UNII Test Report

AIR-RM1520A-A-K9 802.11a Radio Module

FCC ID: LDK102063

Against the following Specifications:

CFR47 Part 15.407

RSS210

Cisco Systems

170 West Tasman Drive

San Jose, CA 95134

Author: James Nicholson

Approved By:

Title:

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Section 1: Overview

1.1 Test Summary

samples were assessed against the tests detailed in section 3 under the requirements of the following specifications:

Emission	Immunity
CFR47 Part 15.407(a)6 CFR47 Part 15.407a (RSS210) CFR47 Part 15: 2005 CFR47 Part 15: 2005 (CAN/CSA-CISPR 22-02)	N/A

The specifications listed above represent actual tests performed to demonstrate compliance against the specifications and basic standards listed on the front cover of this report. This list is not a one to one match to the front cover for one or more of the following reasons.

1. Basic standards call up many different test phenomena specifications such as the 61000-4-X series. The basic standards define which elements and levels shall be applied from these specifications and as such it is not appropriate to list the individual specifications on the front cover.
2. A Standard listed on the front cover may be required in a particular country but is not appropriate for the particular technologies included in the equipment under test. E.g. You cannot test a DC product to the mains Harmonics requirements in EN61000-3-2. See section 3.2.
3. Test results against a particular standard or specification may be included in a different test report. See section 3.2 for an EDCS reference of this data.
4. Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
5. Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.
6. Testing may have been performed to an equivalent test that satisfies the requirements of the standards and specifications listed on the front cover of the report. See section 3.2.
7. Where radiated emissions testing has been performed to EN55022/CISPR22 the additional requirements of VCCI: V- 3/2006.04, EN55022: 1994 +A1/2 and CAN/CSA- CISPR 22-02 have also been evaluated unless otherwise stated.
8. Testing to the requirements of CFR47 Part 15 was performed against the CISPR22 limits. The results are therefore deemed satisfactory evidence of compliance with Industry Canada Interference Causing Equipment Standard ICES-003.
9. Where assessment has been performed to CISPR24, all the applicable test requirements may have not been covered. Refer to the results section for the tests performed.

Notes:

1) Where a specification listed on the front cover of this report has deviations from the basic standards listed above, the additional technical requirements of the specification were also assessed.
2) Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
3) Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.

Section 2: Assessment Information

2.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on the samples submitted. The testing was performed by and for the use of Cisco systems Inc:

With regard to this assessment, the following points should be noted:

a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results due to production and measurement tolerances.

b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.

c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).

d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%

*[Where applicable] For ESD testing the humidity limits used were 30% to 60% and for EFT/B tests the humidity limits used were 25% to 75%.

e) All AC testing was performed at one or more of the following supply voltages:
110V 60 Hz (+/-20%)
220V 50 Hz (+/-20%)

2.2 Date of start of testing

06-Mar-2007

2.3 Report Issue Date

Cisco uses an electronic system to issue, store and control the revision of test reports. This system is called the Engineering Document Control System (EDCS). The actual report issue date is embedded into the original file on EDCS. Any copies of this report, either electronic or paper, that are not on EDCS must be considered uncontrolled

2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.,	Cisco Systems, Inc.
4125 Highlander Parkway	170 West Tasman Drive
Richfield, OH 44286	San Jose, CA 95134
USA	USA

Test Engineers

James Nicholson

2.5 Equipment Assessed (EUT)

AIR-RM1520A-A-K9 802.11a Radio Module.

2.6 EUT Description

The AIR-RM1520A-A-K9 802.11a radio module operates exclusively in the AIR-LAP1520 series access point, and may operate simultaneously with the AIR-RM1520G-A-K9 802.11b/g radio module.

The following antennas are supported by this product.

AIR-ANT5180V-N	4900-5850 MHz	8.0 dBi Omni-directional
AIR-ANT5114P-N	4900 -5850 MHz	14.0 dBi Patch
AIR-ANT5117S-N	4900 -5850 MHz	17.0 dBi 90-degree Sector

Section 3: Sample Details

Sample No.	Equipment Details	Part Number	Manufacturer	Hardware Rev.	Firmware Rev.	Software Rev.	Serial Number
S01	802.11a Radio Module	AIR-RM1520A-A-K9	Cisco Systems	NA	NA	NA	NA
S02	Mesh Access Point	AIR-LAP1522AG-A-K9	Cisco Systems	NA	NA	NA	NA
S03	8.0 dBi Omni Antenna	AIR-ANT5180V-N	Cisco Systems	NA	NA	NA	NA
S04	14 dBi Patch Antenna	AIR-ANT5114P-N	Cisco Systems	NA	NA	NA	NA
S05	17dBi Patch Antenna	AIR-ANT5117S-N	Cisco Systems	NA	NA	NA	NA

Appendix A: Emission Test Results
Testing Laboratory: Cisco Systems, Inc., 4125 Highlander Parkway, Richfield, OH, USA

Average Output Power

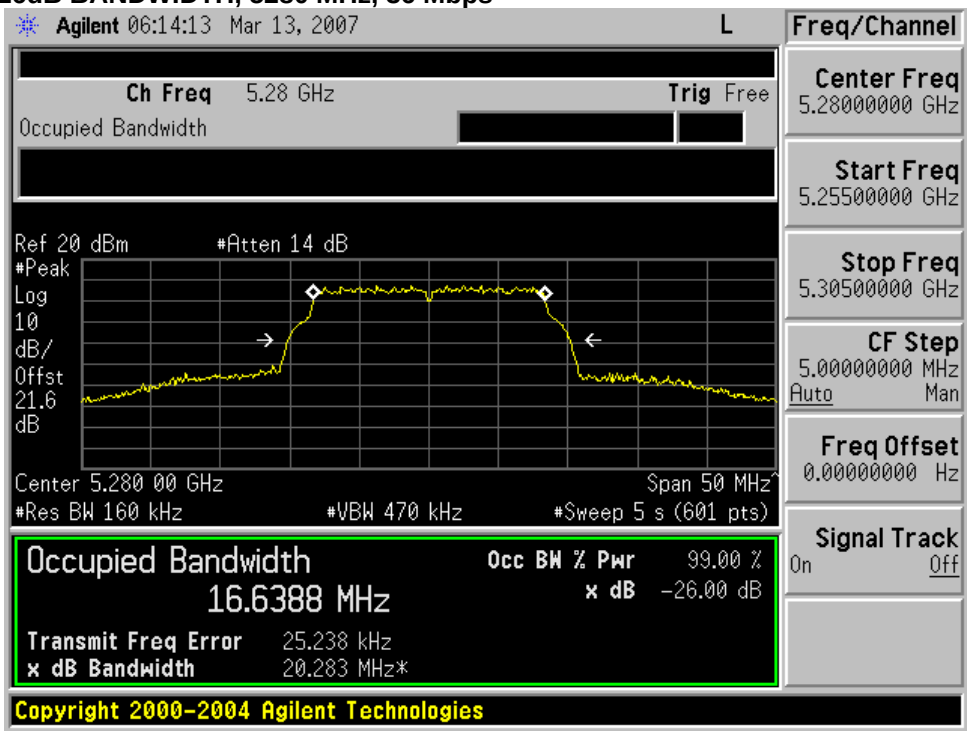
Average Power with up to 8 and 14 dBi Antennas

Frequency (MHz)	Data Rate (Mbps)	Antenna Gain (dBi)	Target Power Level (dBm)	Actual Power Level (dBm)
5280	36	8	19	17.8
5280	36	14	13	11.9
5300	36	8	19	17.7
5300	36	14	13	11.8
5320	36	8	19	17.6
5320	36	14	13	11.8
5500	36	8	19	18.1
5500	36	14	13	11.9
5600	36	8	19	18.3
5600	36	14	13	12.2
5700	36	8	19	17.6
5700	36	14	13	12.0

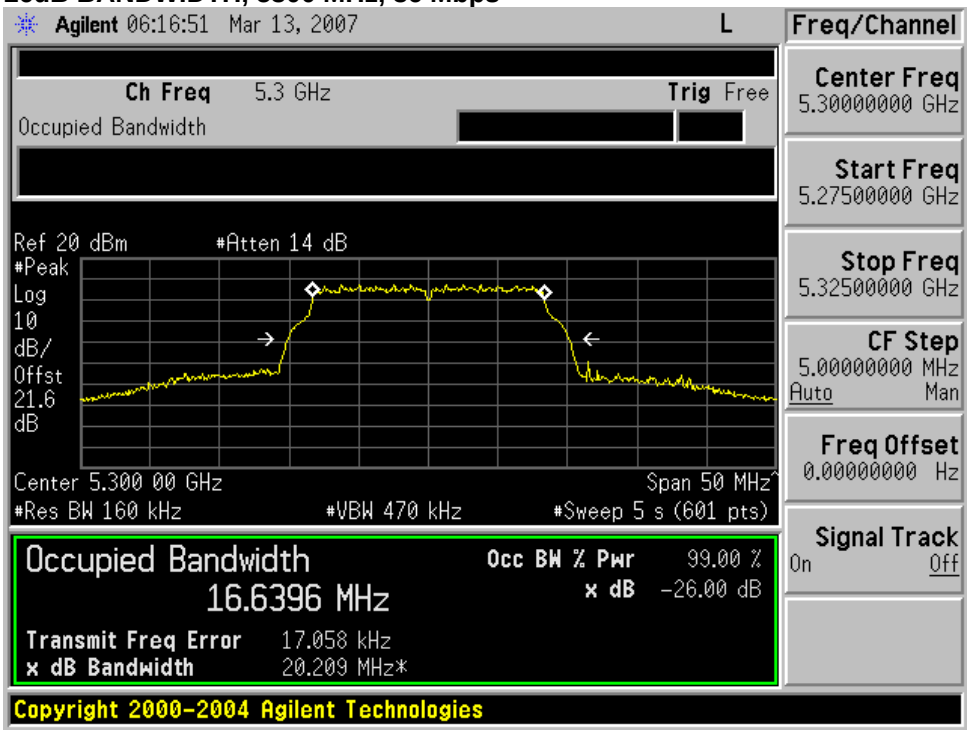
99% and 26dB Bandwidth

Frequency (MHz)	Data Rate (Mbps)	26dB BW (MHz)	99% BW (MHz)
5280	36	20.3	16.6
5300	36	20.2	16.6
5320	36	20.3	16.6
5500	36	20.2	16.6
5600	36	20.2	16.6
5700	36	20.2	16.6

