT 5 ms Unit dBm

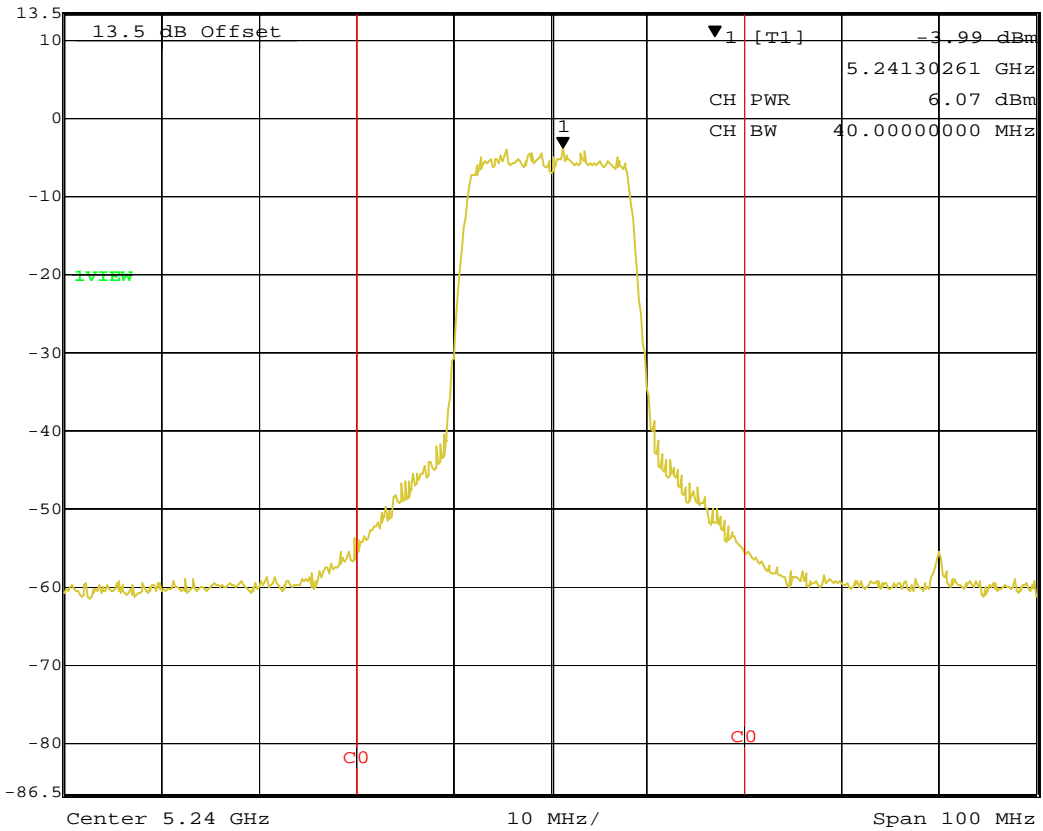


Channel Power,
 PSD, 5220 MHz
 (Power Setting
 9)

Date: 26.MAY.2007 00:34:28



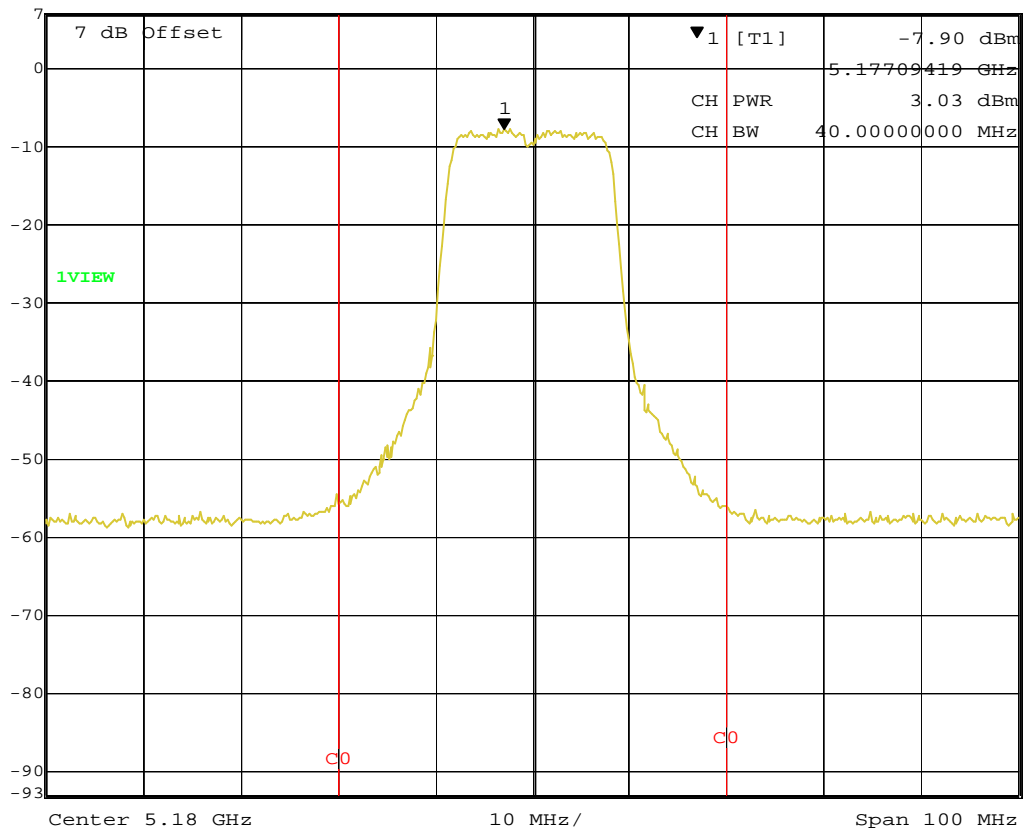
Marker 1 [T1] RBW 1 MHz RF Att 20 dB
 Ref Lvl -3.99 dBm VBW 3 MHz
 13.5 dBm 5.24130261 GHz SWT 5 ms Unit dBm




Channel Power, PSD, 5240 MHz (Power Setting 9)

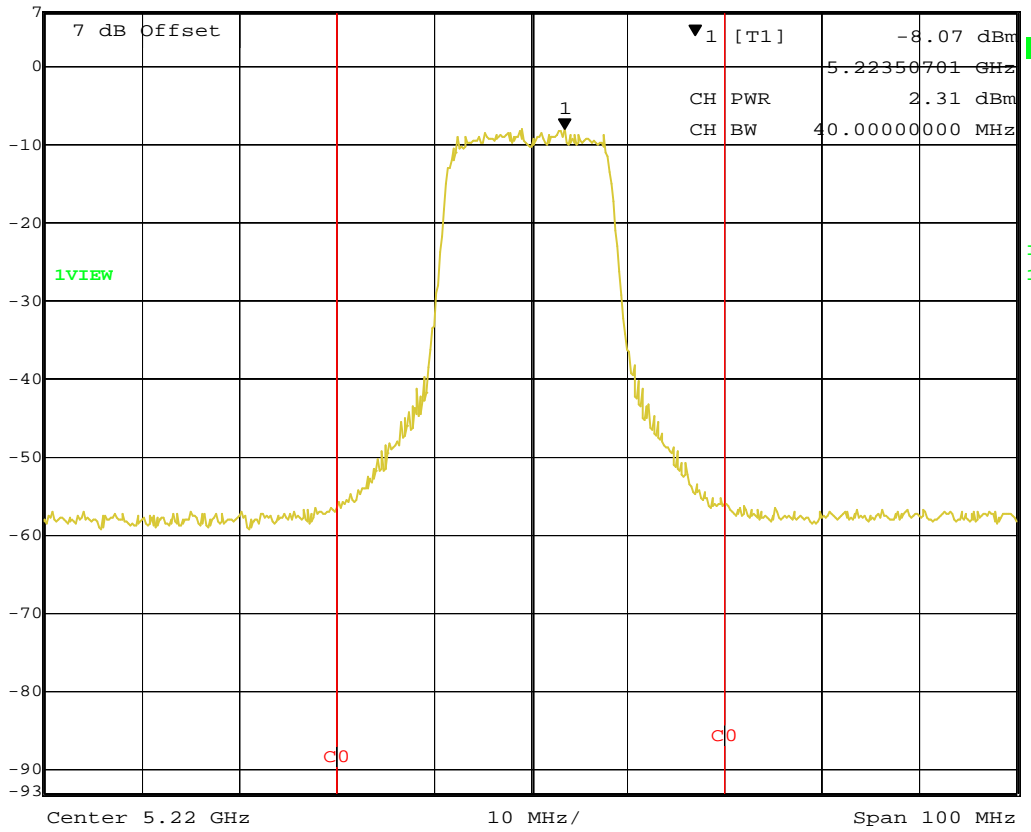


Date: 29.AUG.2007 12:45:43
 Marker 1 [T1] RBW 1 MHz RF Att 30 dB
 Ref Lvl -7.90 dBm VBW 3 MHz
 7 dBm 5.17709419 GHz SWT 5 ms Unit dBm




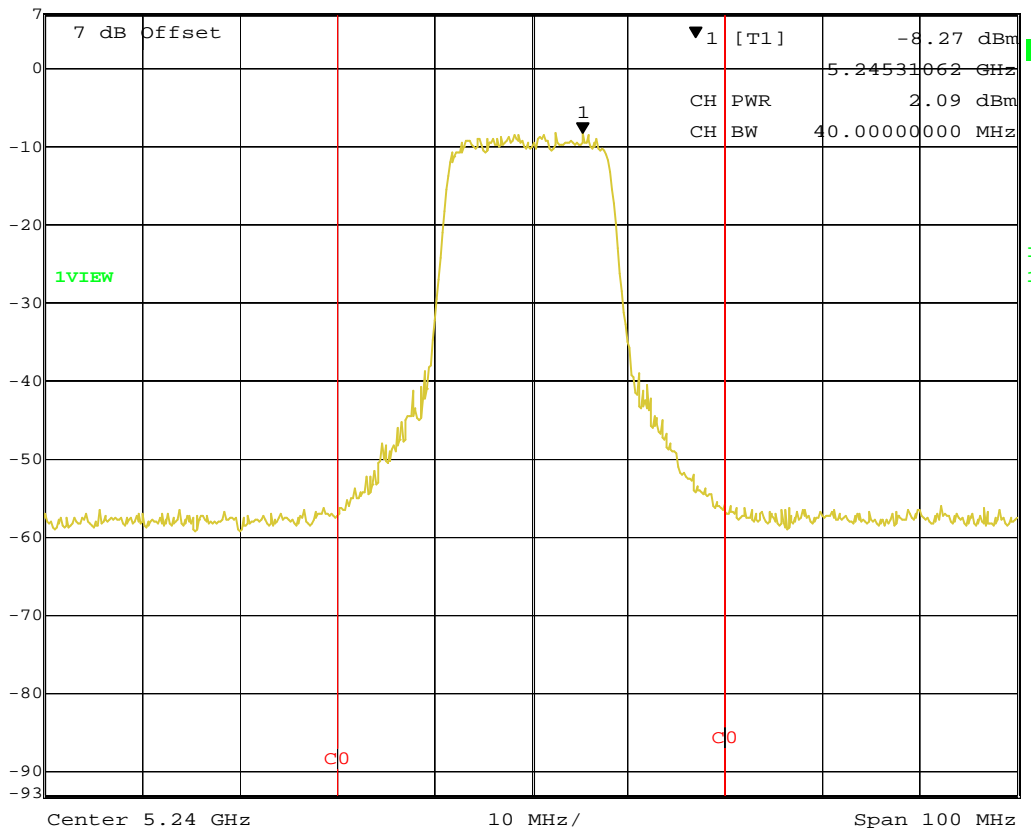
Channel Power, PSD, 5180 MHz (Power Setting 6)


 Marker 1 [T1] RBW 1 MHz RF Att 30 dB
 Ref Lvl -8.07 dBm VBW 3 MHz
 7 dBm 5.22350701 GHz SWT 5 ms Unit dBm



Channel
 Power, PSD,
 5220 MHz
 (Power Setting
 6)


 Marker 1 [T1] RBW 1 MHz RF Att 30 dB
 Ref Lvl -8.27 dBm VBW 3 MHz
 7 dBm 5.24531062 GHz SWT 5 ms Unit dBm



Channel
 Power, PSD,
 5240 MHz
 (Power Setting
 6)

5 GHz Peak Excursion

Specification

FCC Specification: Paragraph 15.407(a)(5)

Procedure:

The test setup was configured as shown in the conducted test setup. The UUT was configured to continuously (100%) transmit random data. Using MAX HOLD and peak search, the frequency with the maximum power was determined.

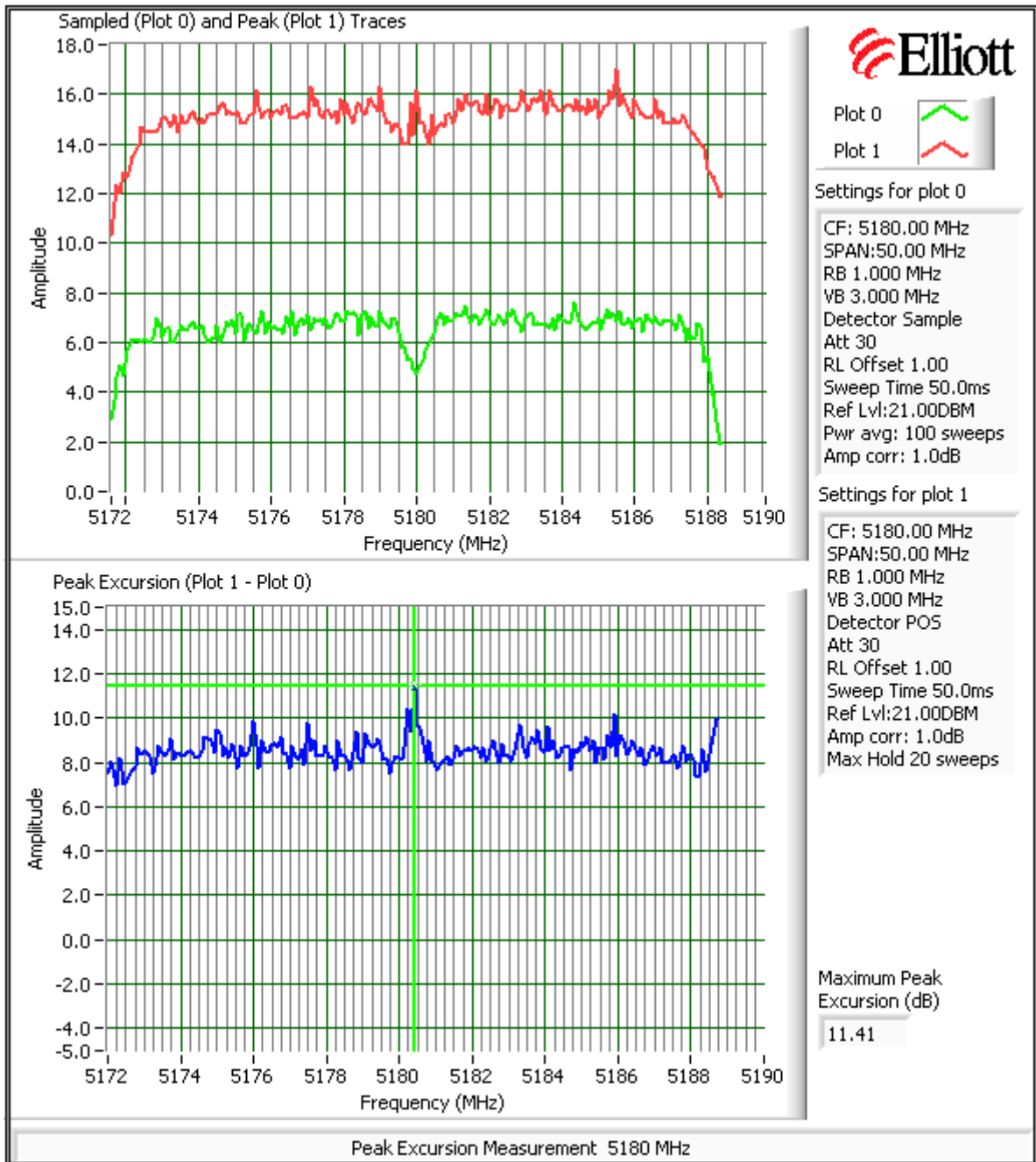
The measurements were made using RBW = 1MHz, VBW = 3MHz, sample detector and power averaging and peak detector and averaging. The difference between the two sets of data is them plotted and the maximum difference between the data sets is recorded.]