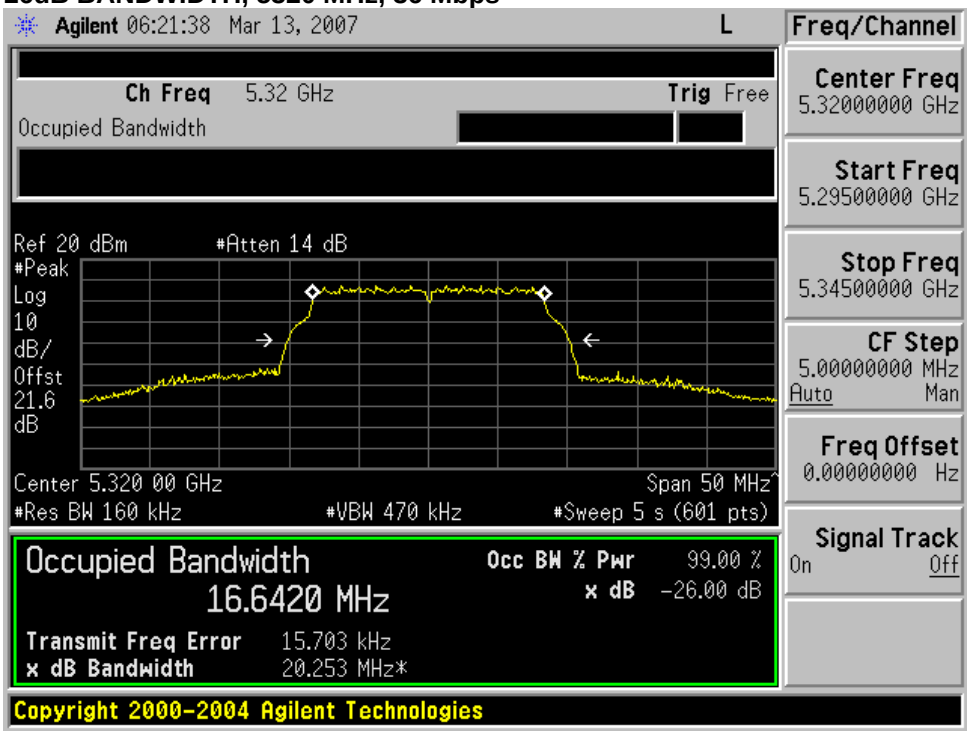
26dB BANDWIDTH, 5280 MHz, 36 Mbps



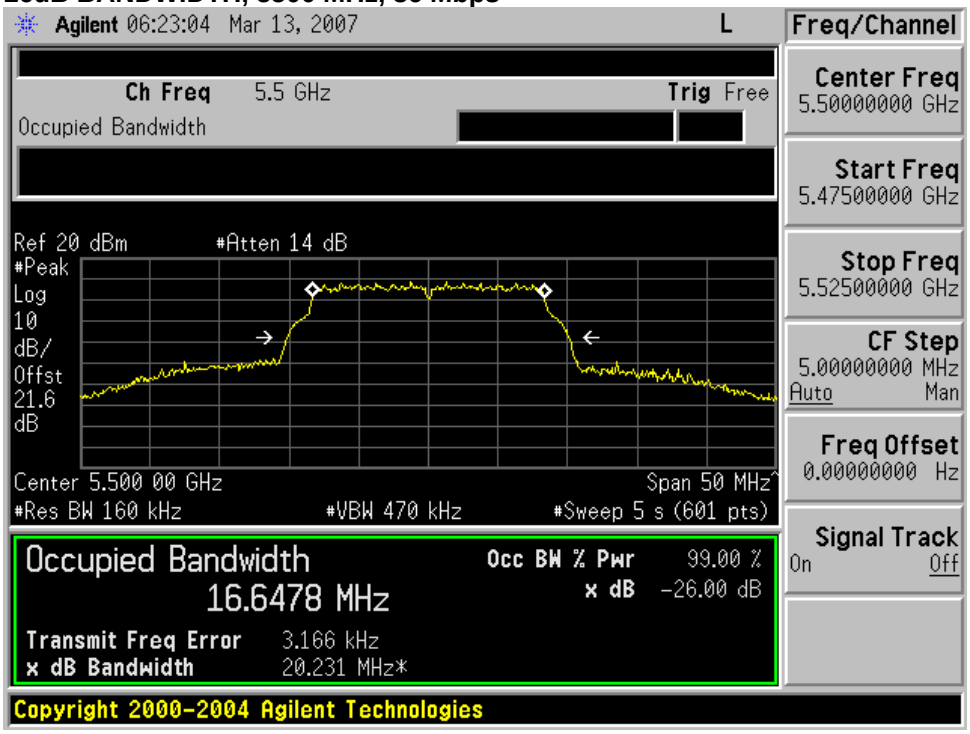
26dB BANDWIDTH, 5300 MHz, 36 Mbps



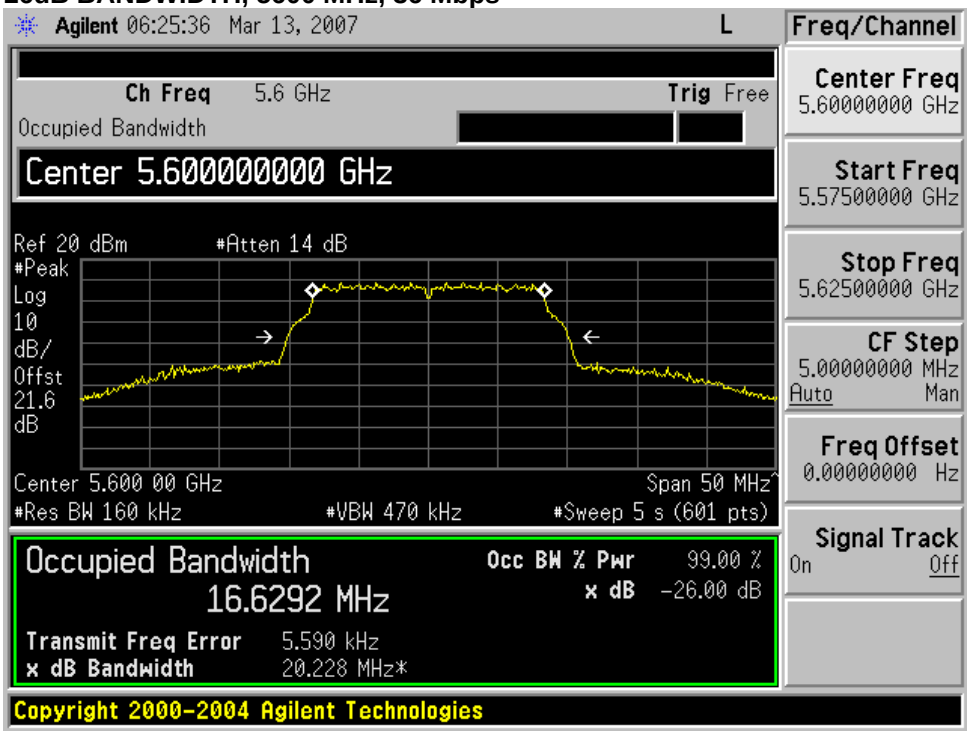
26dB BANDWIDTH, 5320 MHz, 36 Mbps



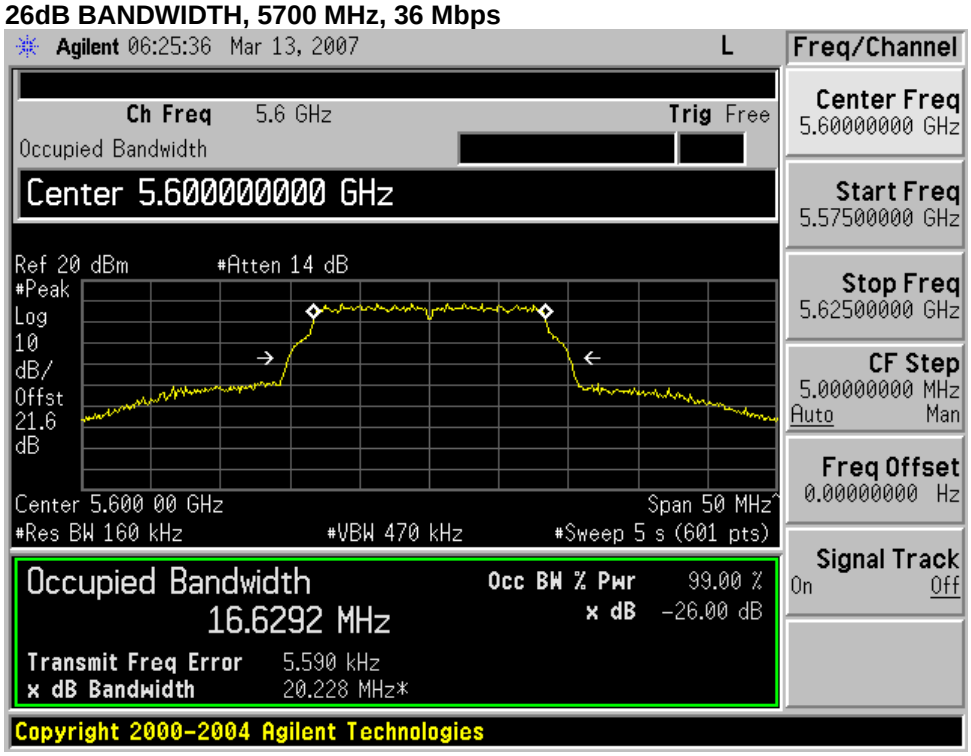
26dB BANDWIDTH, 5500 MHz, 36 Mbps



26dB BANDWIDTH, 5600 MHz, 36 Mbps



26dB BANDWIDTH, 5700 MHz, 36 Mbps



Peak Output Power

15.407: For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The smallest 26dB bandwidth for all channels is 20.2 MHz. The maximum conducted output power is calculated as 11dBm+10*log(20.2MHz) = 24dBm

- For the 8 dBi Omni-directional antenna, the maximum allowable output power must be reduced by 8dBi-6dbi = 2dB, for a maximum peak conducted output power of 28 dBm.
- For the 14 dBi Patch antenna, the maximum allowable output power must be reduced by 14dBi-6dbi = 8dB, for a maximum peak conducted output power of 22 dBm.

Power Spectral Density

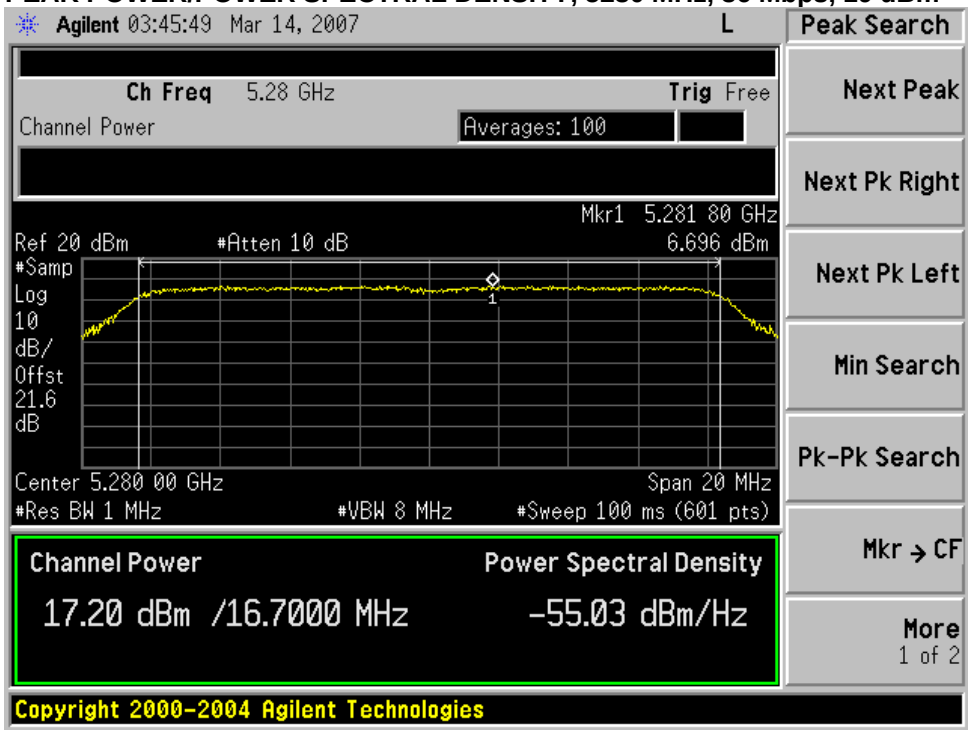
15.407: For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 8 dBi Omni-directional antenna, the peak power spectral density must be reduced by 8dBi-6dbi = 2dB, for a maximum peak power spectral density of 9 dBm/MHz.

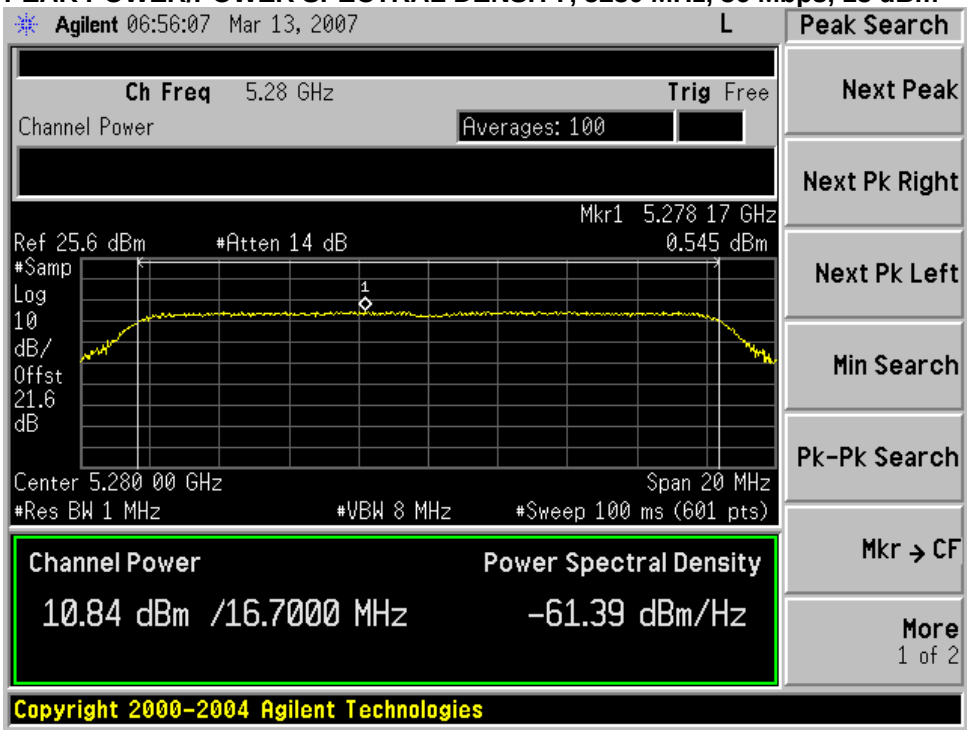
For the 14 dBi Patch antenna, the peak power spectral density must be reduced by 14dBi-6dbi = 8dBi, for a maximum peak power spectral density of 3 dBm/MHz.

Frequency (MHz)	Data Rate (Mbps)	Antenna Gain (dBi)	Peak Power (dBm)	Limit (dBm)	Margin (dB)	PSD (dBm/MHz)	Limit (dBm)	Margin (dB)
5280	36	8	17.2	28.0	10.8	6.7	9.0	2.3
5280	36	14	10.8	22.0	11.2	0.5	3.0	2.5
5300	36	8	17.1	28.0	10.9	6.4	9.0	2.6
5300	36	14	10.8	22.0	11.2	0.0	3.0	3.0
5320	36	8	17.0	28.0	11.0	6.5	9.0	2.5
5320	36	14	10.9	22.0	11.1	0.4	3.0	2.6
5500	36	8	17.9	28.0	10.1	7.2	9.0	1.8
5500	36	14	12.0	22.0	10.0	1.4	3.0	1.6
5600	36	8	18.3	28.0	9.7	7.9	9.0	1.1
5600	36	14	12.4	22.0	9.6	2.1	3.0	0.9
5700	36	8	17.6	28.0	10.4	7.0	9.0	2.0
5700	36	14	11.8	22.0	10.2	1.4	3.0	1.6

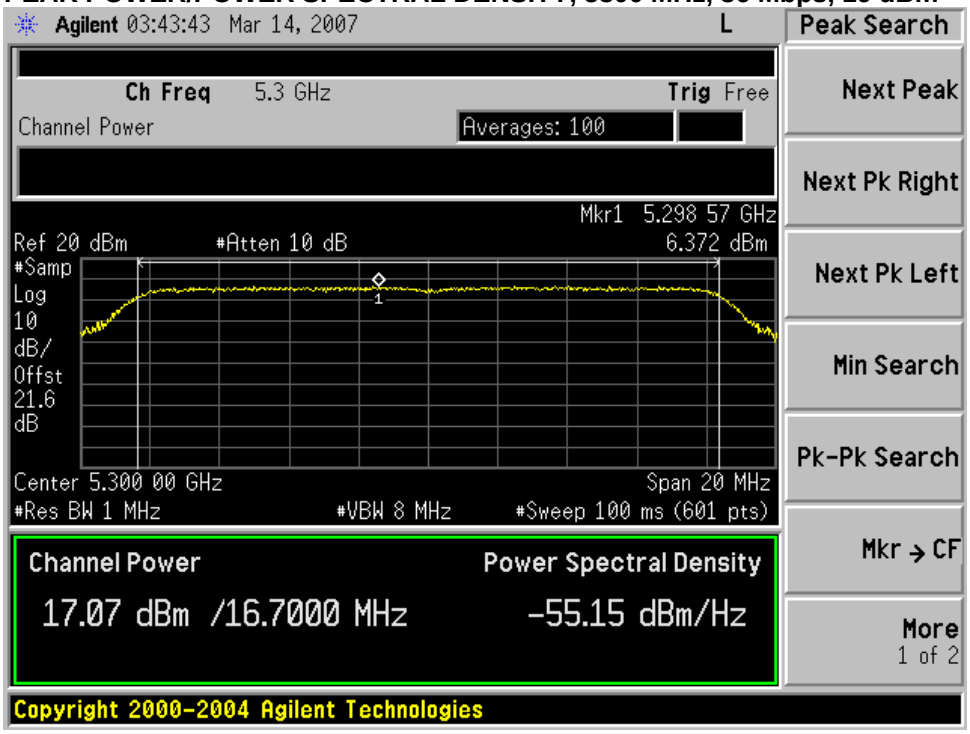
PEAK POWER/POWER SPECTRAL DENSITY, 5280 MHz, 36 Mbps, 19 dBm



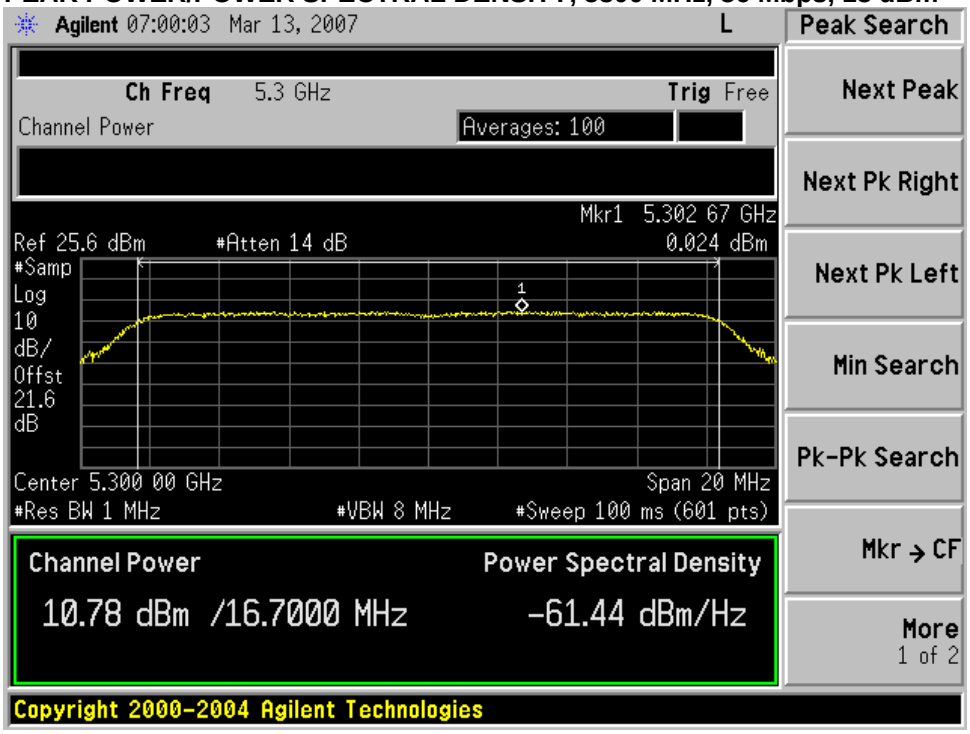
PEAK POWER/POWER SPECTRAL DENSITY, 5280 MHz, 36 Mbps, 13 dBm



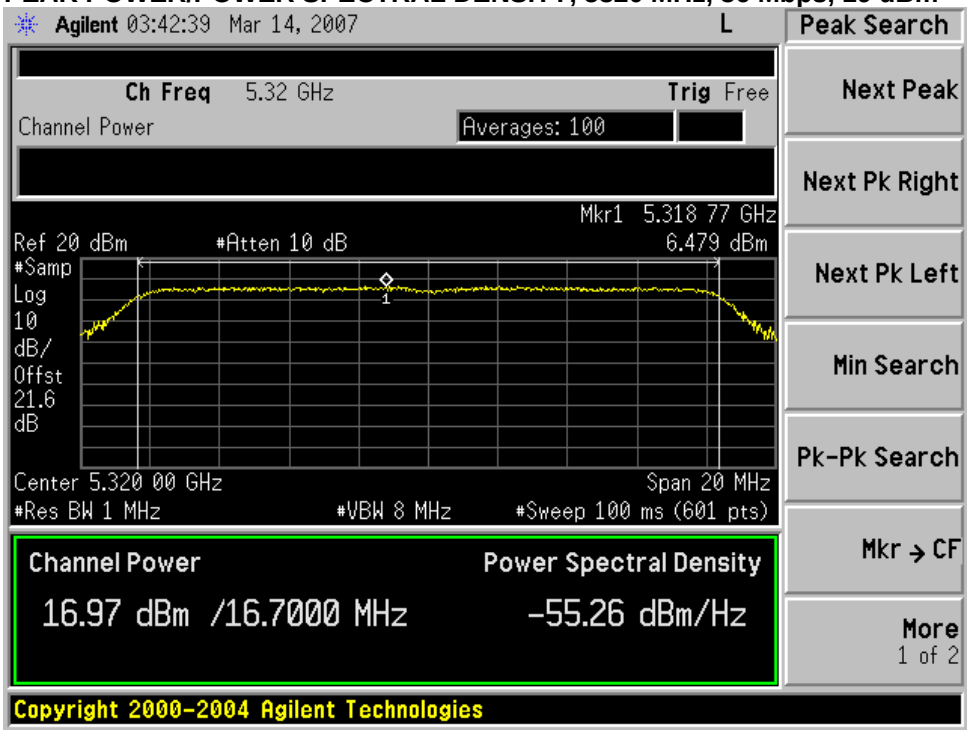
PEAK POWER/POWER SPECTRAL DENSITY, 5300 MHz, 36 Mbps, 19 dBm



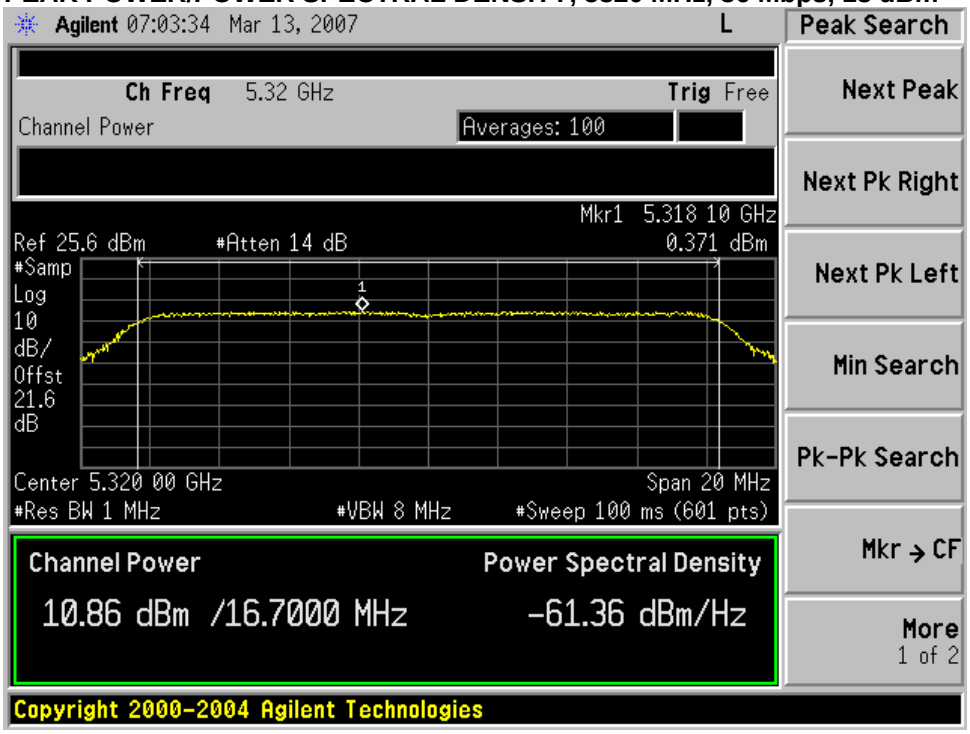
PEAK POWER/POWER SPECTRAL DENSITY, 5300 MHz, 36 Mbps, 13 dBm



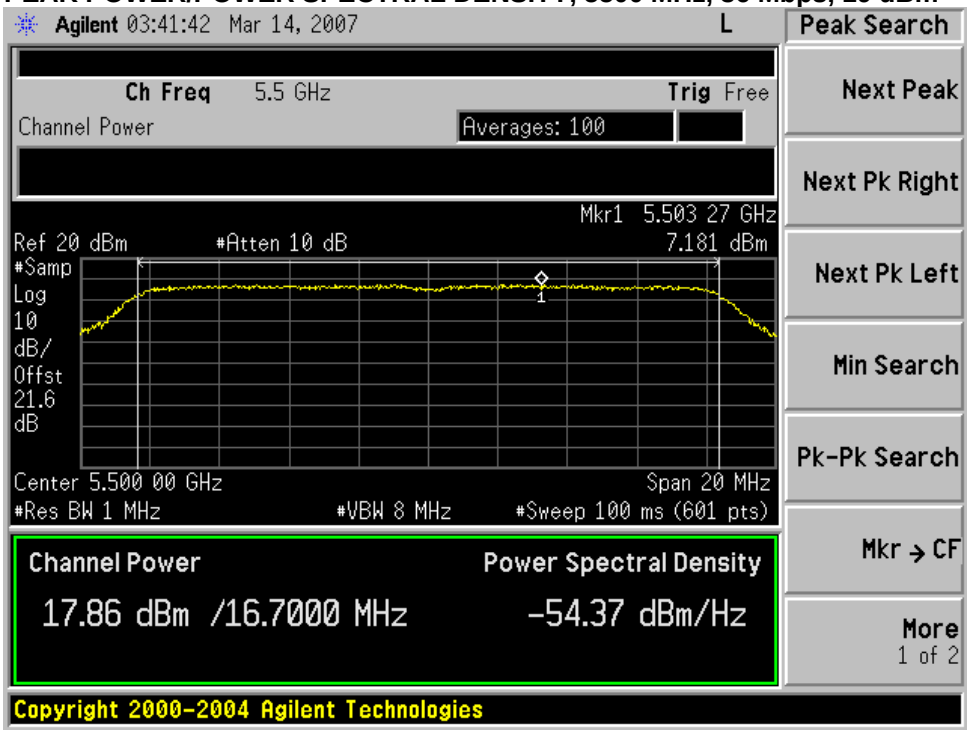
PEAK POWER/POWER SPECTRAL DENSITY, 5320 MHz, 36 Mbps, 19 dBm



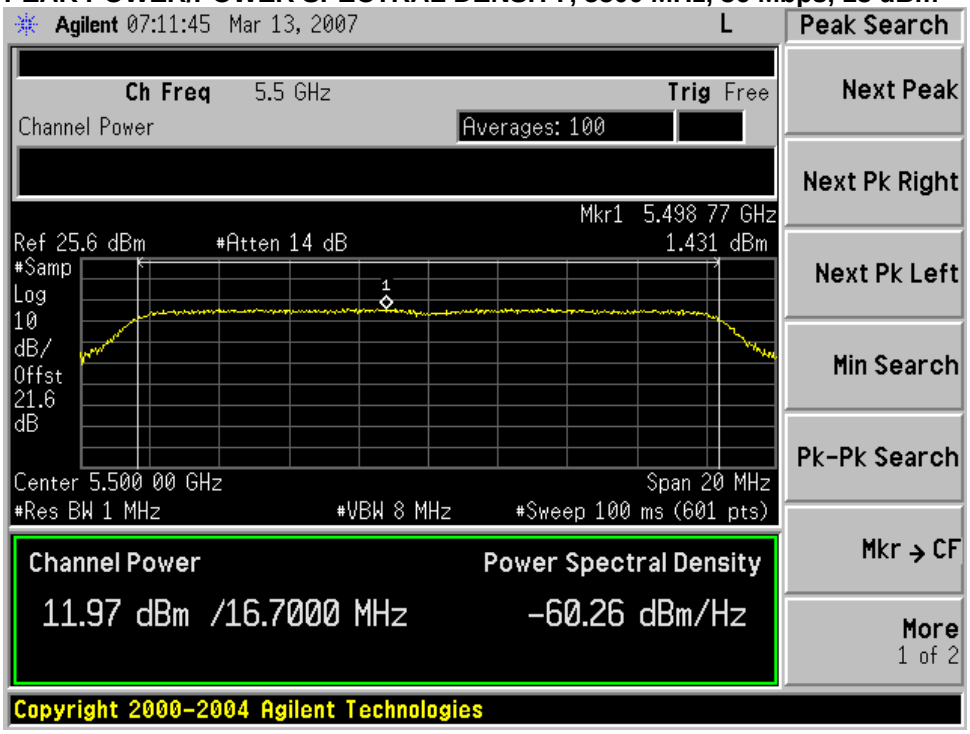
PEAK POWER/POWER SPECTRAL DENSITY, 5320 MHz, 36 Mbps, 13 dBm