This measurement is made at the highest power level. Though the AP will use lower power levels in the normal operation, this would have little / no effect pn the peak excursion.

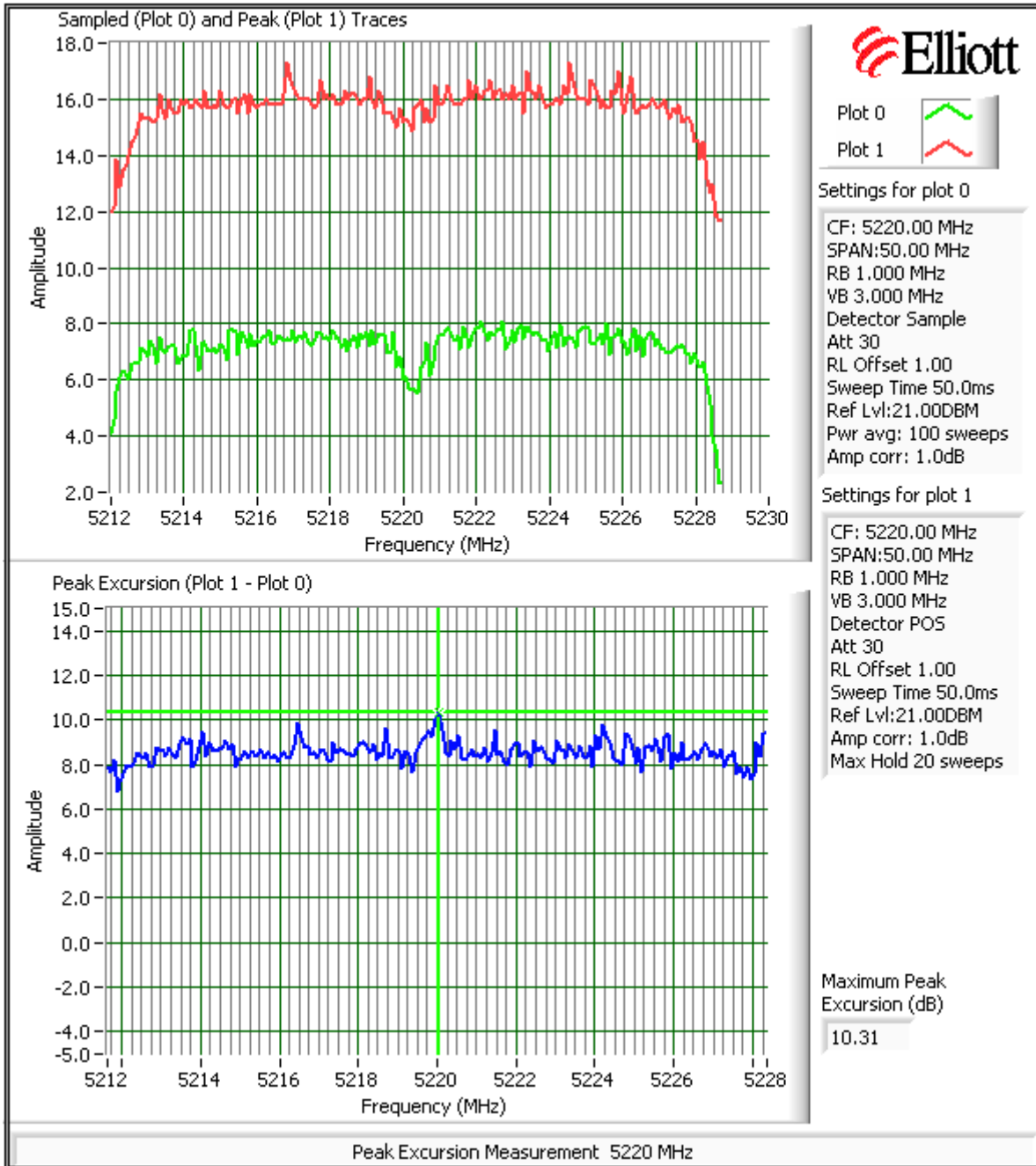
Results:

Freq (MHz)	Power Setting	Pk Excursion (dB)	FCC Limit (dB)	Pk Exc Spec Delta (dB)
5180	Low	11.41	13	1.59
5220	Low	10.31	13	2.69
5240	Low	10.74	13	2.26

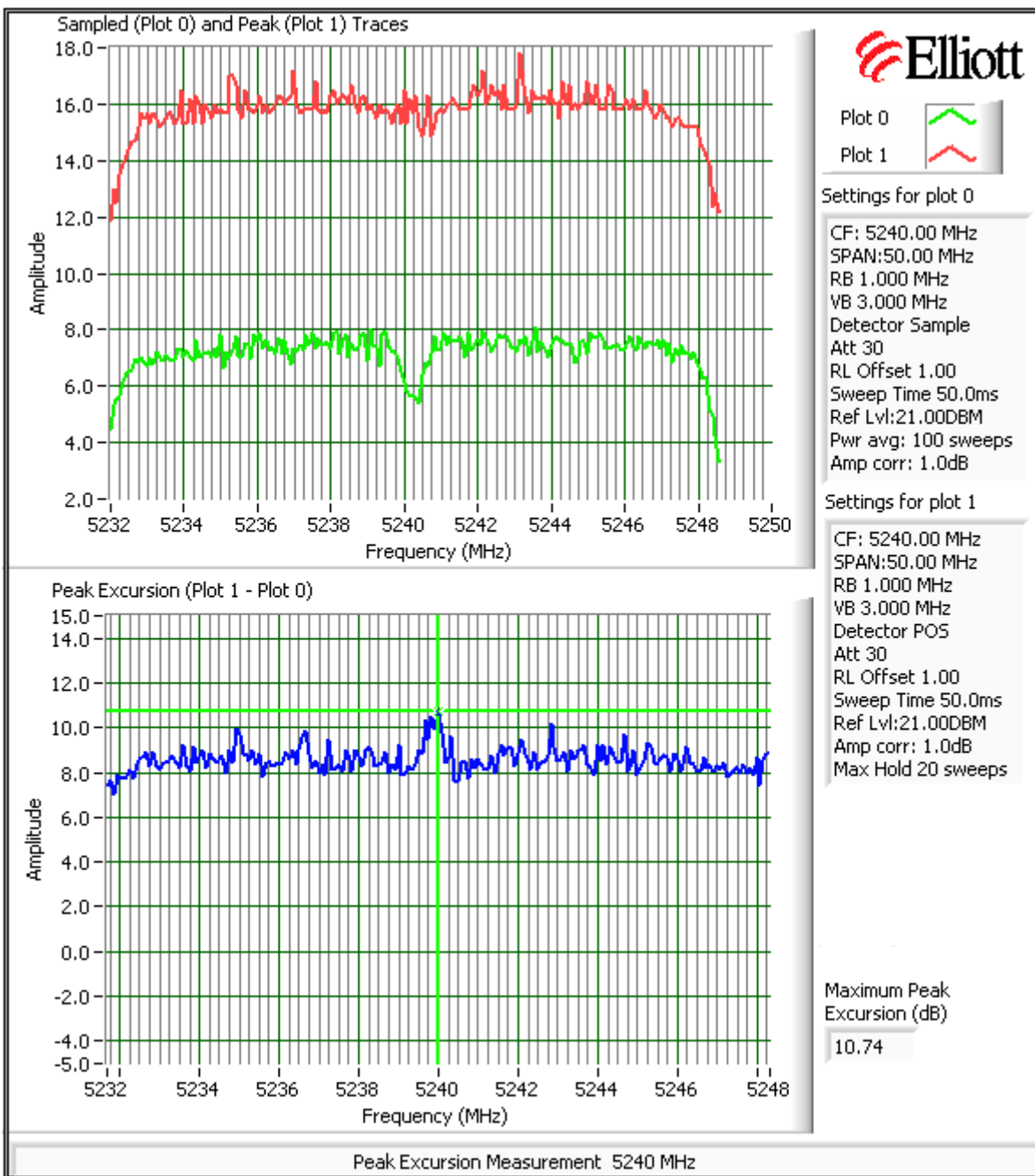
Pk Excursion, Power Setting 21, 5180 MHz



Pk Excursion, Power Setting 21, 5220 MHz



Pk Excursion, Power Setting 21, 5240 MHz



26 dB bandwidth

Specification

FCC Specification: Paragraph 15.407(a)

IC Specification: 210 / 7 Sec 8.2(a)

Procedure

The access point operates on the standard IEEE 802.11 'A' channels. The 26dB bandwidth was measured on the low middle and high channel of the 5 GHz UNII band (5.15 - 5.25 GHz) using the conducted RF test setup.

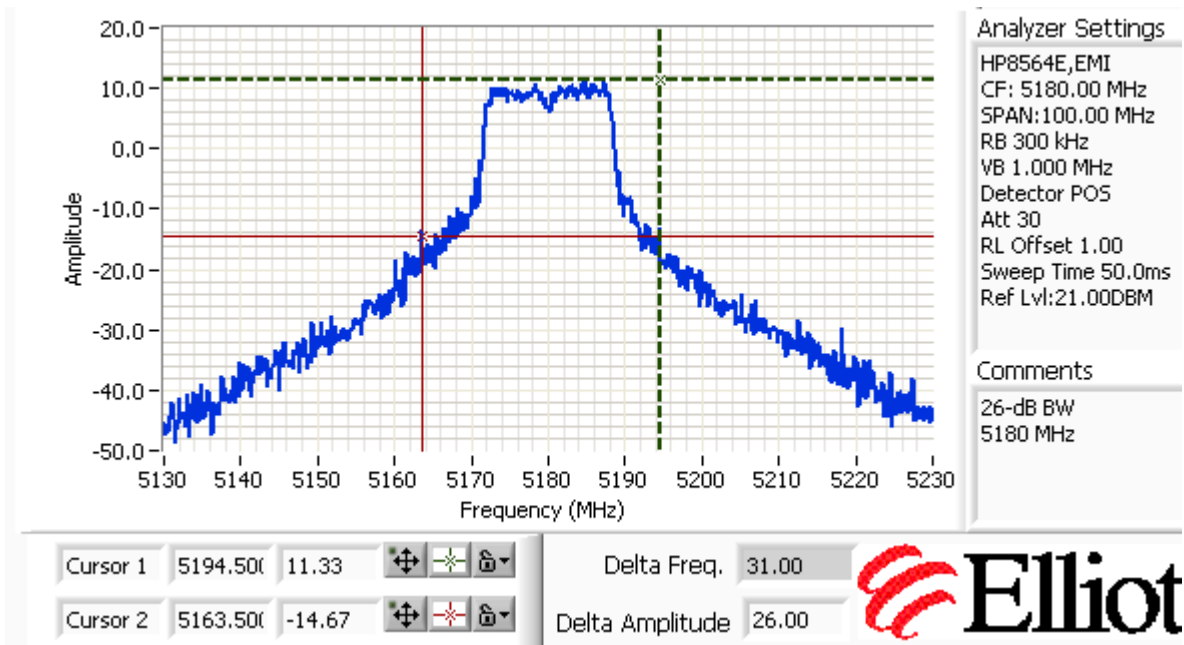
Once the trace had stabilized, the BW function of the analyzer was used to determine the 26 dB BW; RBW was 300kHz and VBW was set to 1MHz.

26 dB bandwidth Summary Results

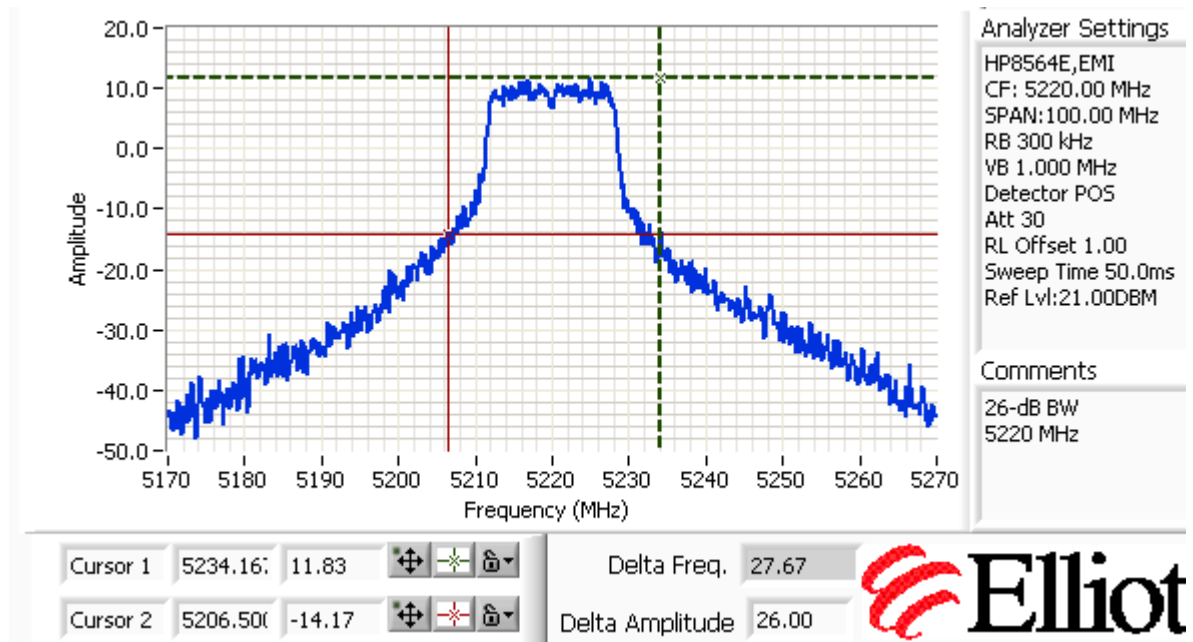
Freq (MHz)	802.11 A BW, 26 dB	Spec, Min (MHz)	Delta
5180	31	0.5	30.5
5220	27.67	0.5	27.17
5240	28.5	0.5	28

26 dB Bandwidth Plots

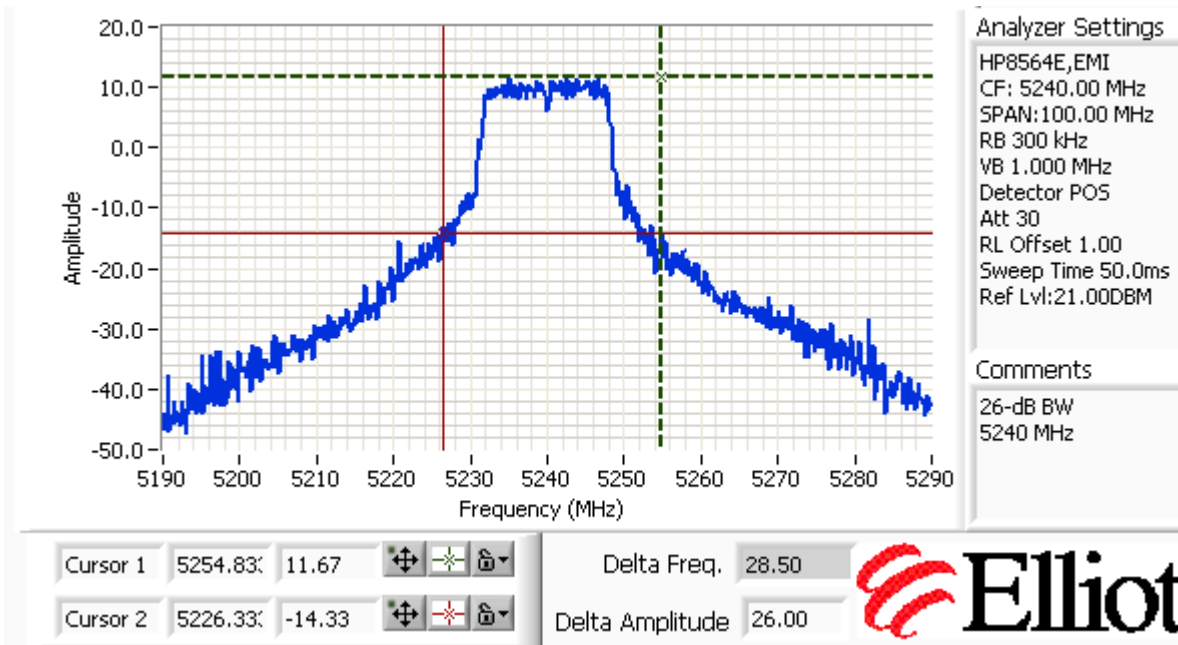
5180MHz 26dB BW



5220MHz 26dB BW



5240MHz 26dB BW



5.25 GHz Bandedge

Specification

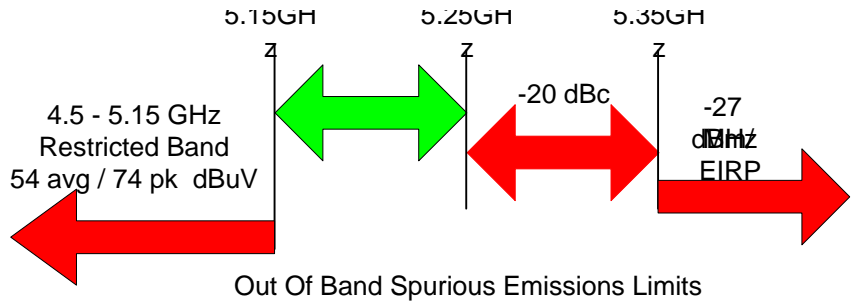
FCC Specifications: Paragraphs 15.407(b)(3)

Procedure:

The UUT was configured to transmit continuous random data on the standard channel (5180 MHz) closest to the band edge being examined. The UUT was configured to the maximum power setting.

FCC policy is that the level for the emission at the 5.25 GHz band edge must be at least 20 dB below the level of the modulated carrier. in 1 MHz RBW.

The plot below was intended to show the out of band emission level at 5.35 GHz, but has been edited to indicate the level at 5.25 GHz. The plot was made with the power setting set to maximum with the highest gain antenna used with the device, as such, it presents the worst case scenario for emissions at the 5.25 GHz band edge.

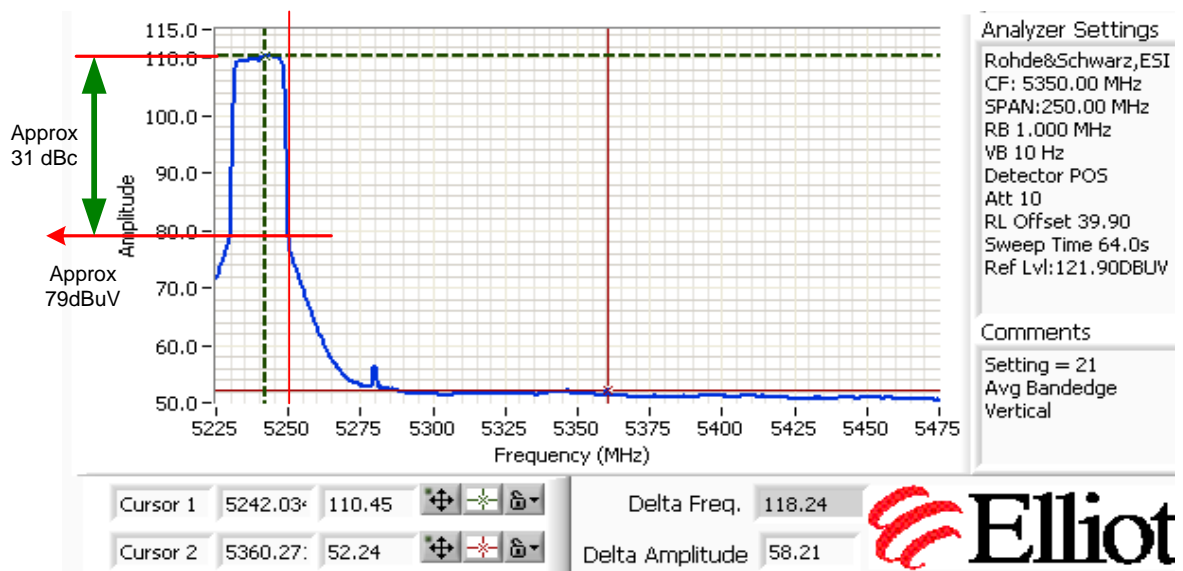


5.15 - 5.25 GHz Bandedge Results:

The measurement was made with RBW = 1MHz, VBW = 10Hz, maximum power setting and the highest gain antenna.

The plot below show approximately -31 dBc At the 5.25 Band Edge.

NOTE: If the power setting or the antenna gain had been lower, as it is under normal operation, the emission level at the band edge would be lower than shown below



Radiated Emissions in Restricted Bands / Out of Band Emissions

Specification:

FCC Specification: Paragraph 15.407(b)(1), 15.407(b)(2), 15.407(b)(3), 15.407(b)(6)
 IC Specification: RSS210 Issue 7, 2.2(6)

Procedure:

This test was conducted in a 5-meter semi anechoic chamber at Elliott Laboratories. The unit was placed on a rotating wooden table 80cm above the ground plane. A Horn antenna(s) were secured to a mast 3 meters away. The unit was tested at a low, mid and high channel within the 5.15-5.35GHz bands. The UUT was configured to transmit random data. The transmit power was set to the settings outlined in the power setting table in this report. The test equipment was configured as shown below.

The band from 1 to 40 GHz was scanned (40 GHz is the limit of the available test equipment). A high pass filter prior to the pre-amplifier was required to prevent the signal level of the fundamental frequency from overloading the front end of the spectrum analyzer and creating harmonics within the analyzer.

The EUT was rotated 360 degrees and the height of the antenna adjusted from 1 to 4 meters above the ground plane to determine the maximum level of the emission. The level of the harmonic emission was measured in two modes, "Peak" and "Average".

The maximum spectrum analyzer reading was captured by the automated test software where correction factors (antenna factor, cable loss, pre-amplifier gain, HPF loss...) were then applied to obtain a final corrected measurement.

Fund	2	3	4	5	6	7	8	9	10
5180	10360	15540	20720	25900	31080	36260	41440	46620	51800
5220	10440	15660	20880	26100	31320	36540	41760	46980	52200
5240	10480	15720	20960	26200	31440	36680	41920	47160	52400

15.407(b)(6) Harmonic test table

NOTE: RED indicates a harmonic that falls within a restricted band, the harmonics in green are NOT in restricted bands.

For emissions falling in the restricted bands detailed in 15.205 the general limits of 15.209 apply. For all other emissions, the limit is EIRP < -27dBm/MHz (equivalent to a field strength at 3m of 68.3 dBuV/m).

Emission is within a restricted band

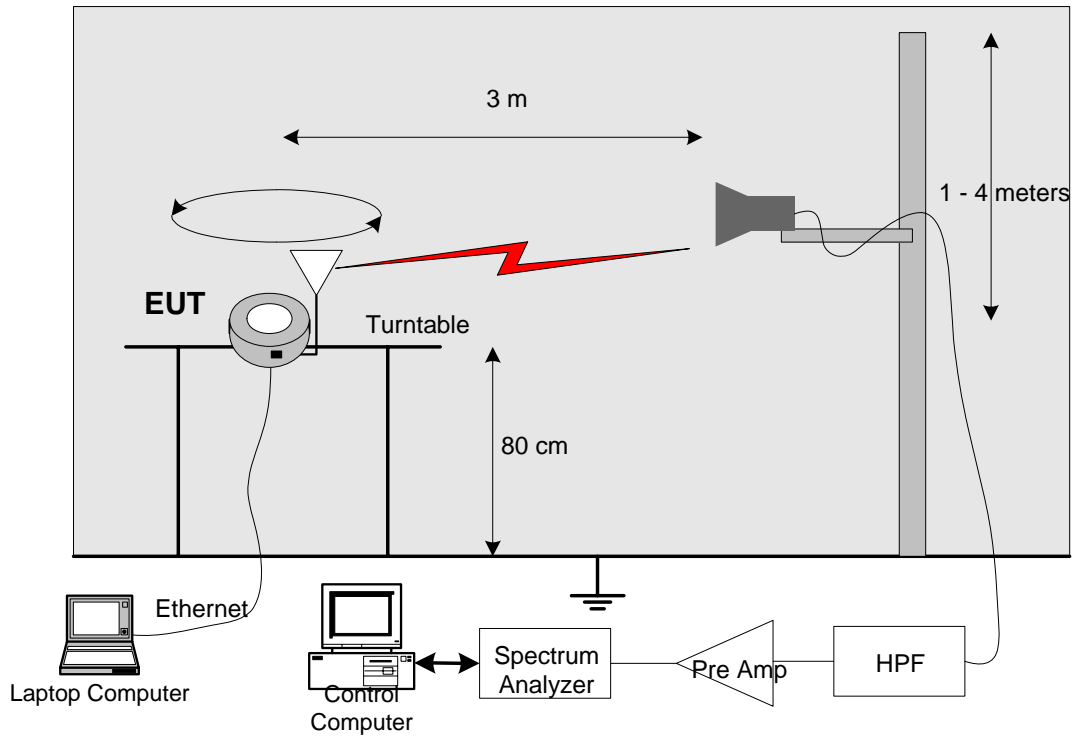
Peak measurements: Resolution and Video BW: 1 MHz, 74 dBuV Limit
 Average Measurements: Resolution BW: 1MHz and Video BW: 10 Hz, 54 dBuV Limit
 Peak measurements: 74 dBuV Limit
 Average Measurements: 54 dBuV Limit

Emission is NOT within a restricted band.

Measurement settings: Resolution BW = 1MHz and VBW = 3MHz.
 Video averaging on (100 samples).
 Limit: -27 dBm / MHz EIRP, adjusted to 3M field strength: 68.3 dBuV

In some cases, for simplicity, the more stringent restricted band limit is applied to some emissions that in fact do not fall within a restricted band.

Radiated Emissions in Restricted Bands Test Setup

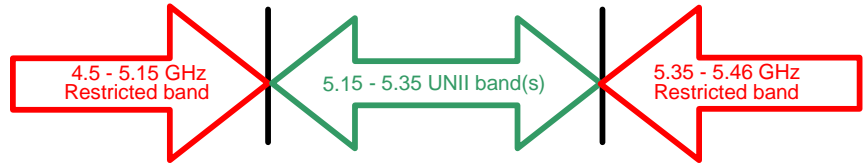


Support Equipment				
<u>Description</u>	<u>Model number</u>	<u>FCC ID or SN</u>	<u>Manufacturer</u>	<u>Power Cable</u>
Laptop	Satellite	DOC	Toshiba	Laptop PS
Ethernet Switch	2350	DoC	Nortel	48 VDC Adapter below
48VDC AC adapter	Generic		Generic	CAT 5 Ethernet cable

Test Conditions			
Temperature	21 C	Humidity:	62%
ATM pressure	1030 mBar	Grounding:	None
Tested By	R Veralas, J Martinez, Elliott Labs	Date of Test:	May / June 2007
Test Reference	FCC Part 15.205 IC Paragraph RSS210, issue 7, sec 2.2(1)		
Setup Method	ANSI C63.4 / 2003		
Tested Range	1 GHz to 40 GHz		
Test Voltage	48 VDC		
Modifications	No modifications were made to the unit		

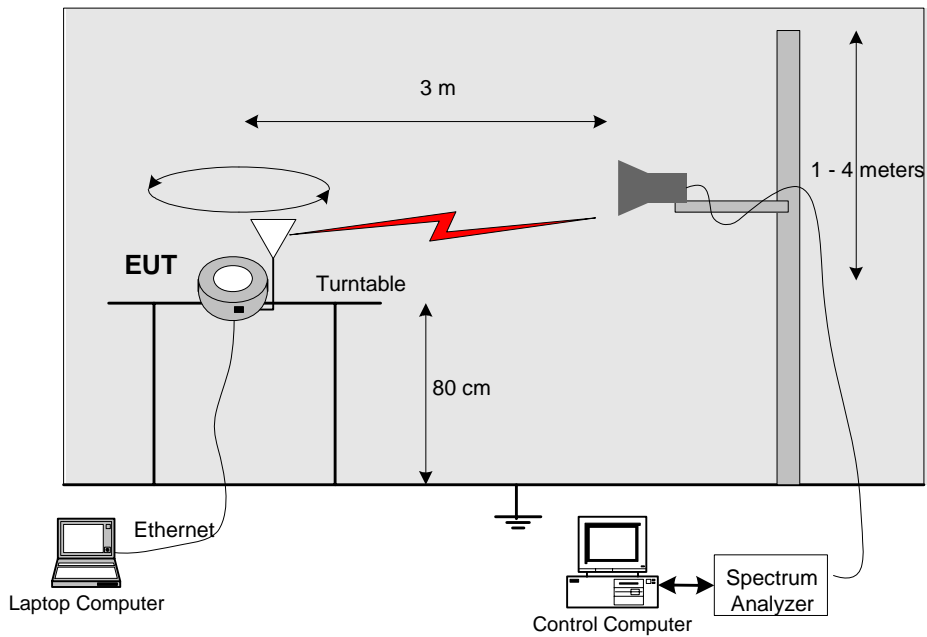
Radiated emissions at the band edges

The analyzer was set to examine the restricted band at the edges of the 5.15 – 5.25GHz UNII band.



The measurement was made at the band edges for the restricted bands just below 5150MHz. The level for the emission within the restricted band was measured for each of the different types of antennas used with the device.

The test setup is shown below and is the same as the basic setup with the exception that the filter and preamp are removed.