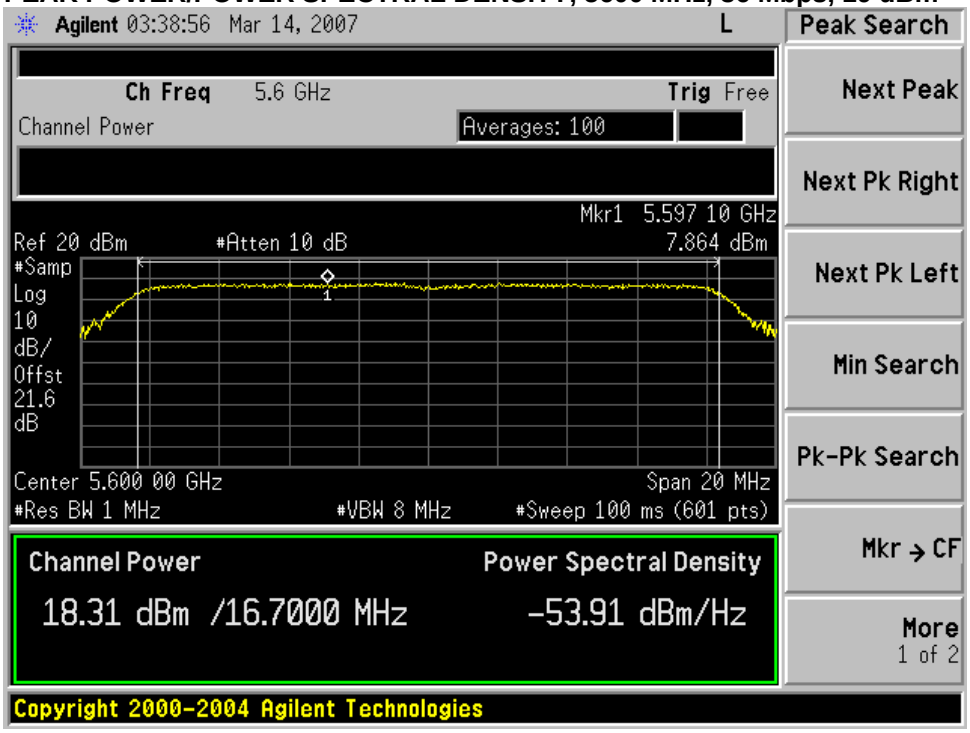
PEAK POWER/POWER SPECTRAL DENSITY, 5500 MHz, 36 Mbps, 19 dBm



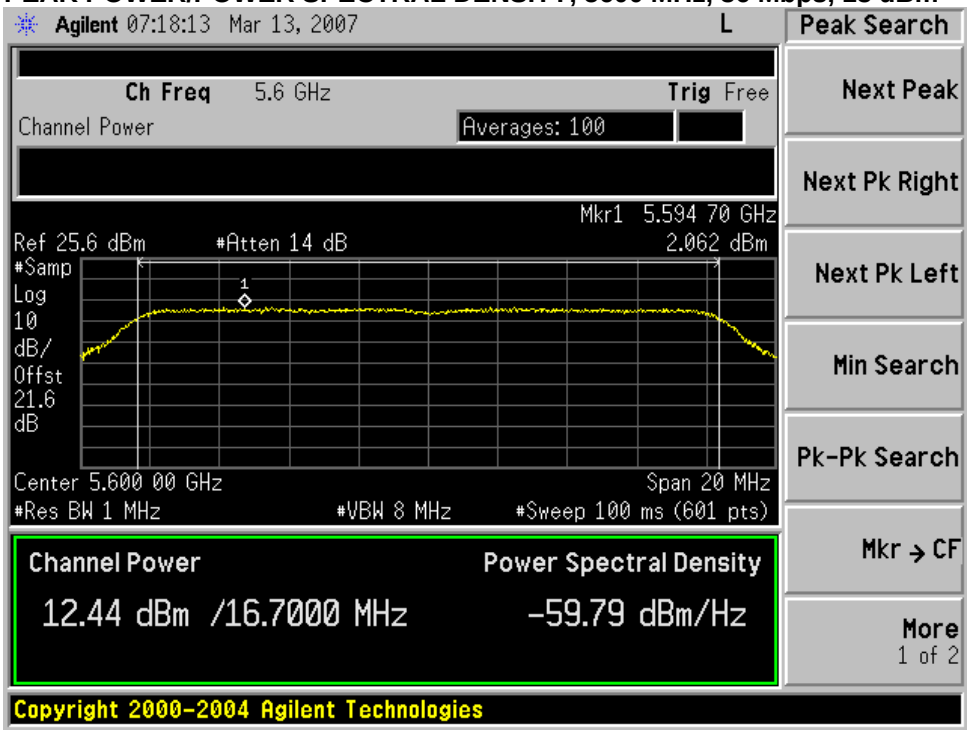
PEAK POWER/POWER SPECTRAL DENSITY, 5500 MHz, 36 Mbps, 13 dBm



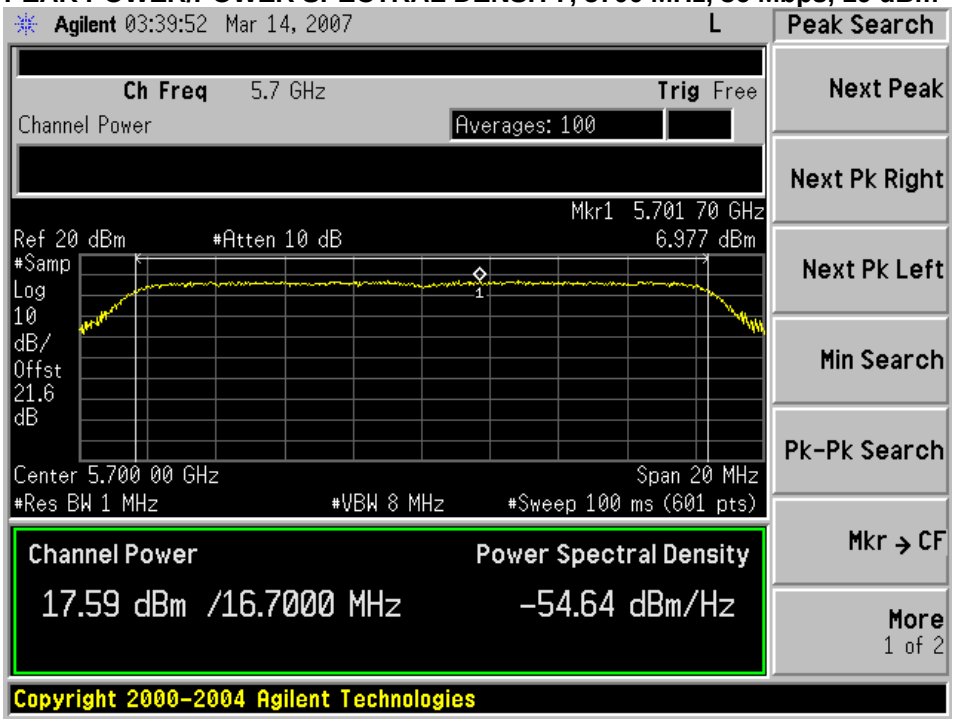
PEAK POWER/POWER SPECTRAL DENSITY, 5600 MHz, 36 Mbps, 19 dBm



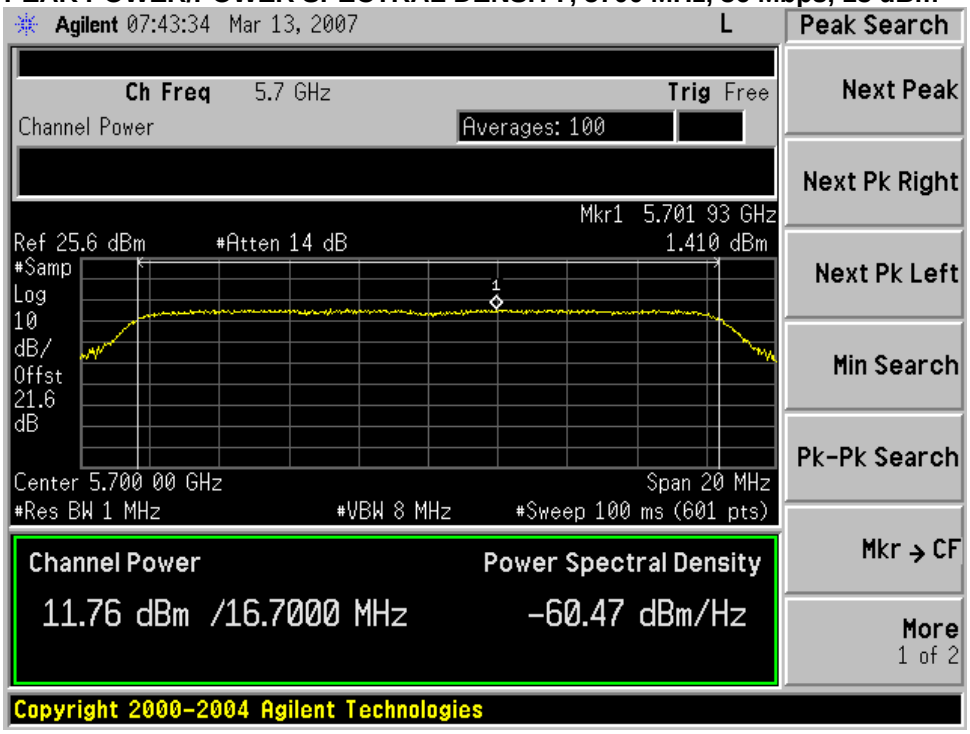
PEAK POWER/POWER SPECTRAL DENSITY, 5600 MHz, 36 Mbps, 13 dBm



PEAK POWER/POWER SPECTRAL DENSITY, 5700 MHz, 36 Mbps, 19 dBm



PEAK POWER/POWER SPECTRAL DENSITY, 5700 MHz, 36 Mbps, 13 dBm

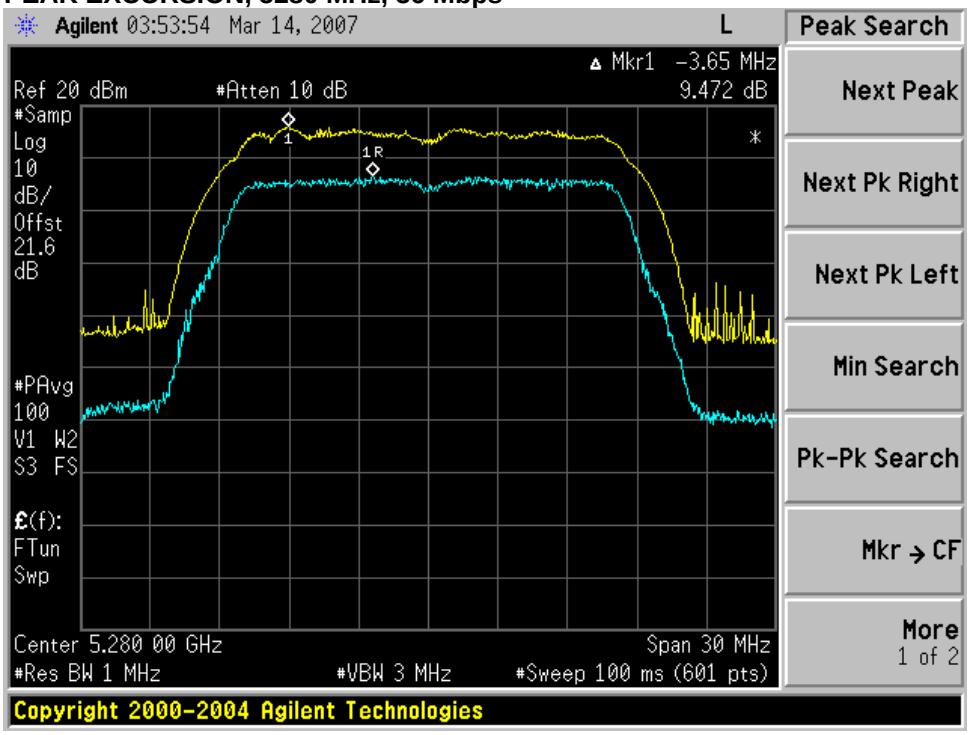


Peak Excursion

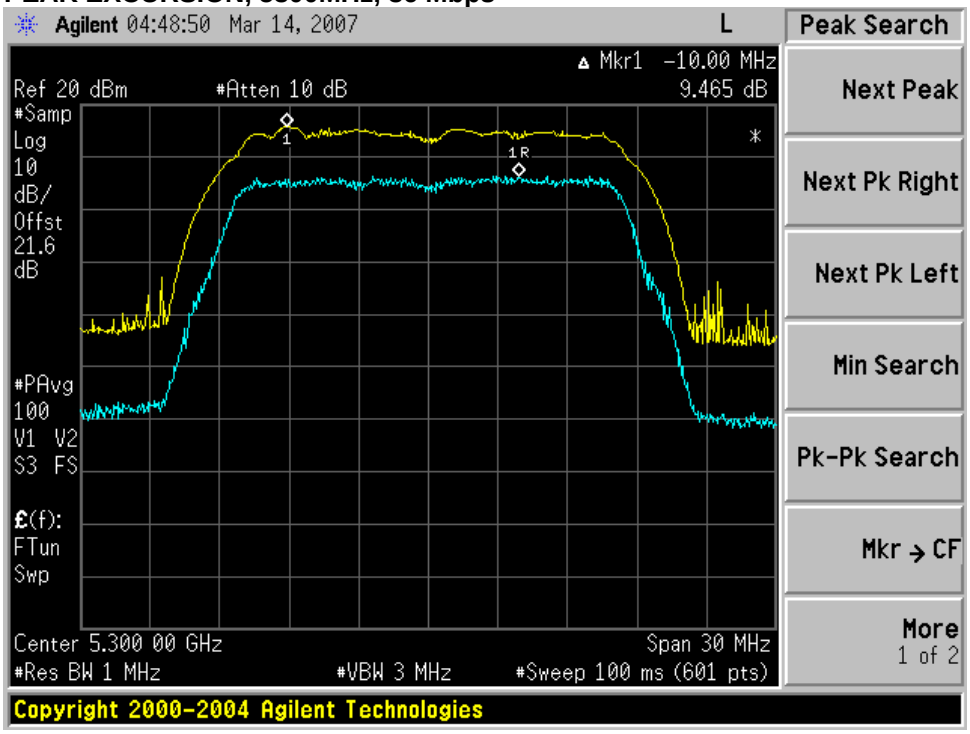
15.407: The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Frequency (MHz)	Data Rate (Mbps)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
5280	36	9.4	13	3.6
5300	36	9.5	13	3.5
5320	36	9.5	13	3.5
5500	36	9.7	13	3.3
5600	36	9.5	13	3.5
5700	36	9.4	13	3.6

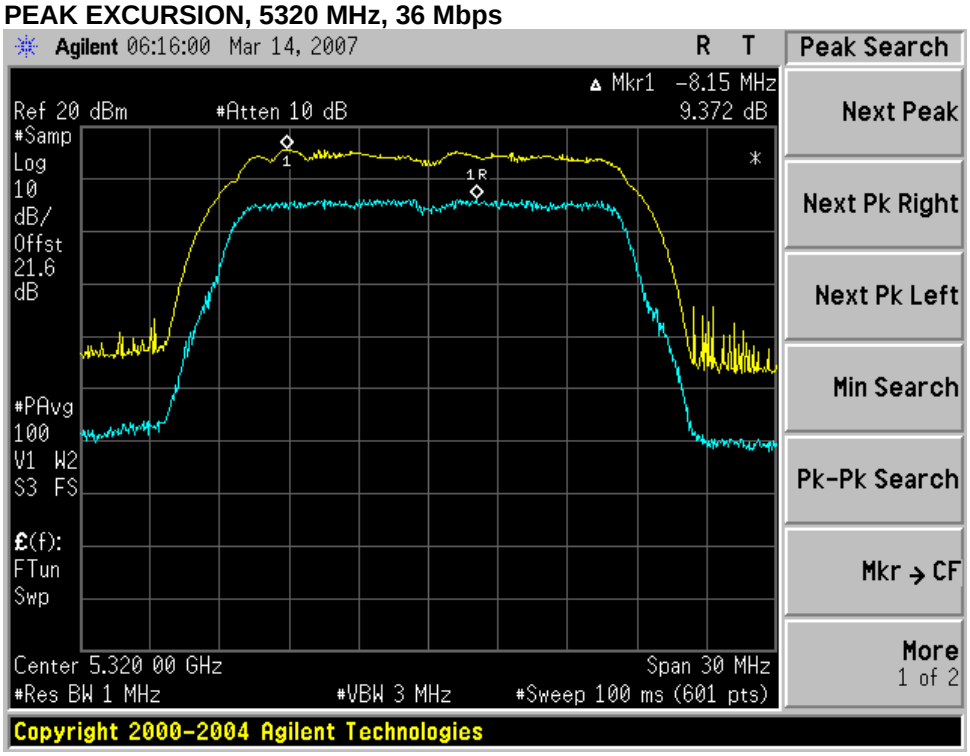
PEAK EXCURSION, 5280 MHz, 36 Mbps



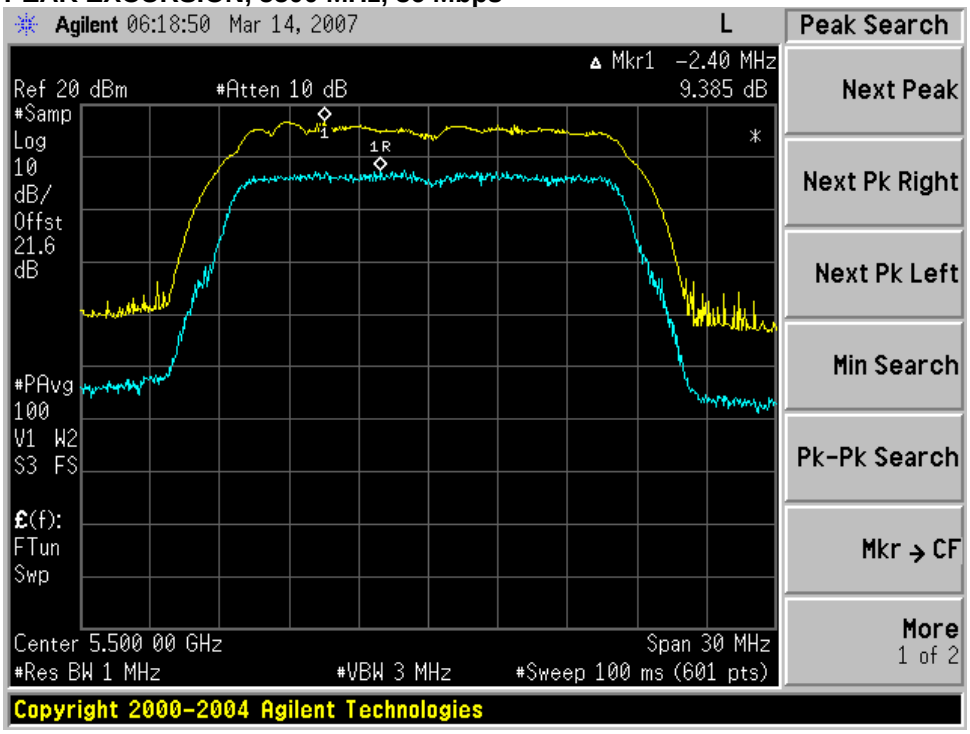
PEAK EXCURSION, 5300MHz, 36 Mbps



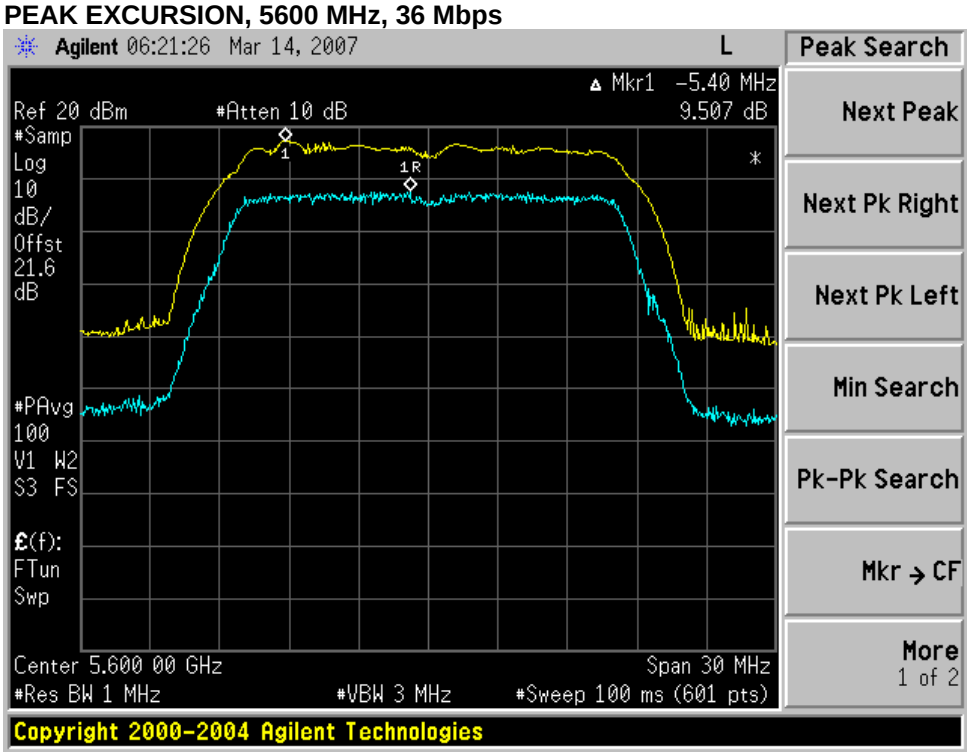
PEAK EXCURSION, 5320 MHz, 36 Mbps



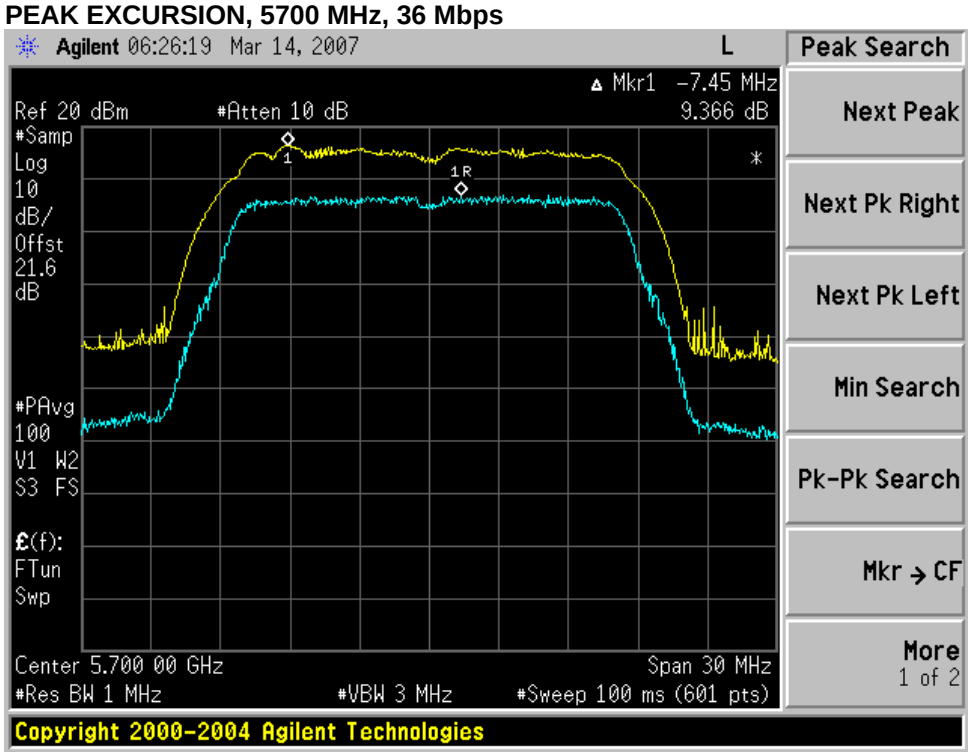
PEAK EXCURSION, 5500 MHz, 36 Mbps



PEAK EXCURSION, 5600 MHz, 36 Mbps



PEAK EXCURSION, 5700 MHz, 36 Mbps



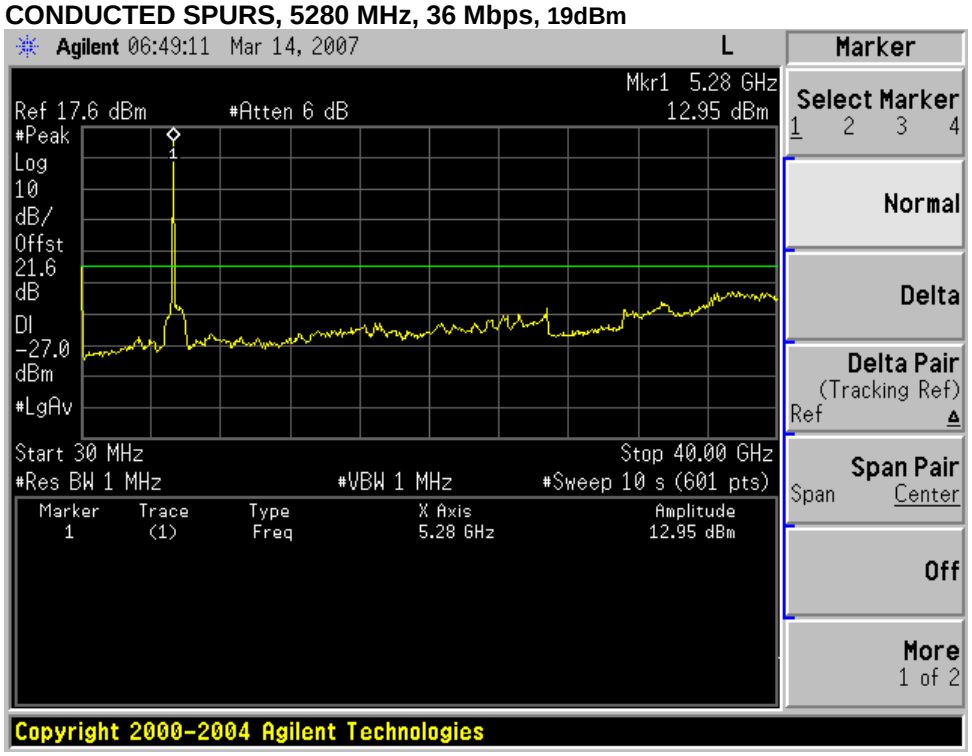
Conducted Spurious Emissions

15.407: For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

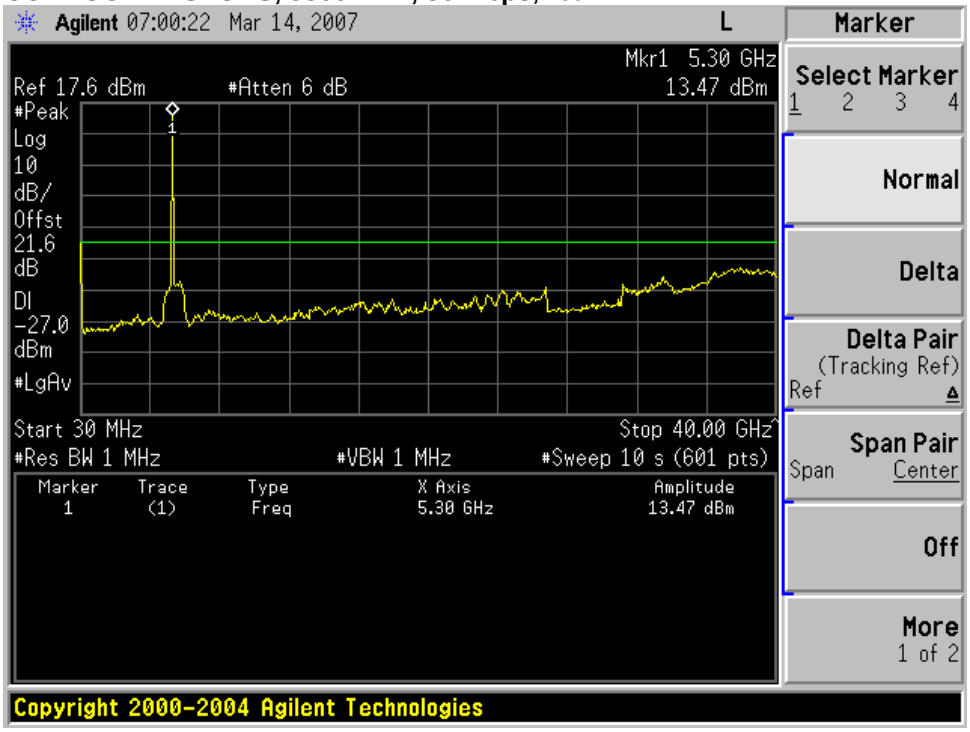
For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27dBm/MHz.