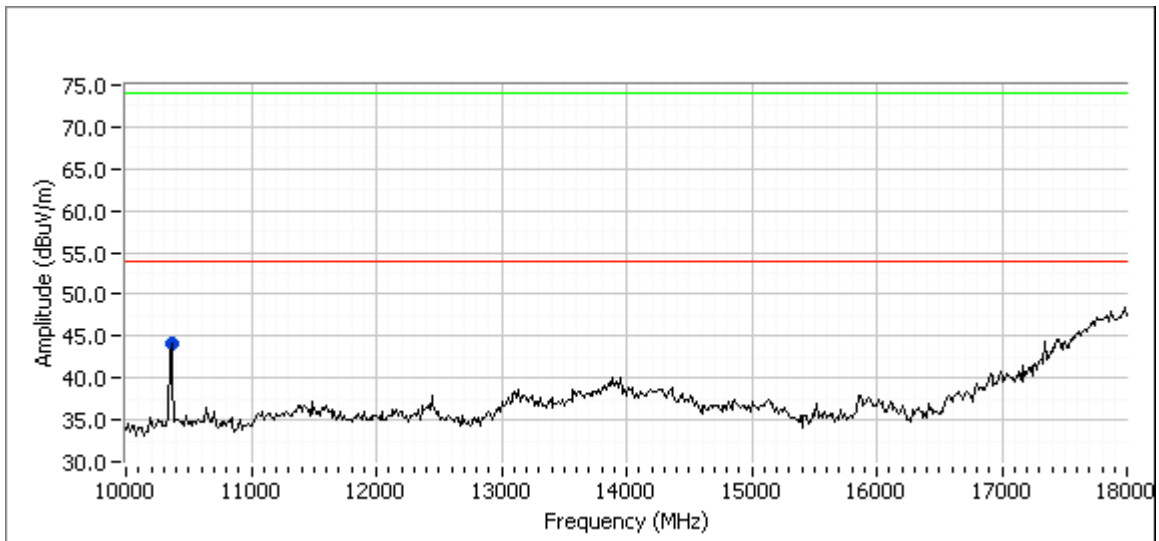
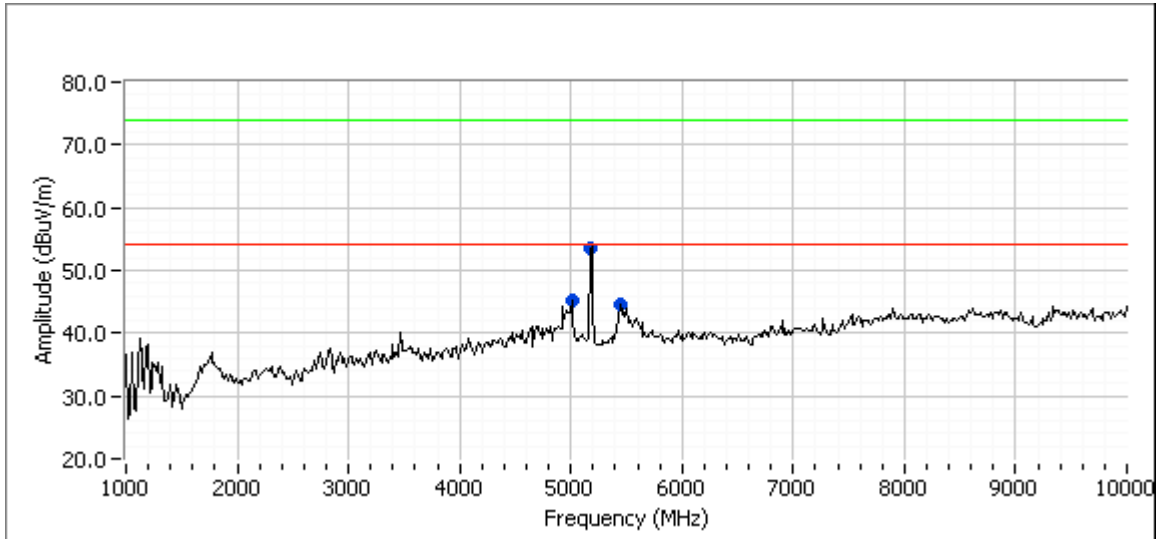


Radiated Emissions in Restricted Bands Test Results

There were some emissions detected during the test. The results are below. In cases where the emission was not within a restricted band the Out Of Band Emission limit is applied. The band up to 40 GHz was examined however, no emissions above approximately the third harmonic (16 GHz) were detected.

Note: In several cases PSD is the limiting factor determining the RF Transmit power, not harmonic performance, for some antennas. In many cases the unit was tested at a power setting of 21 when in reality, it will be operated at a much lower power level setting, thus the results presented below are much higher than those encountered under normal operation. At the time of radiated emissions testing, it was not known that the power setting would have to be lowered for PSD compliance.

Restricted Band Emissions, UUT Transmitting on 5180 MHz, S4901790 PANEL Antenna
Power Setting 21,
See note above

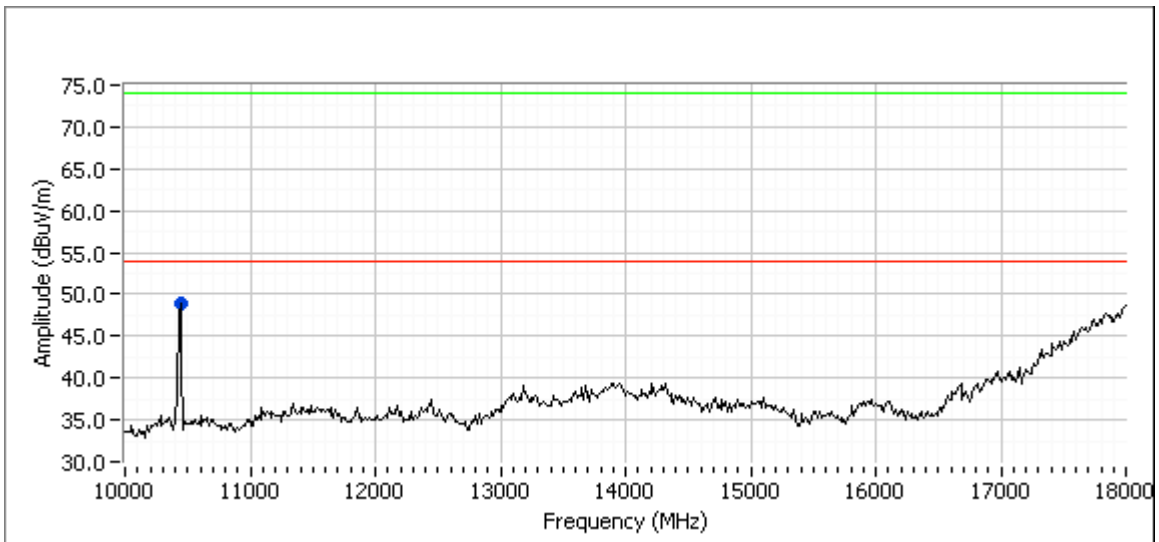
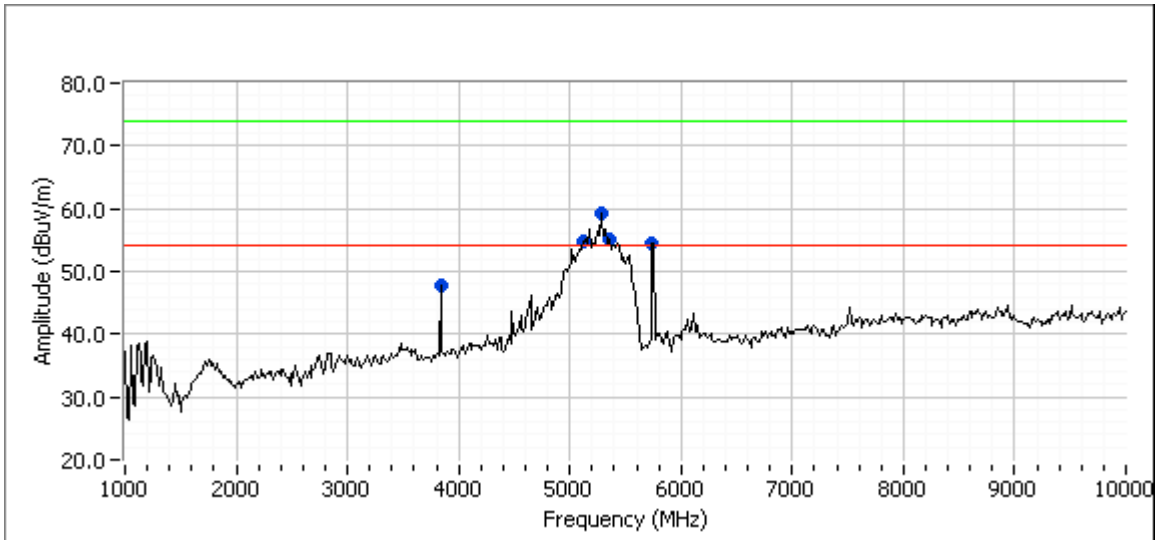


Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5005.000	45.2	V	54.0	-8.8	Peak	187	1.3	
5170.000	53.5	V	-	-	Peak	196	1.3	Fundamental
5440.000	44.5	V	54.0	-9.5	Peak	187	1.3	
10360.00	44.2	V	54.0	-9.8	Peak	273	1.0	

Restricted Band Emissions, UUT Transmitting on 5220 MHz, S4901790 PANEL Antenna

Power level 21

See Note Above

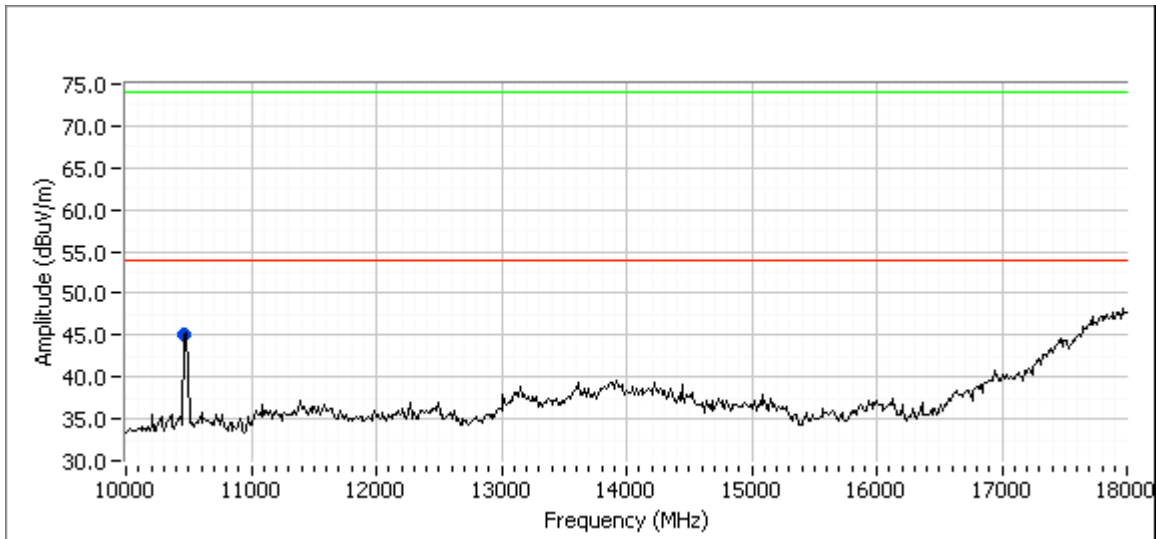
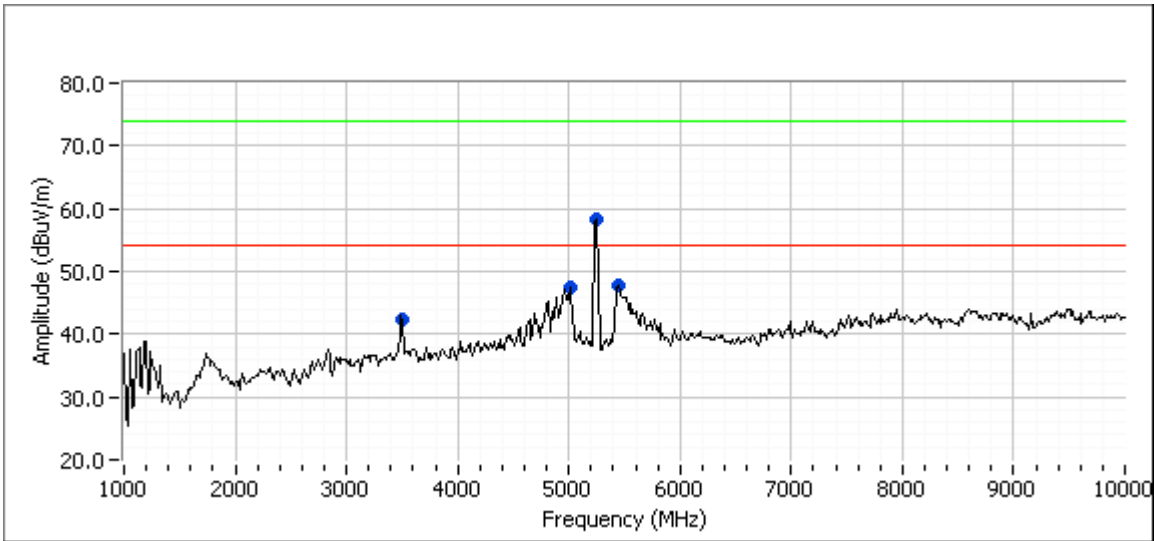


Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
3490.000	46.9	V	54.0	-7.1	Peak	198	1.3	
5005.000	48.9	V	54.0	-5.1	Peak	181	1.3	
5220.000	54.4	H	-	-	Peak	205	1.0	Fundamental
5440.000	48.3	V	54.0	-5.7	Peak	181	1.3	
10440.00	49.0	V	54.0	-5.0	Peak	280	1.0	