Frequency (MHz)	Data Rate (Mbps)	Conducted Spurs
5280	36	<-27dBm/MHz
5300	36	<-27dBm/MHz
5320	36	<-27dBm/MHz
5500	36	<-27dBm/MHz
5600	36	<-27dBm/MHz
5700	36	<-27dBm/MHz

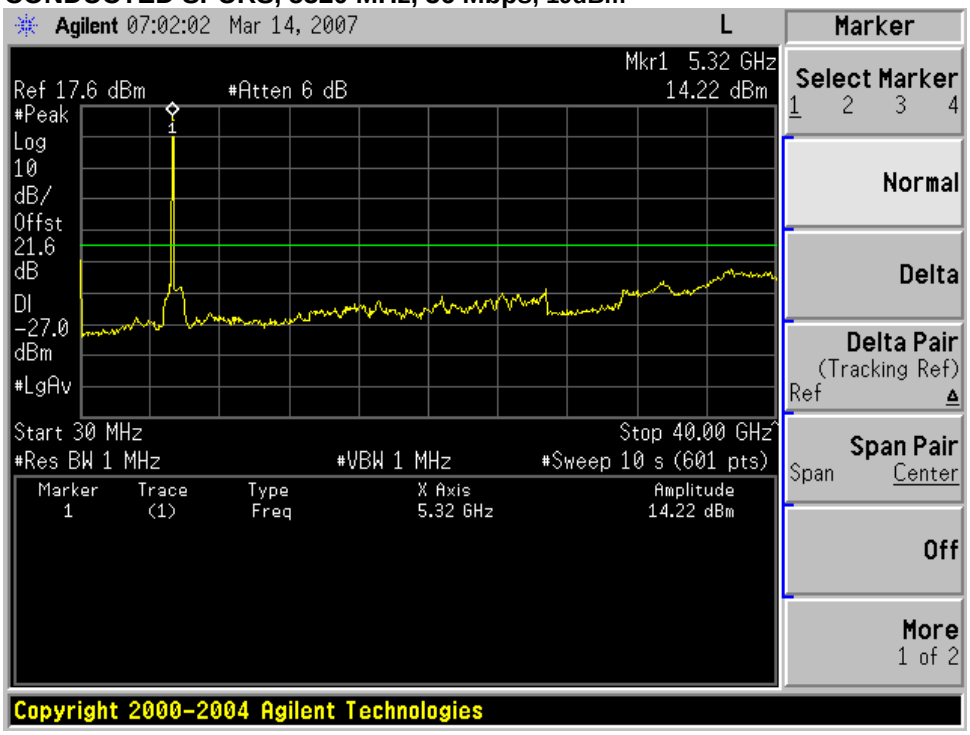
CONDUCTED SPURS, 5280 MHz, 36 Mbps, 19dBm



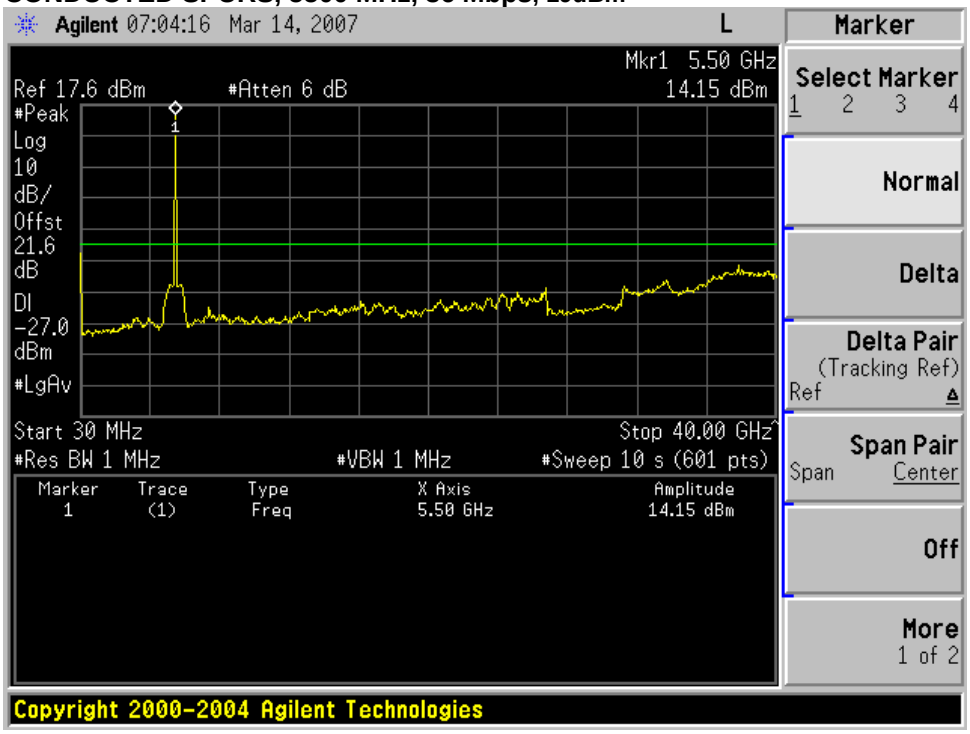
CONDUCTED SPURS, 5300 MHz, 36 Mbps, 19dBm



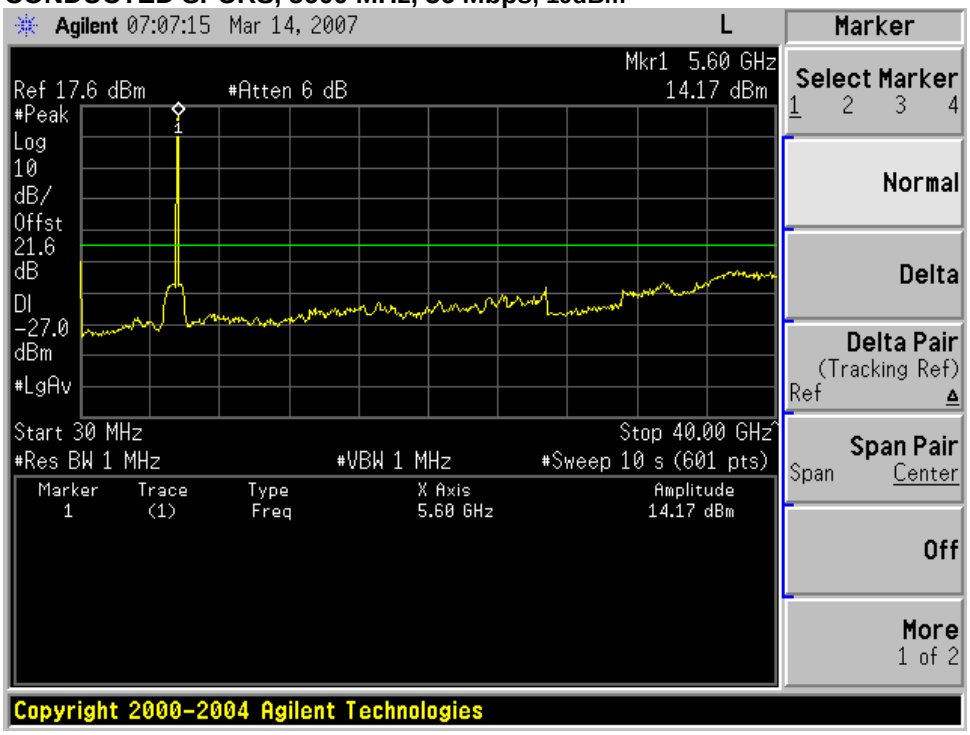
CONDUCTED SPURS, 5320 MHz, 36 Mbps, 19dBm



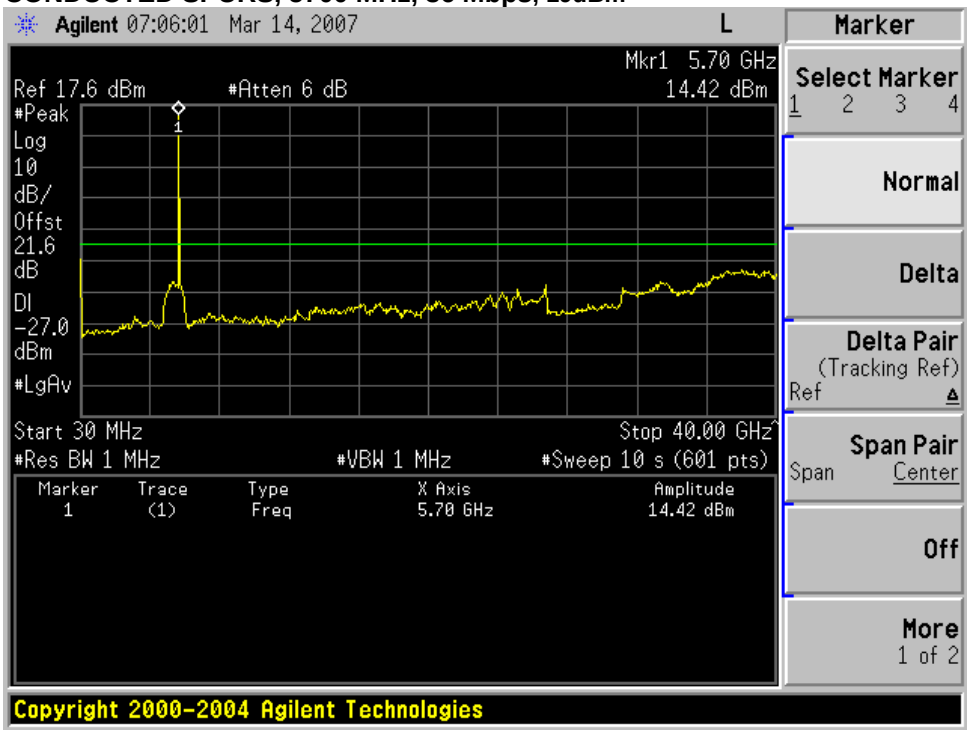
CONDUCTED SPURS, 5500 MHz, 36 Mbps, 19dBm



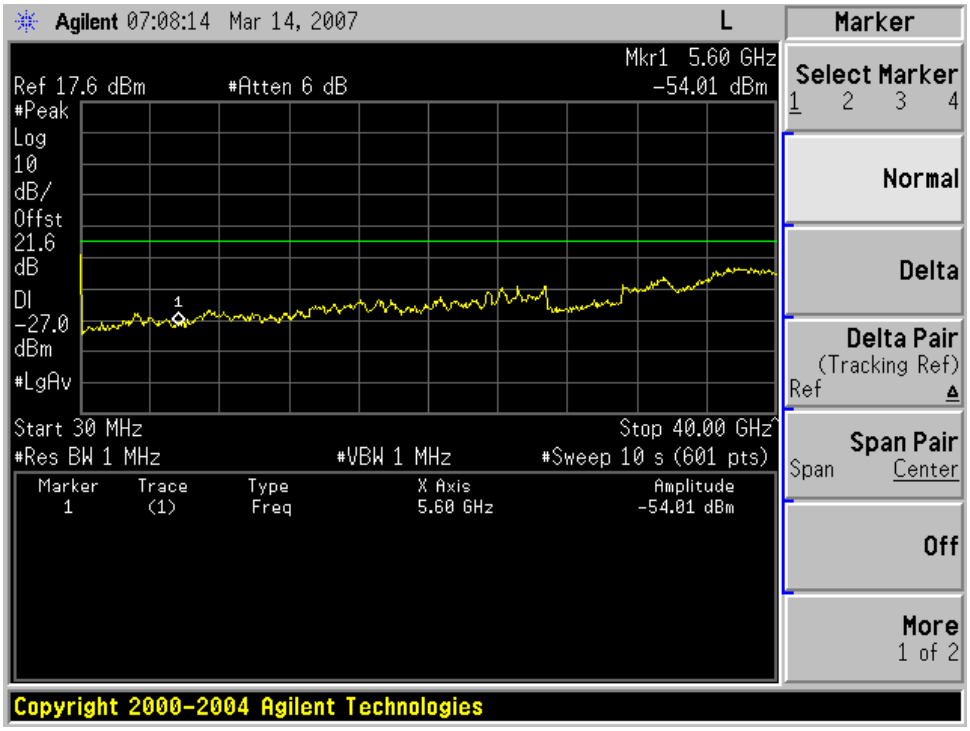
CONDUCTED SPURS, 5600 MHz, 36 Mbps, 19dBm



CONDUCTED SPURS, 5700 MHz, 36 Mbps, 19dBm



CONDUCTED Rx SPURS



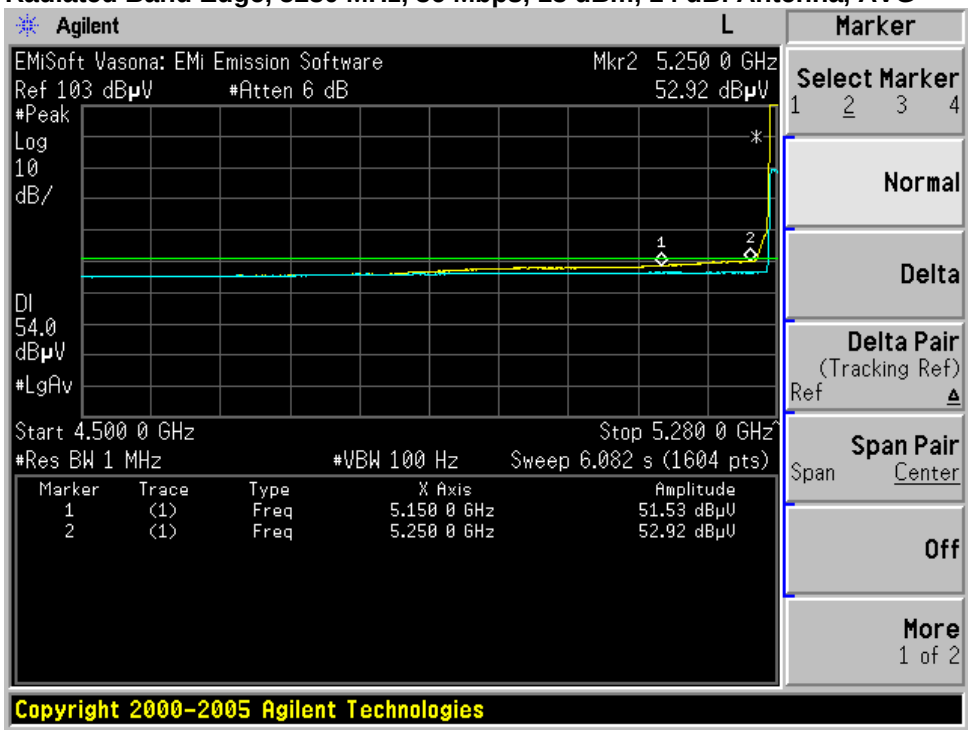
Appendix B: Emission Test Results
Testing Laboratory: Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134, USA

Radiated Band Edge Emissions

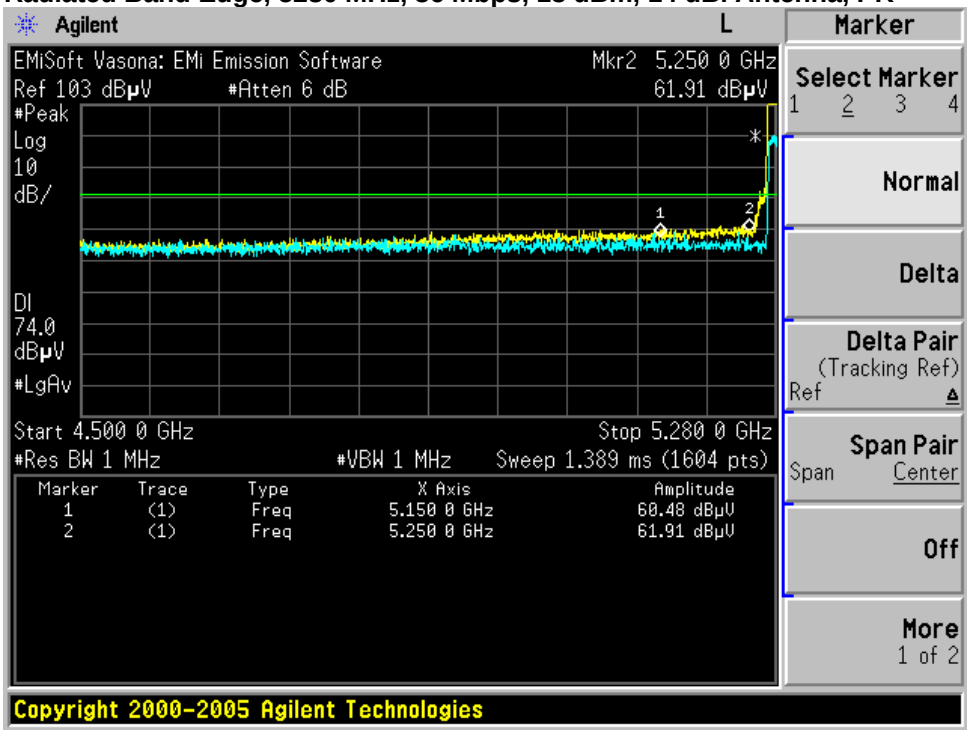
Radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a).

Frequency (MHz)	Data Rate (Mbps)	Radiated Bandedge Margin (dB)
5280	36	2.5
5320	36	0.7
5500	36	0.1
5700	36	0.9

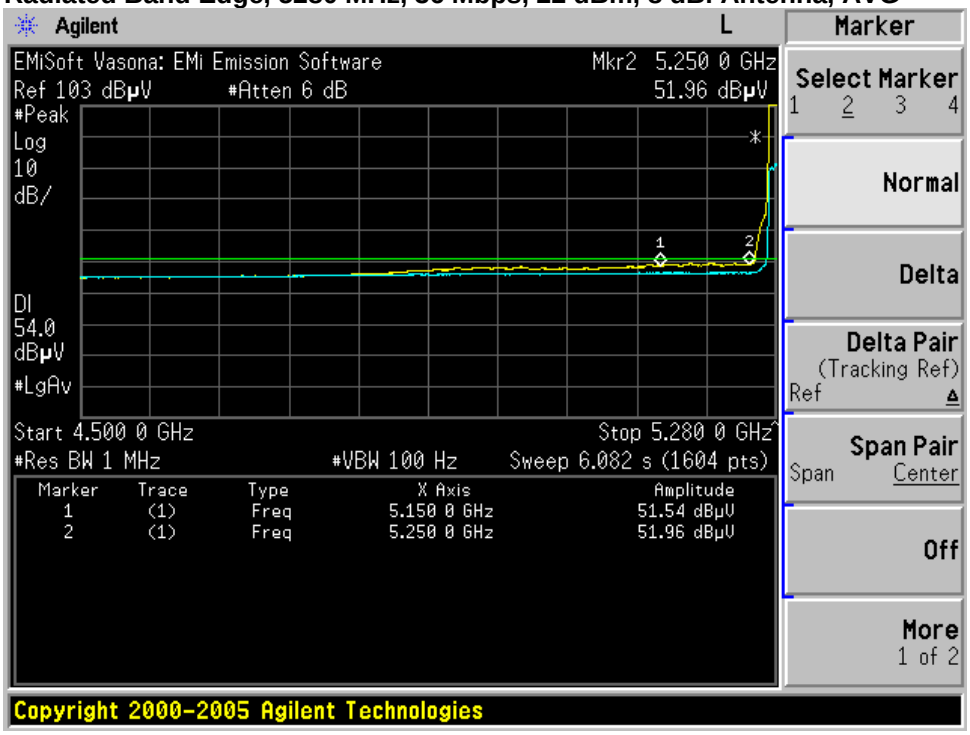
Radiated Band Edge, 5280 MHz, 36 Mbps, 13 dBm, 14 dBi Antenna, AVG



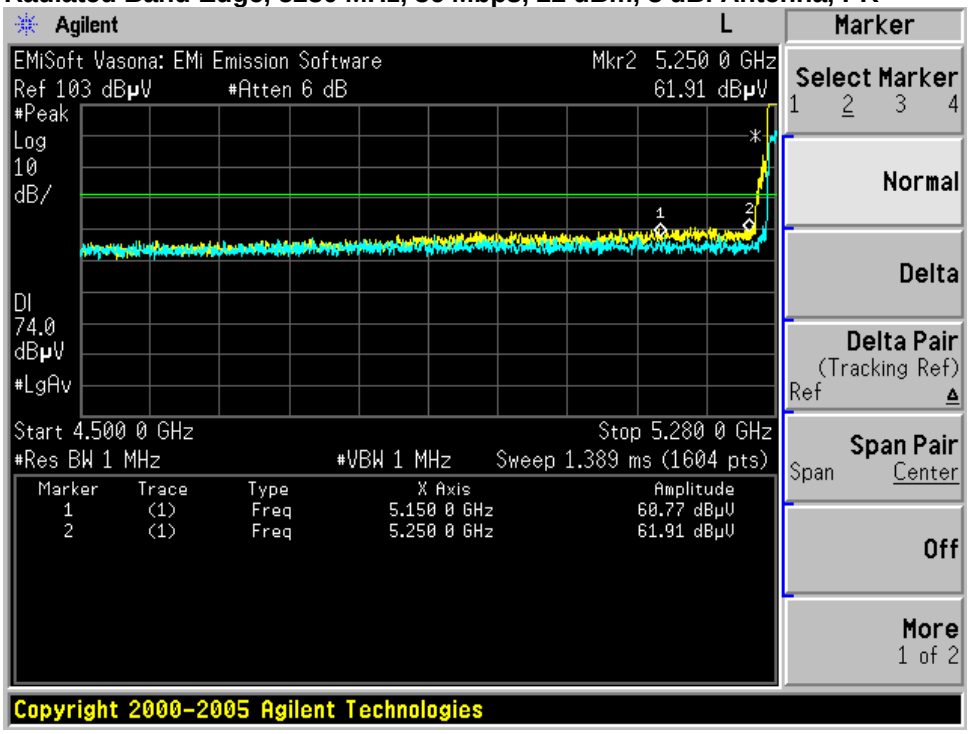
Radiated Band Edge, 5280 MHz, 36 Mbps, 13 dBm, 14 dBi Antenna, PK



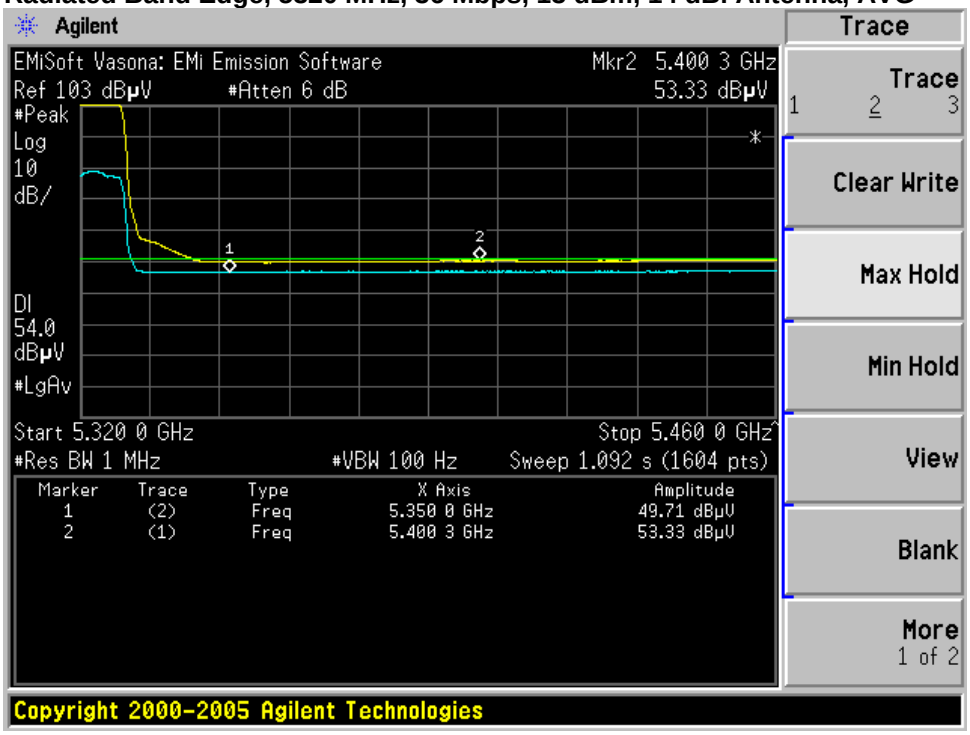
Radiated Band Edge, 5280 MHz, 36 Mbps, 22 dBm, 8 dBi Antenna, AVG