Restricted Band Emissions, UUT Transmitting on 5240 MHz, S4901790 PANEL Antenna

Power setting 21

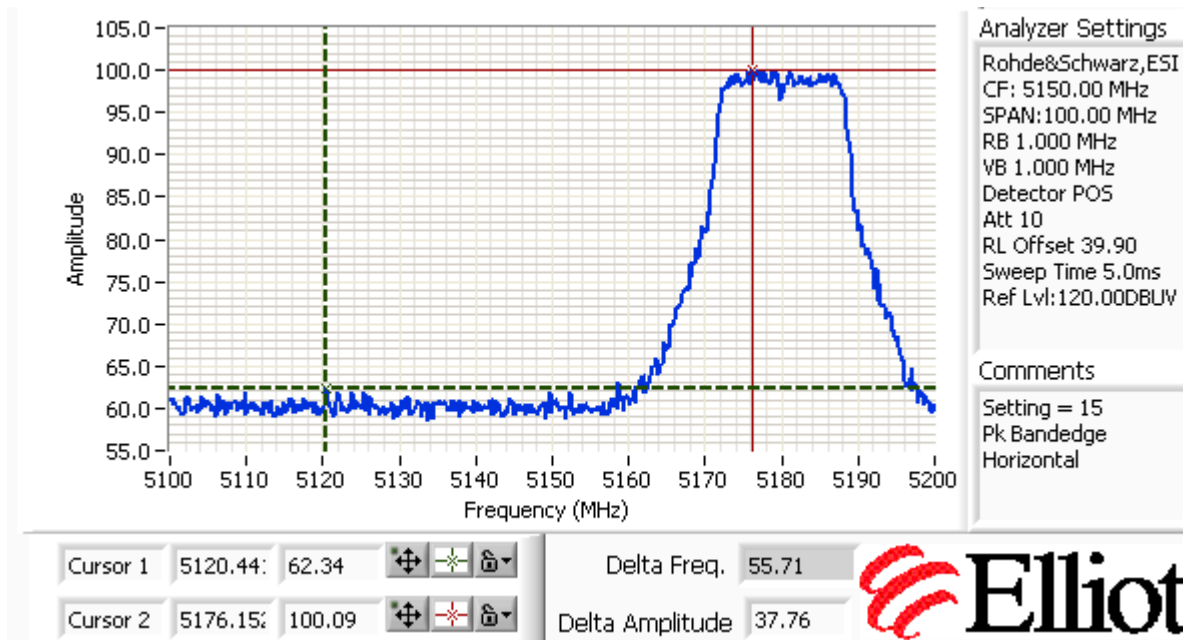
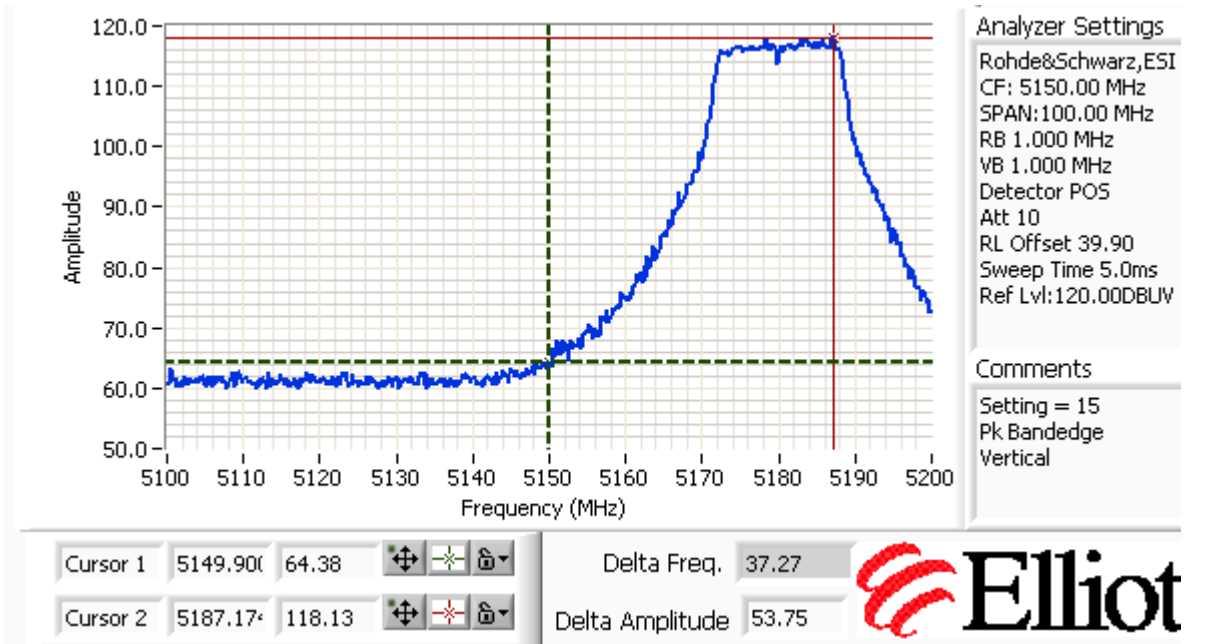
See Note Above

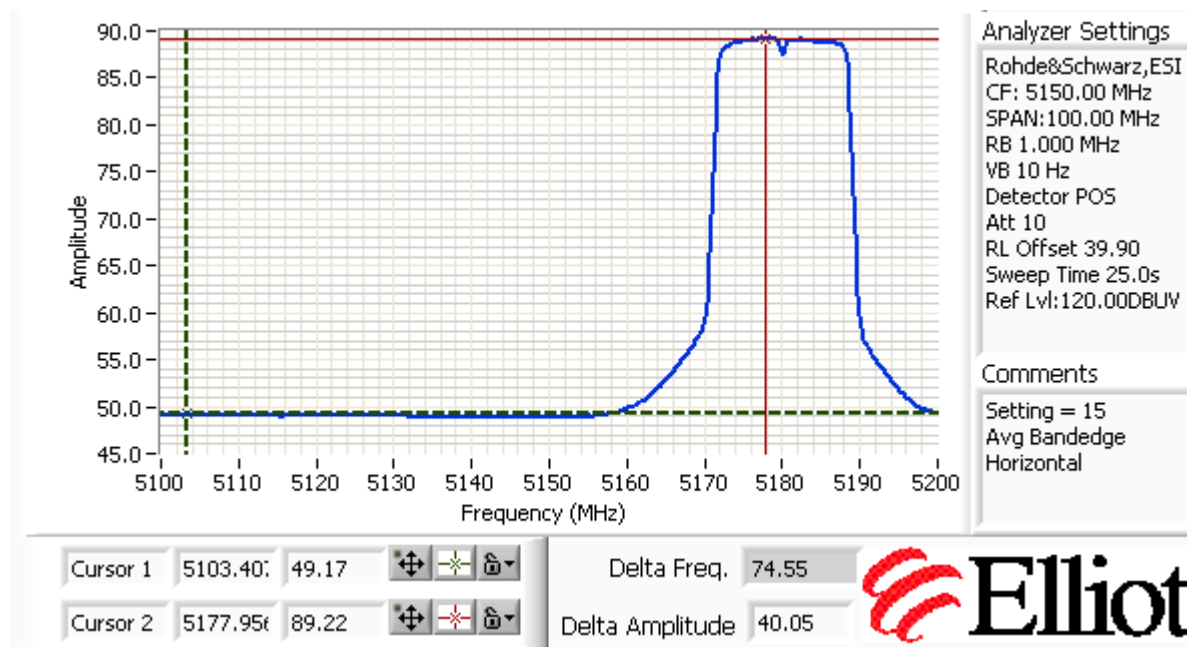
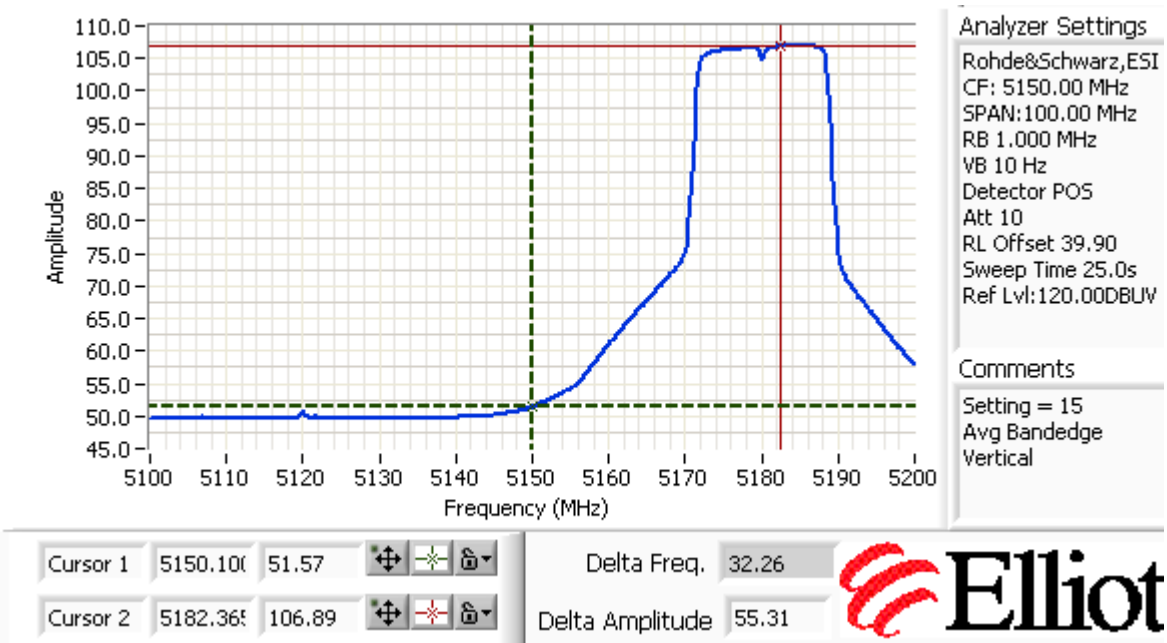


Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5245.000	58.2	V	-	-	Peak	209	1.9	Fundamental
3505.000	42.3	V	54.0	-11.7	Peak	222	1.0	
5005.000	47.6	V	54.0	-6.4	Peak	180	1.3	
5440.000	47.8	V	54.0	-6.2	Peak	188	1.3	
10466.67	45.1	V	54.0	-8.9	Peak	282	1.3	

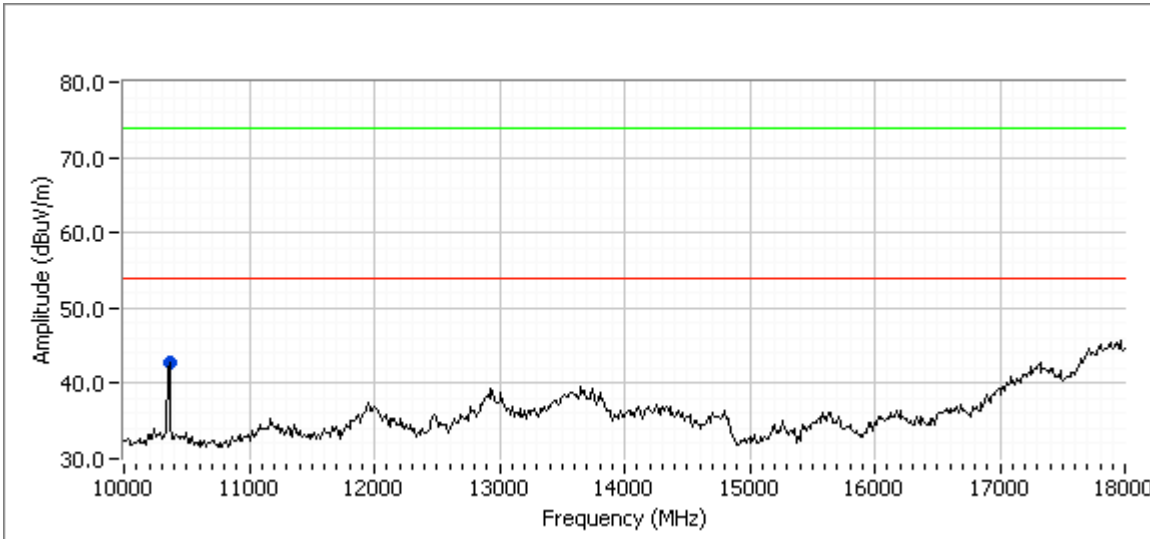
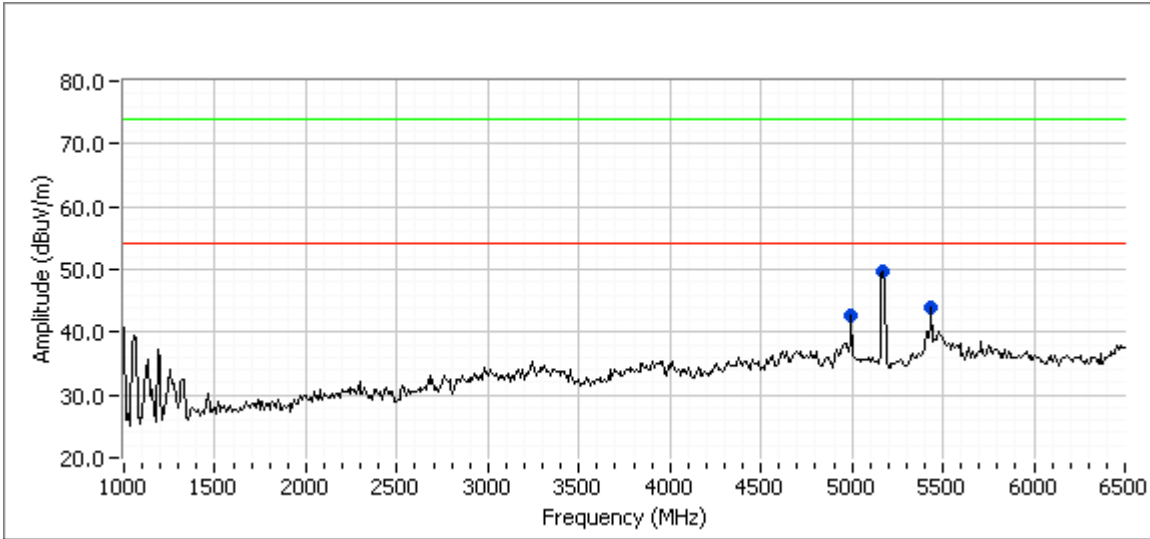
Restricted Band Emissions, UUT Transmitting on 5180 MHz, S4901790 PANEL Antenna - Band Edge Emissions at 5150 MHz

Band Edge	Vertical, Avg, dBuV/m	Vertical, Peak, dBuV/m	Horz Avg, dBuV/m	Horz Peak, dBuV/m
5150 MHz	51.57	64.38	49.17	62.34





Restricted Band Emissions, UUT Transmitting on 5180 MHz, S5153 DIPOLE Antenna
 Power setting 21
 See Note Above

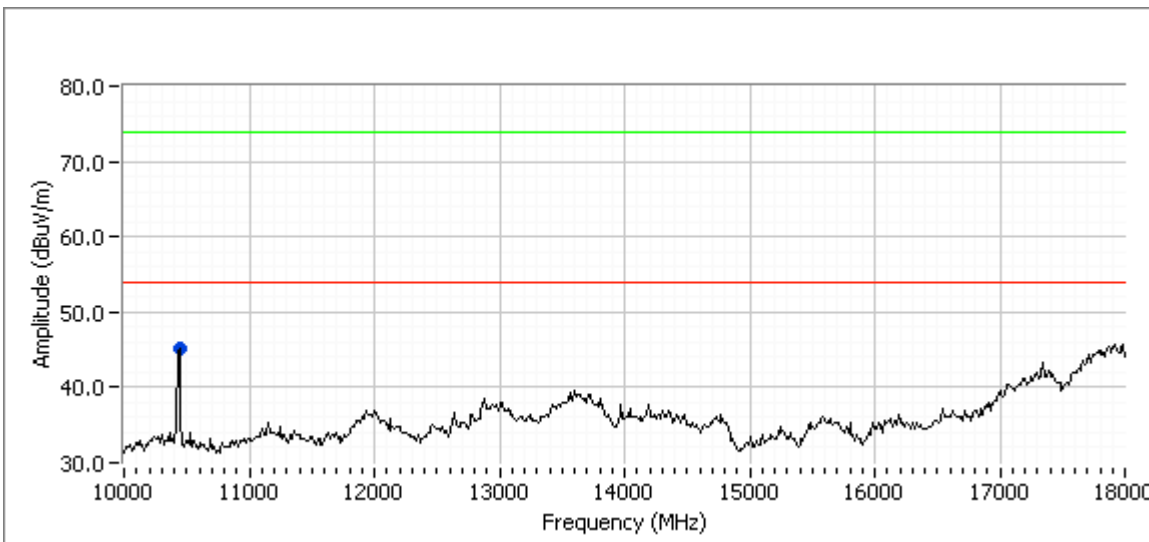
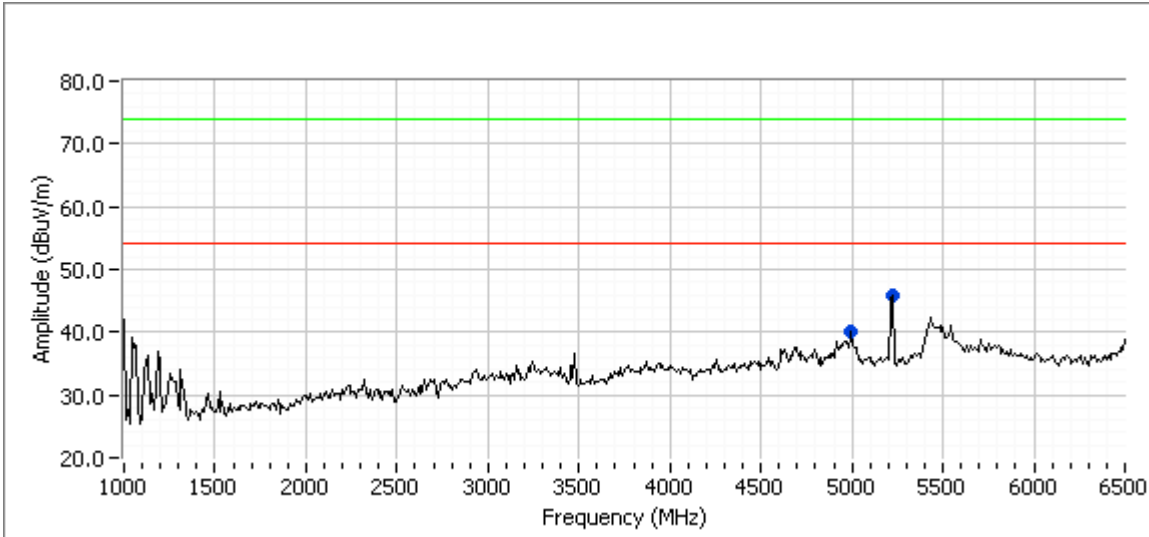


Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4996.670	42.8	V	54.0	-11.2	Peak	146	1.0	
5436.670	43.8	V	54.0	-10.2	Peak	146	1.0	
5180.000	49.6	V	-	-	Peak	44	1.3	Fundamental
10360.00	42.8	V	54.0	-11.2	Peak	125	1.0	

Restricted Band Emissions, UUT Transmitting on 5220 MHz, S5153 DIPOLE Antenna

Power setting 21

See Note Above

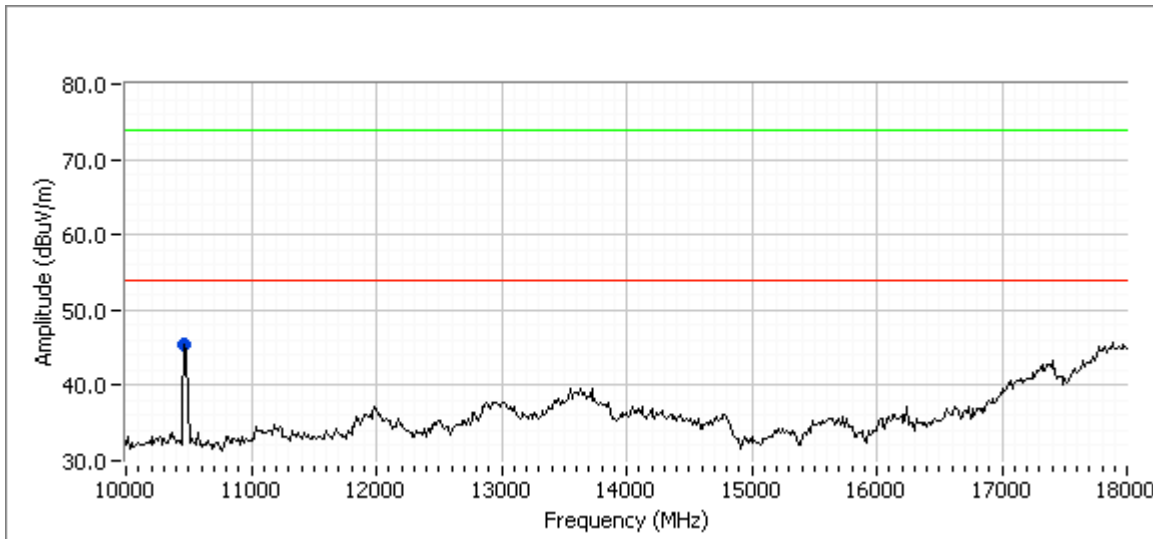
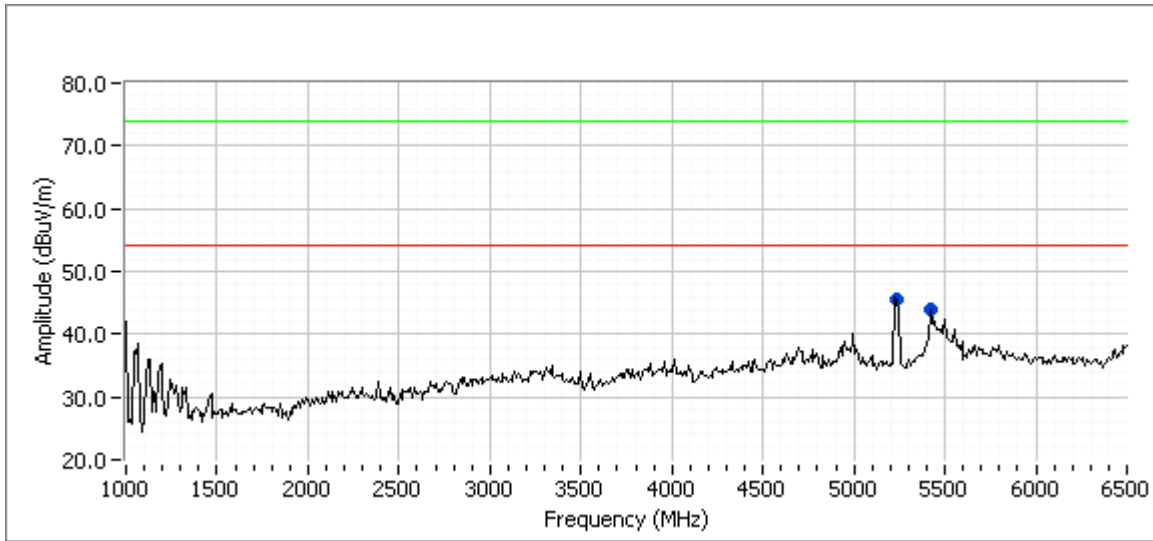


Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4996.670	40.1	V	54.0	-13.9	Peak	32	1.0	
5220.000	45.9	V	-	-	Peak	162	1.0	Fundamental
10440.00	45.1	H	54.0	-8.9	Peak	104	1.0	

Restricted Band Emissions, UUT Transmitting on 5240 MHz, S5153 DIPOLE Antenna

Power setting 21

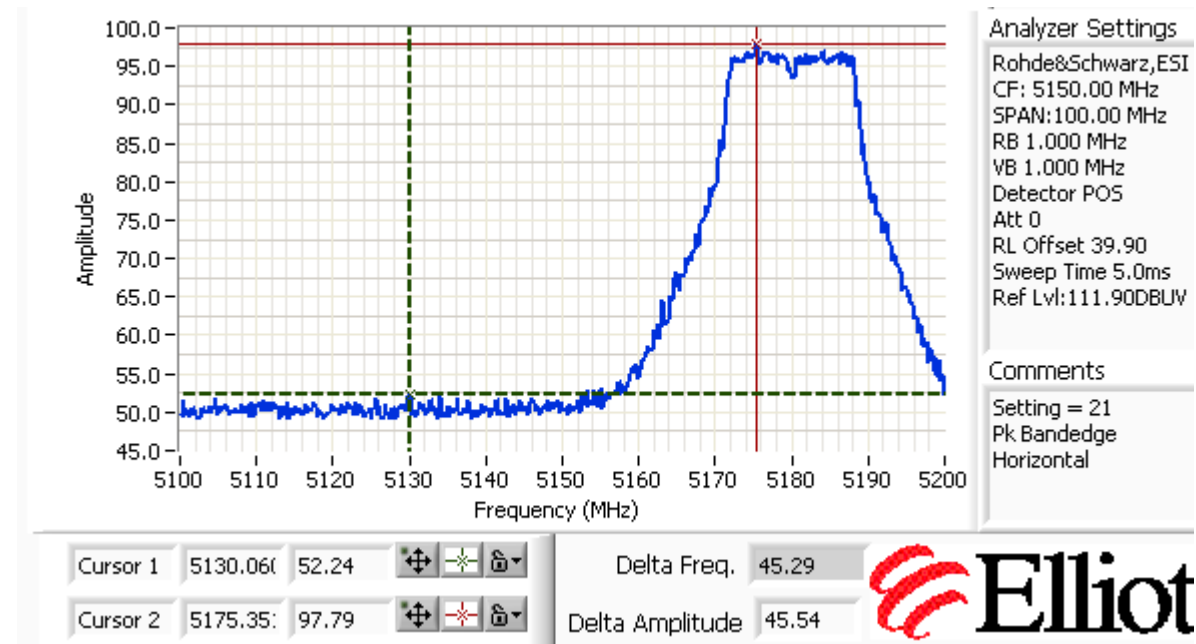
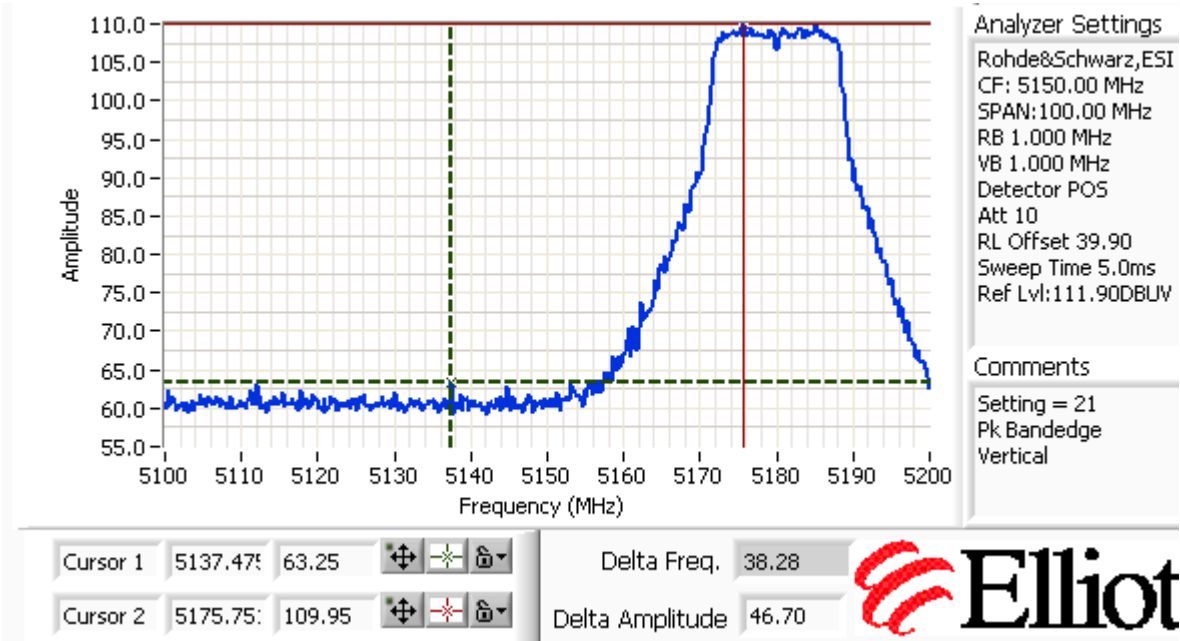
See Note Above

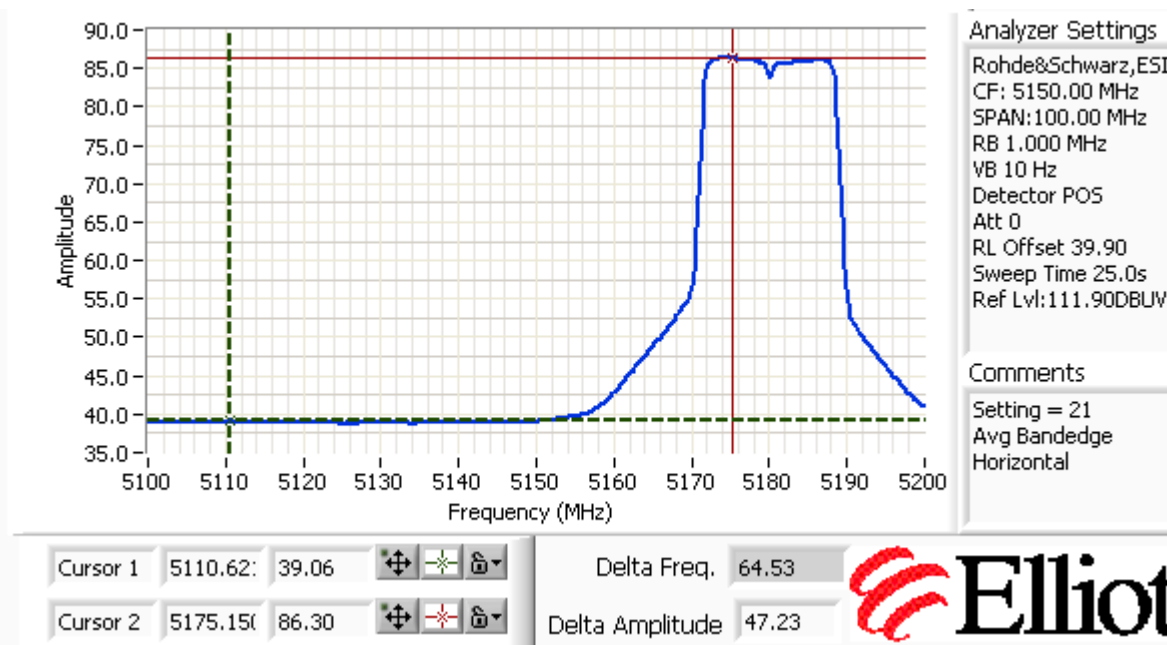
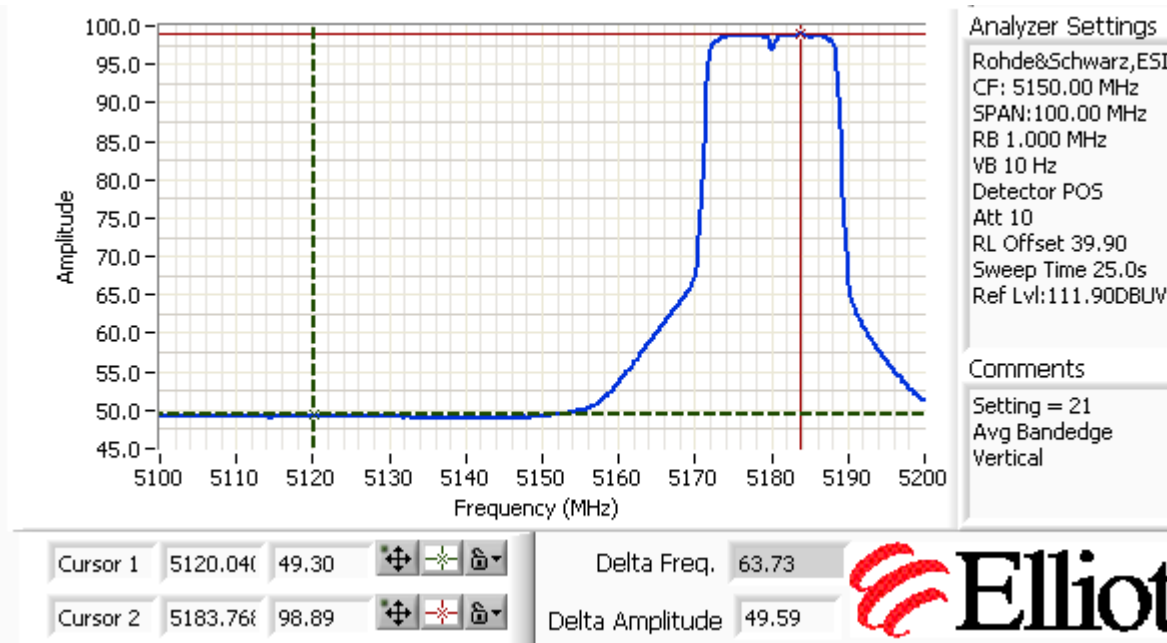


Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
10466.67	45.3	H	54.0	-8.7	Peak	105	1.0	
5240.00	45.6	V	54.0	-	-	147	1.6	Fundamental
5418.33	43.8	V	54.0	-10.2	Peak	54	1.0	

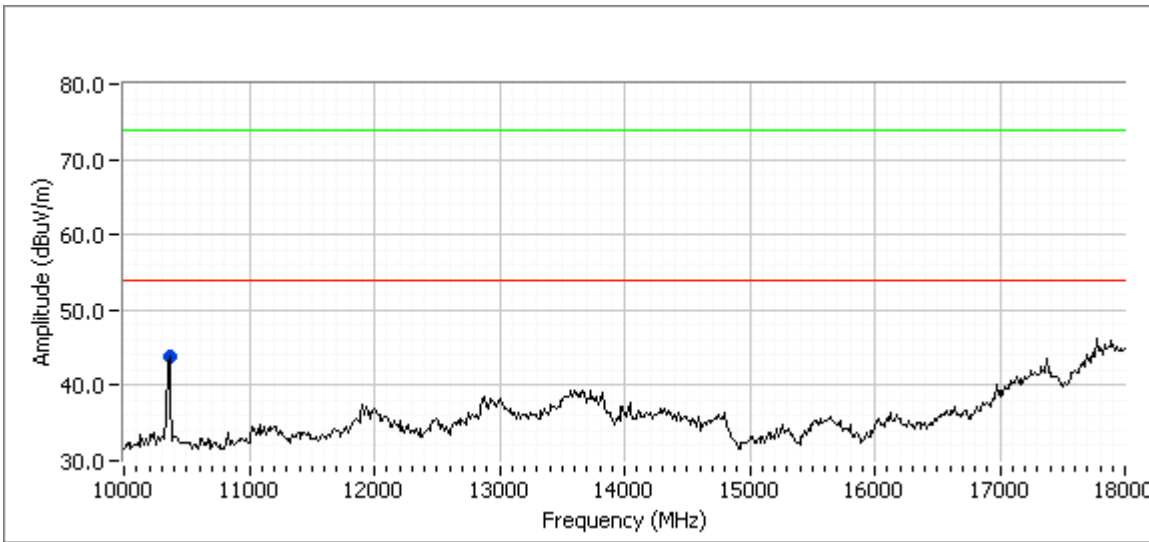
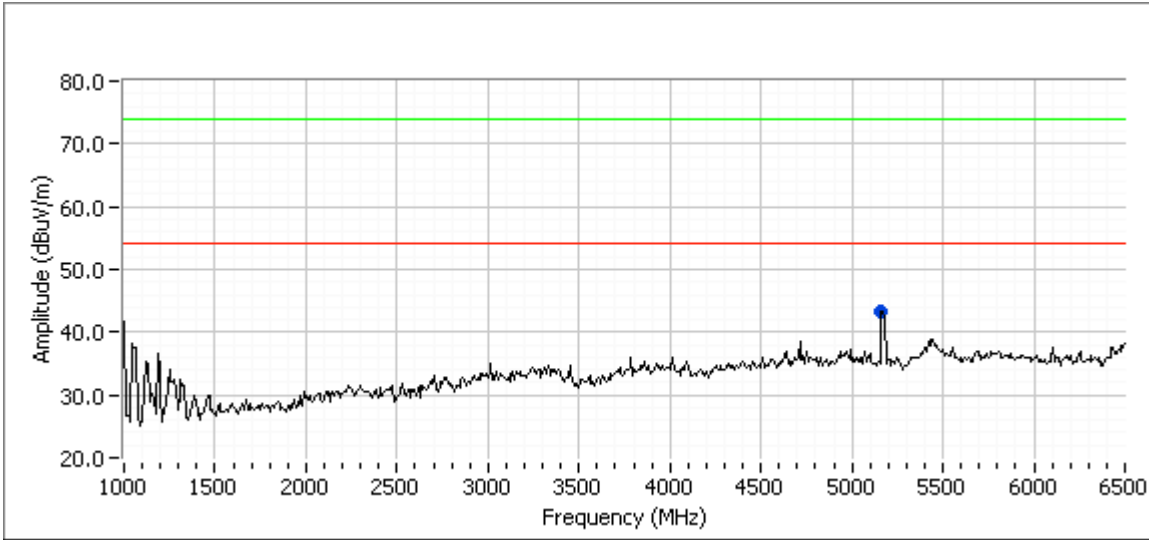
**Restricted Band Emissions, UUT Transmitting on 5180 MHz, S5153 DIPOLE Antenna
Band Edge Emissions at 5150 MHz**

Band Edge	Vertical, Avg, dBuV/m	Vertical, Peak, dBuV/m	Horz Avg, dBuV/m	Horz Peak, dBuV/m
5150 MHz	49.3	63.25	39.06	52.24



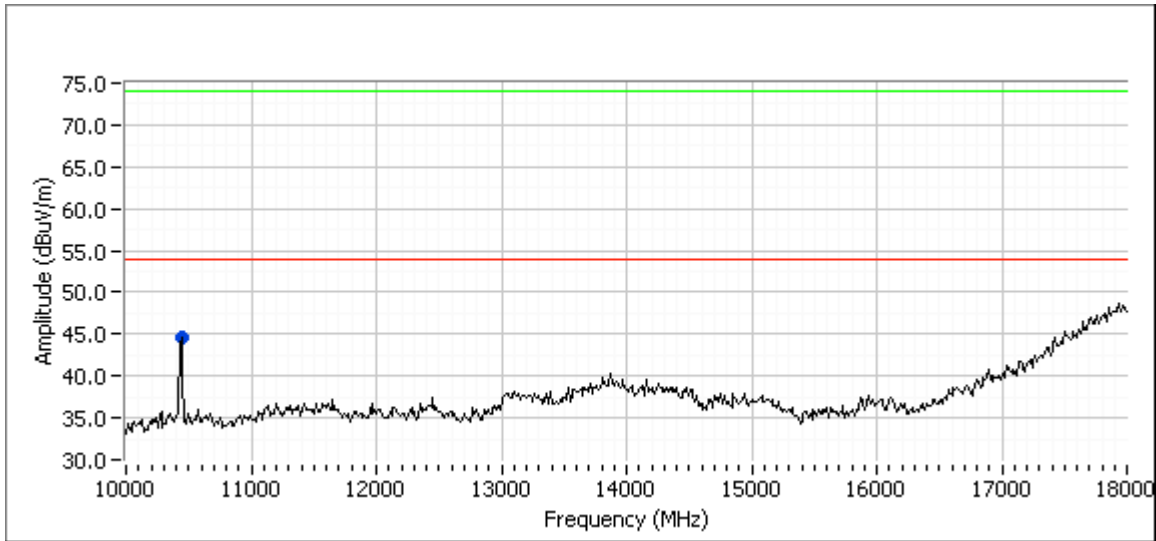
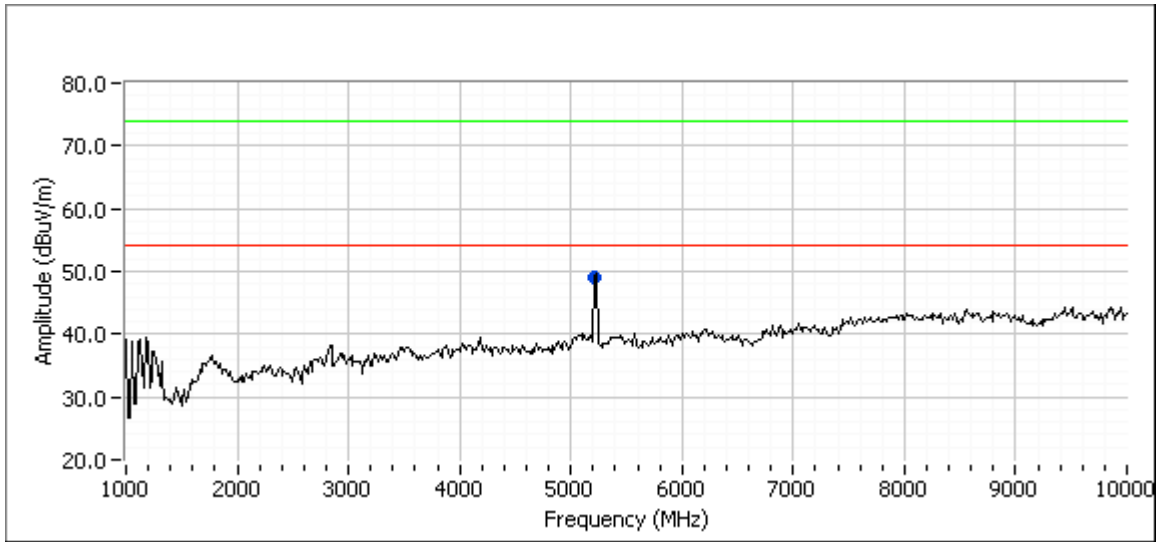


Restricted Band Emissions, UUT Transmitting on 5180 MHz, SQ5153 MONOPOLE Antenna
Power setting 21



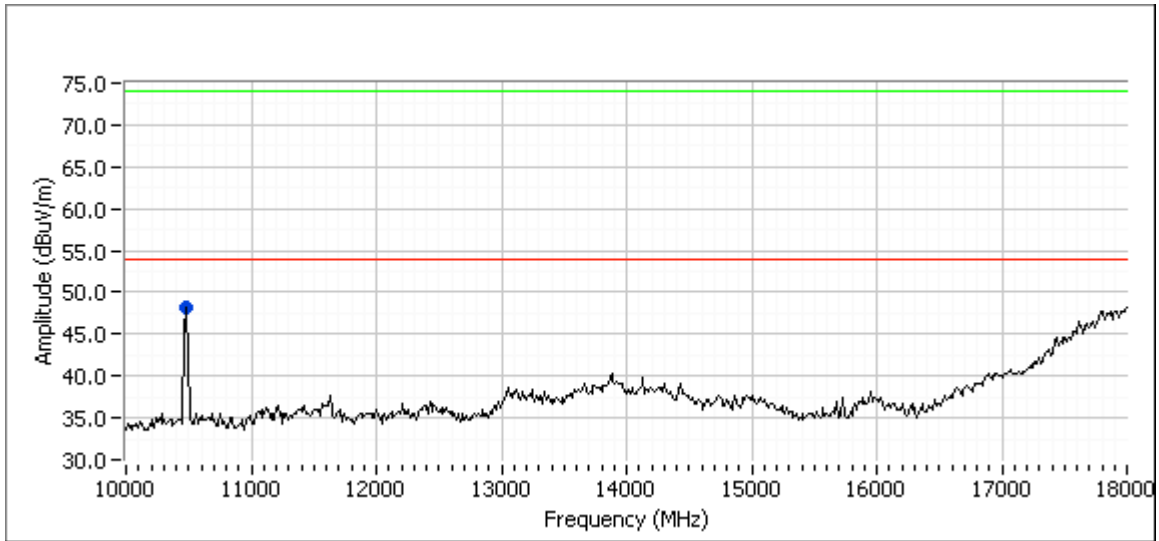
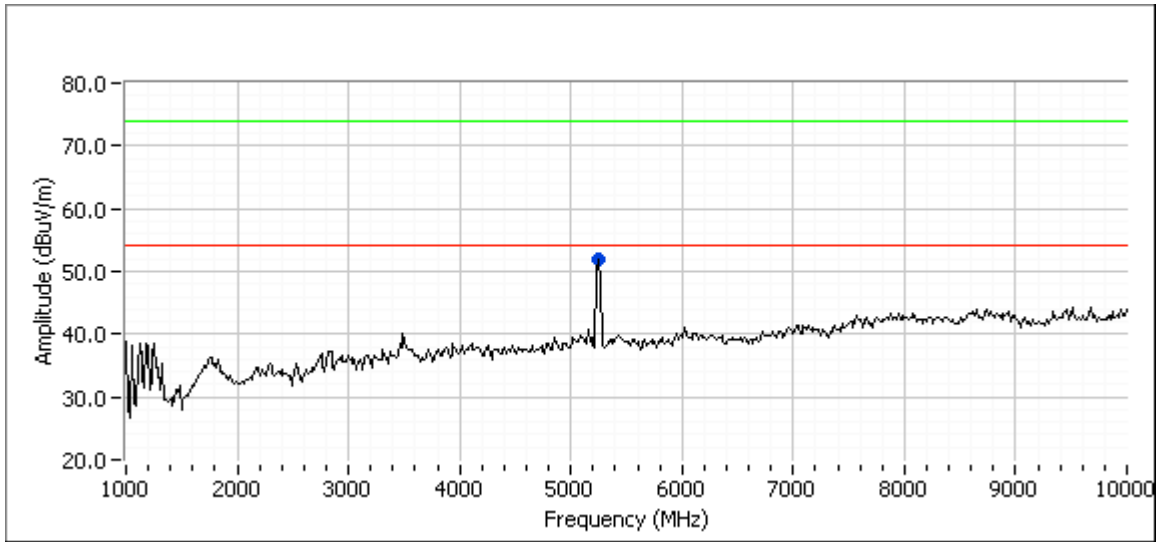
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5161.670	43.2	H	54.0	-10.8	Peak	3	1.9	
10360.00	43.8	V	54.0	-10.2	Peak	132	1.0	

Restricted Band Emissions, UUT Transmitting on 5220 MHz, SQ5153 MONOPOLE Antenna
Power setting 21



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	$\text{dB}\mu\text{V/m}$	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5220.000	48.9	V	-	-	Peak	132	1.9	Fundamental
10440.00	44.5	V	54.0	-9.5	Peak	298	1.0	

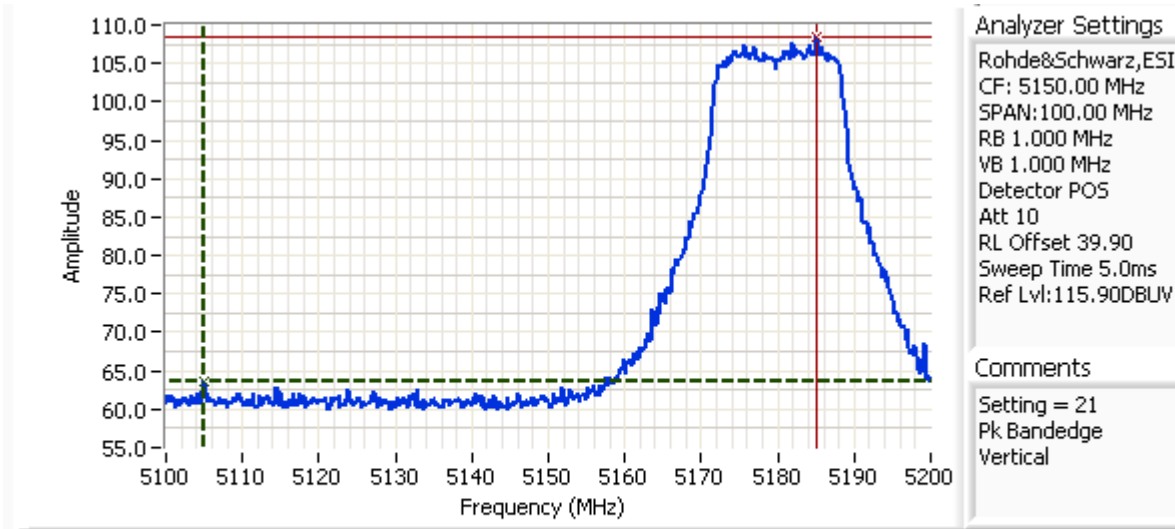
Restricted Band Emissions, UUT Transmitting on 5240 MHz, SQ5153 MONOPOLE Antenna
Power setting 21



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
5240.000	52.0	H	-	-	Peak	140	1.6	Fundamental
10480.940	43.1	V	54.0	-10.9	AVG	291	1.0	
10480.940	54.6	V	74.0	-19.4	PK	291	1.0	

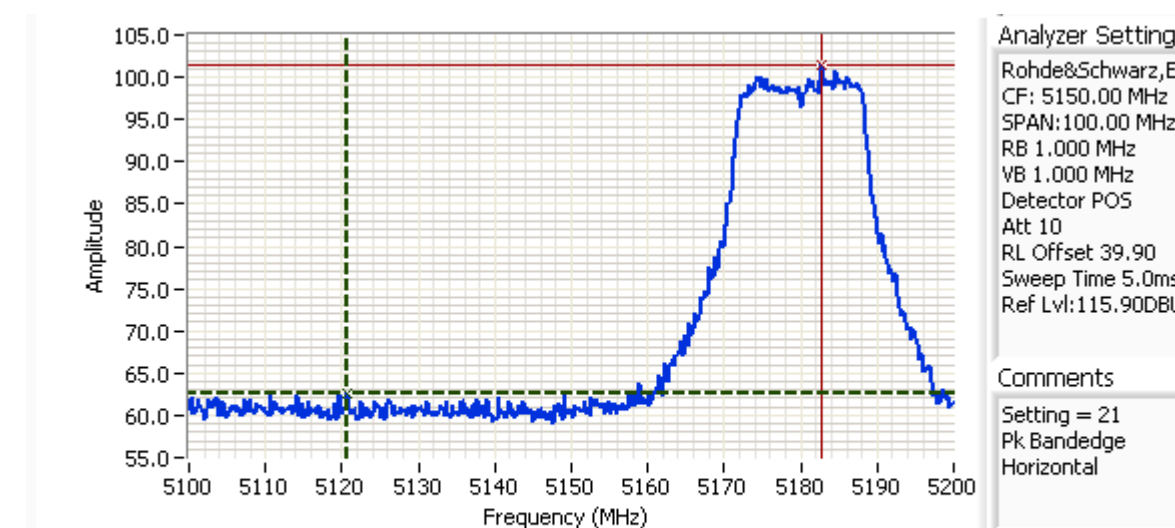
**Restricted Band Emissions, UUT Transmitting on 5180 MHz, SQ5153 MONOPOLE Antenna
Band Edge Emissions at 5150 MHz**

Band Edge	Vertical, Avg, dBuV/m	Vertical, Peak, dBuV/m	Horz Avg, dBuV/m	Horz Peak, dBuV/m
5150 MHz	49.35	63.58	49.32	62.67



Cursor 1	5105.01	63.58	↕	↖	🔒
Cursor 2	5185.17	108.41	↕	↗	🔒

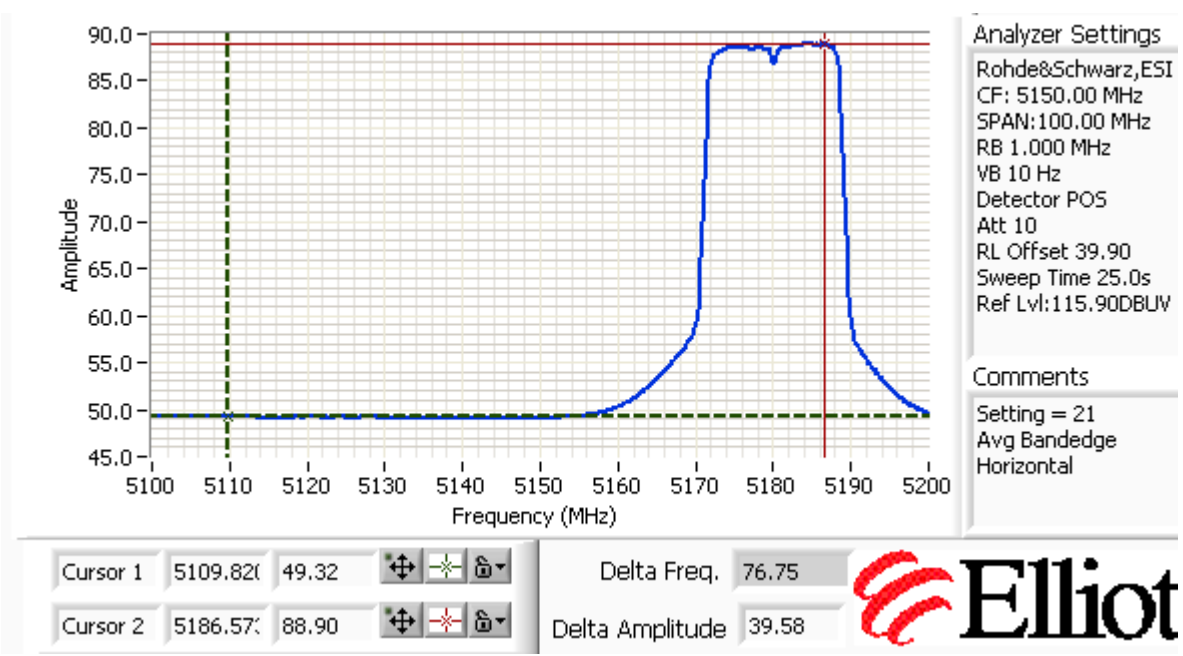
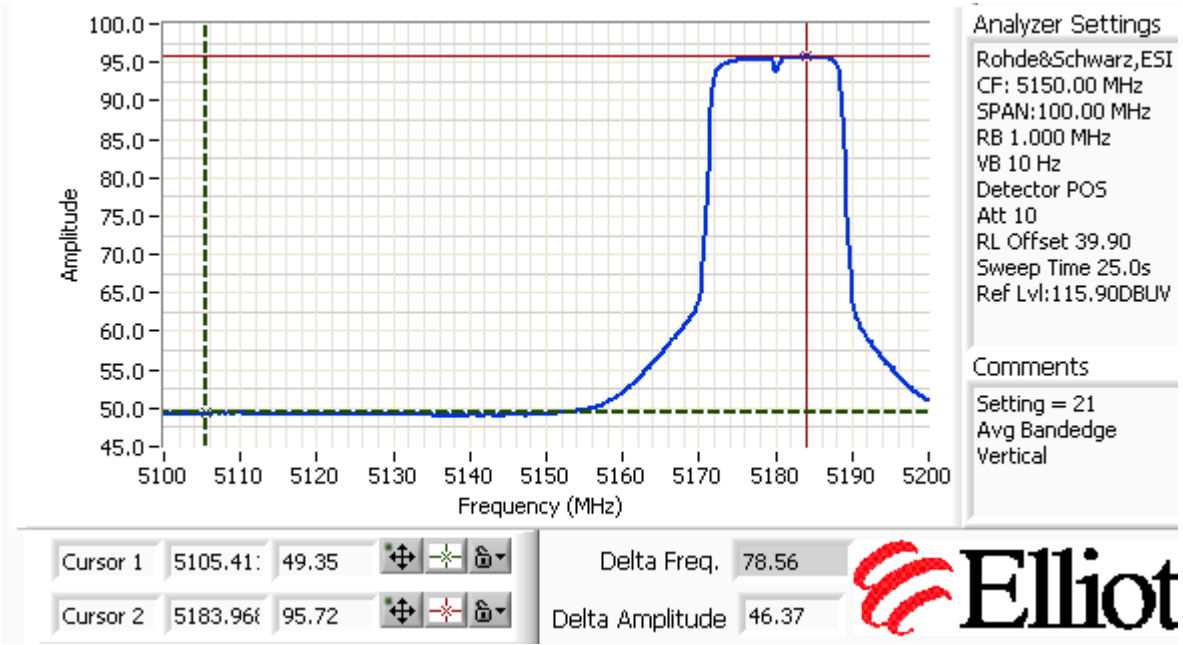
Delta Freq. 80.16
 Delta Amplitude 44.83



Cursor 1	5120.64	62.67	↕	↖	🔒
Cursor 2	5182.76	101.39	↕	↗	🔒

Delta Freq. 62.12
 Delta Amplitude 38.72





Frequency Drift Versus Temperature and Supply Voltage.

Procedure

The AP was placed into a temperature chamber and powered with its typical supply voltage. the temperature of the AP was allowed to stabilize. Once stabile, the carrier frequent was measure. This frequency was defined as “Zero Drift”

The temperature was then lowered to the low specified operating temperature of the product (0C) and the temperature was allowed to stabilize. One stabile, the frequency drift was measured with the unit running on its Low supply voltage and then its high supply voltage.

The temperature was then raised to the unit maximum temperature (55C) and the frequency drift measure at the low and high supply voltage.

This test was performed for the low middle and high channel

Result

The maximum measured drift over these temperature and supply voltage extremes was: **5.32 ppm**

AC Line Conducted Emissions

Specification:

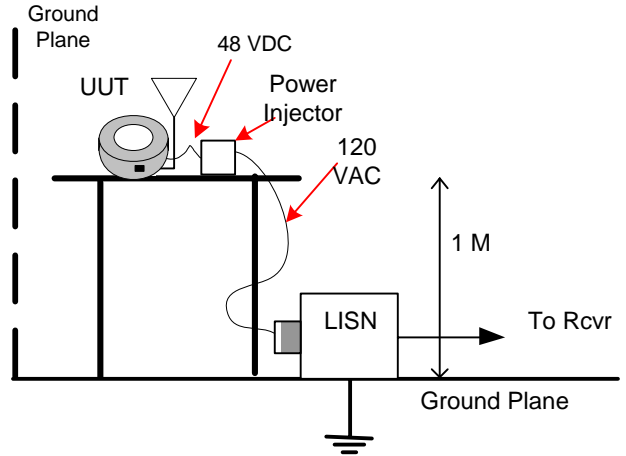
Specification: CISPR 22

Procedure:

The test was set up according to the guidelines set forth in EN55022:1998 and FCC Part 2 for AC Line Conducted Emissions. The measurement used a LISN line on each AC line and an EMI receiver. A peak scan was made over the measurement frequency range (150 kHz to 30 MHz). The highest peaks were then marked and re-measured and quasi-peaked and averaged.

The test was configured as shown below.

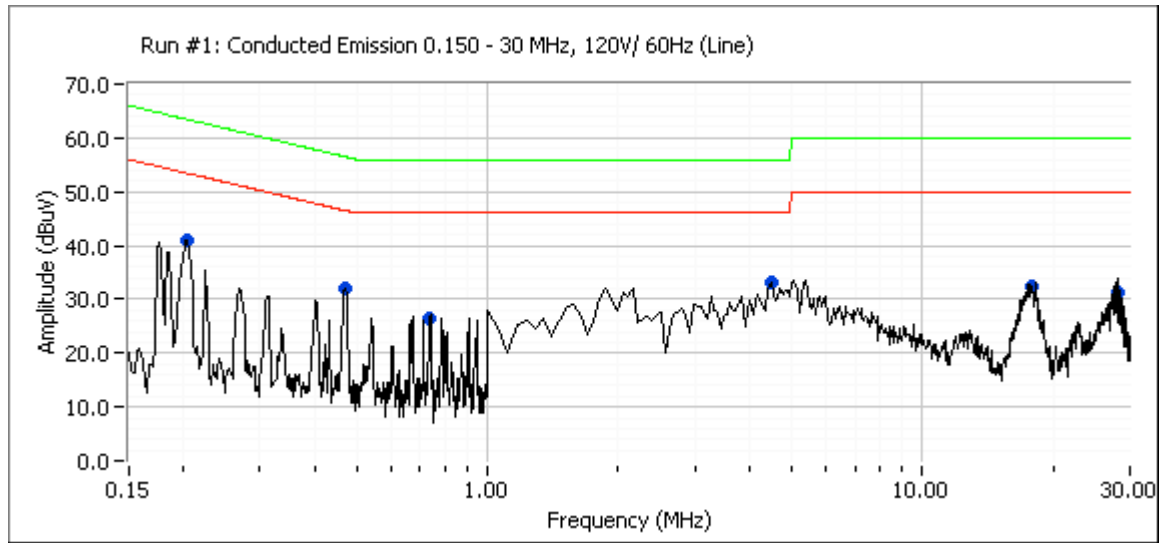
The product was tested with “power injector” running on 120 VAC @ 60 Hz. The power injector provides -48VDC onto an Ethernet cable to power the access point. The AP was configured to transmit high power on both 2.4 and 5 GHz simultaneously. This presents the largest load to the power supply and results in the worst case conducted emissions.



AC line Conducted Emissions Results

Frequency MHz	Level dB μ V	AC Line	EN55022 B Limit	Margin	Detector QP/Ave
0.469	27.4	Line	46.5	-19.1	Average
4.478	26.9	Neutral	46.0	-19.1	Average
0.469	26.2	Neutral	46.5	-20.3	Average
2.206	24.7	Line	46.0	-21.3	Average
17.440	28.2	Line	50.0	-21.8	Average
0.200	30.4	Neutral	53.6	-23.2	Average
0.200	40.0	Neutral	63.6	-23.6	QP
4.478	31.6	Neutral	56.0	-24.4	QP
0.202	38.5	Line	63.5	-25.0	QP
0.469	31.2	Line	56.5	-25.4	QP
0.469	31.1	Neutral	56.5	-25.5	QP
0.736	20.5	Neutral	46.0	-25.5	Average
0.202	27.8	Line	53.5	-25.8	Average
2.206	27.9	Line	56.0	-28.2	QP
17.440	30.4	Line	60.0	-29.6	QP
0.164	35.4	Line	65.3	-29.8	QP
0.736	25.3	Neutral	56.0	-30.7	QP
0.164	13.4	Line	55.3	-41.8	Average

AC Line conducted emissions, LINE



AC Line conducted emissions, NEUTRAL