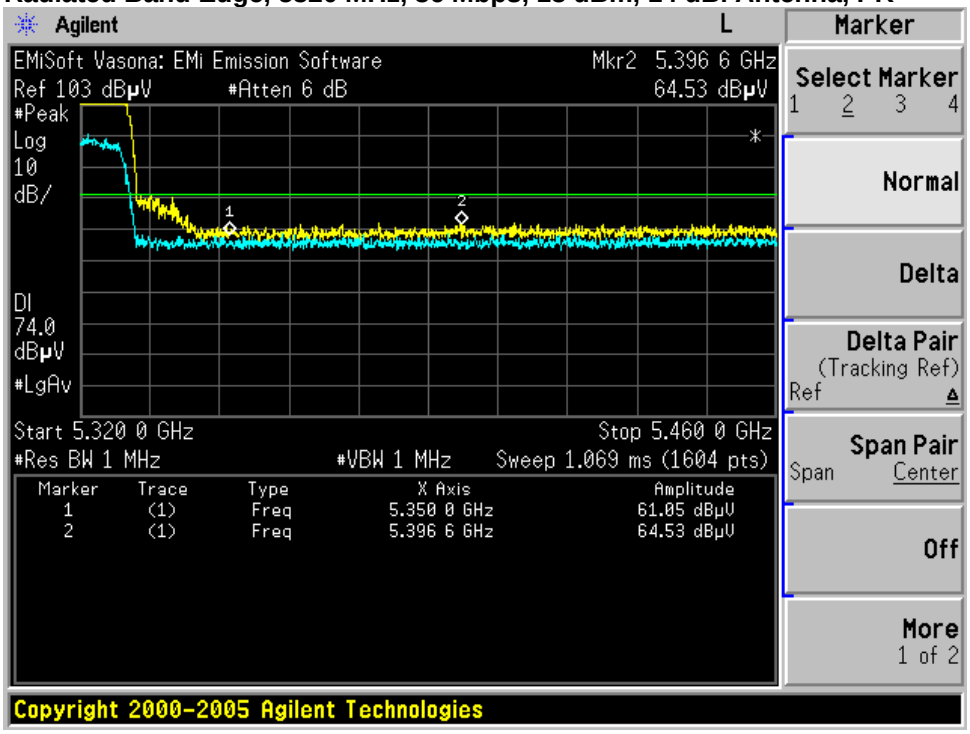
Radiated Band Edge, 5280 MHz, 36 Mbps, 22 dBm, 8 dBi Antenna, PK



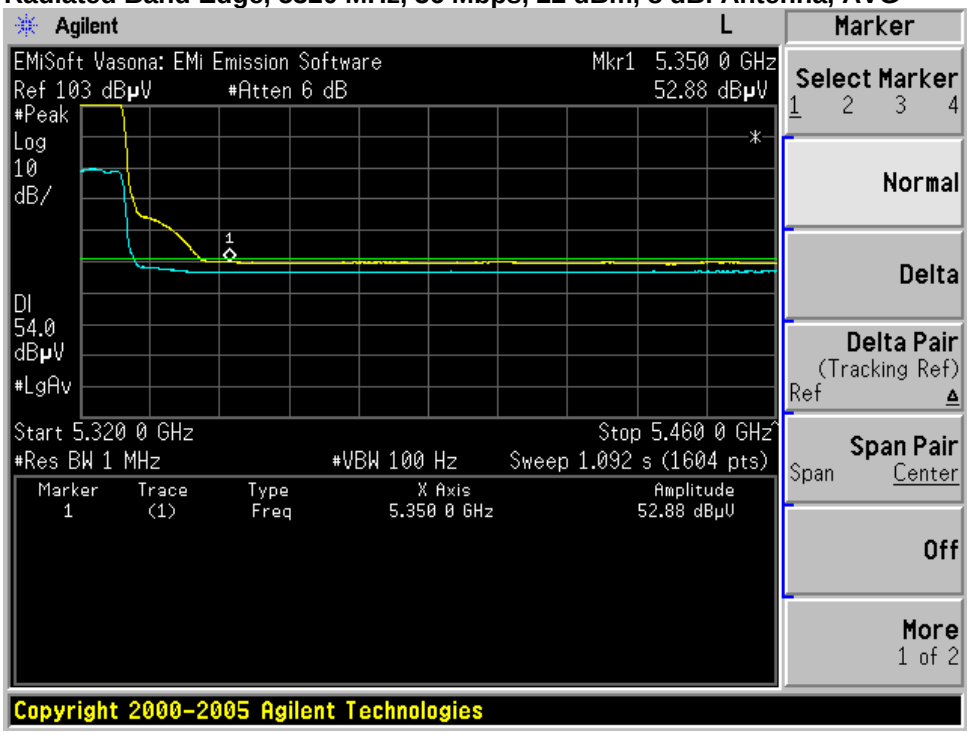
Radiated Band Edge, 5320 MHz, 36 Mbps, 13 dBm, 14 dBi Antenna, AVG



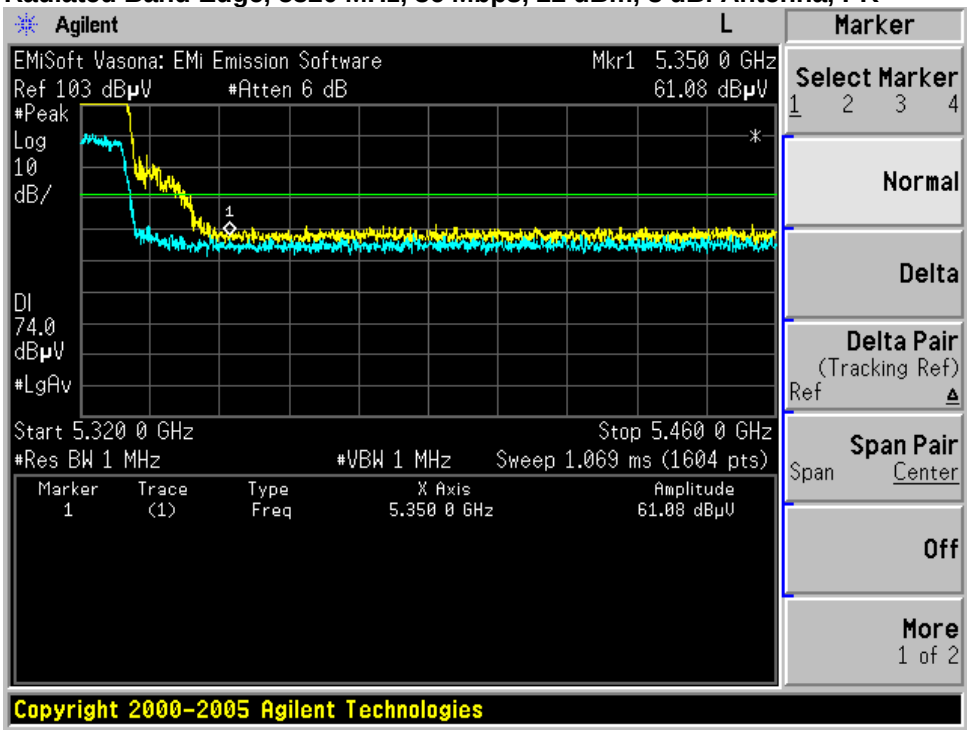
Radiated Band Edge, 5320 MHz, 36 Mbps, 13 dBm, 14 dBi Antenna, PK



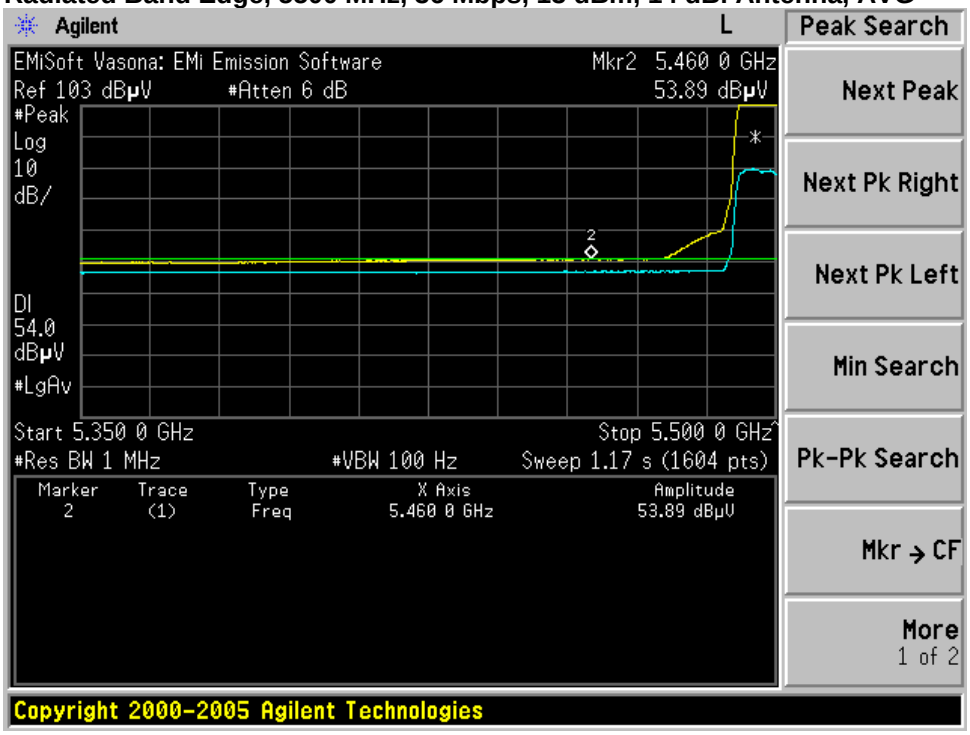
Radiated Band Edge, 5320 MHz, 36 Mbps, 22 dBm, 8 dBi Antenna, AVG



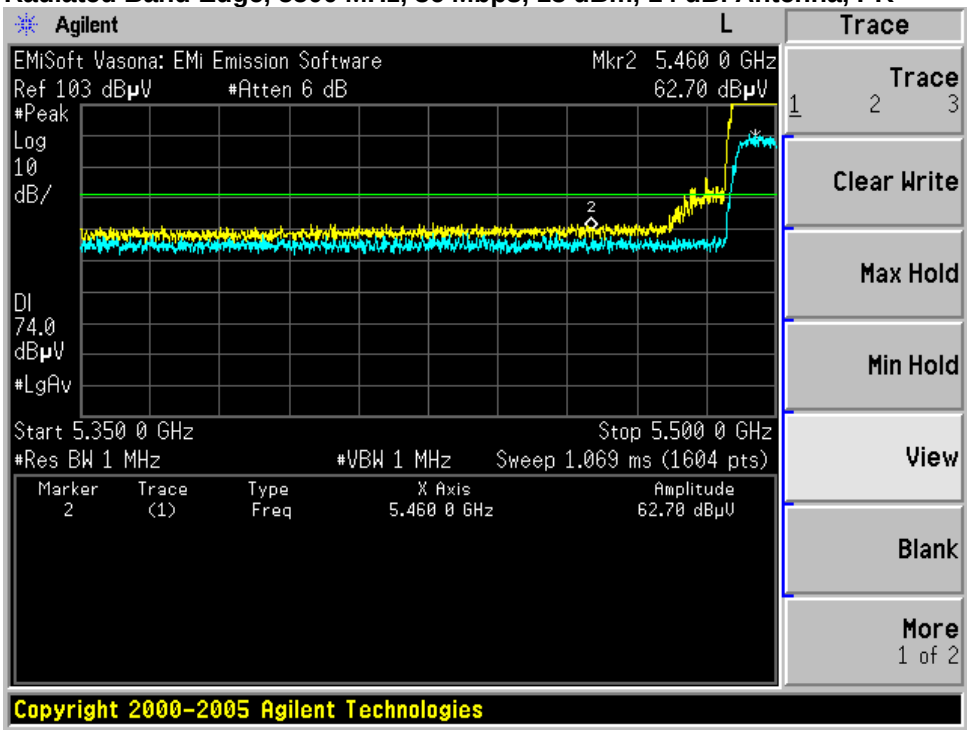
Radiated Band Edge, 5320 MHz, 36 Mbps, 22 dBm, 8 dBi Antenna, PK



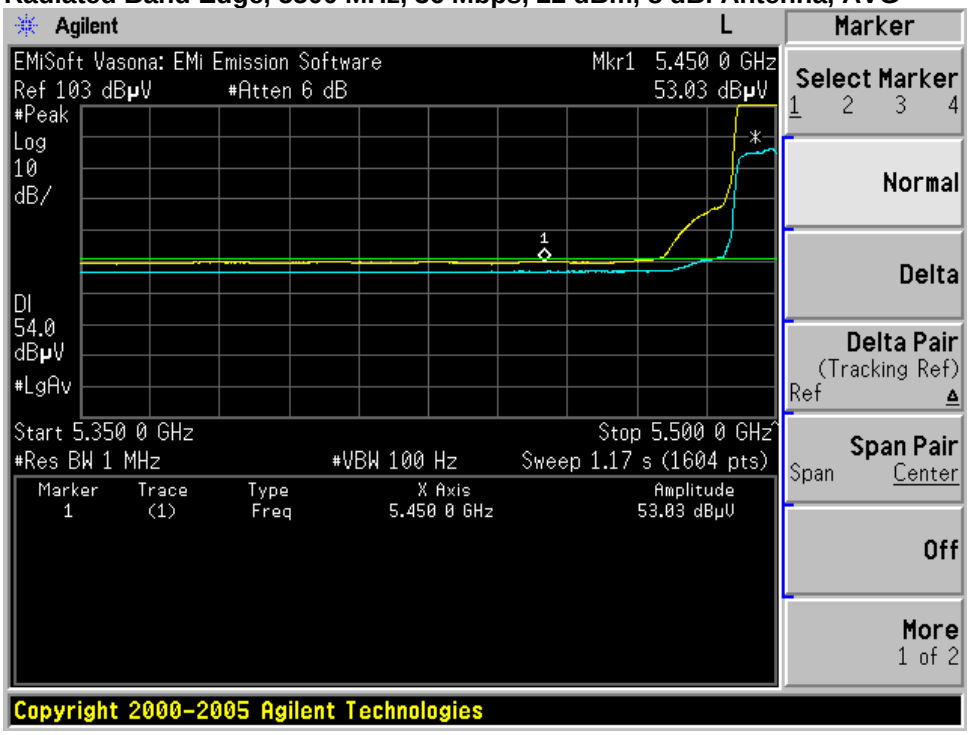
Radiated Band Edge, 5500 MHz, 36 Mbps, 13 dBm, 14 dBi Antenna, AVG



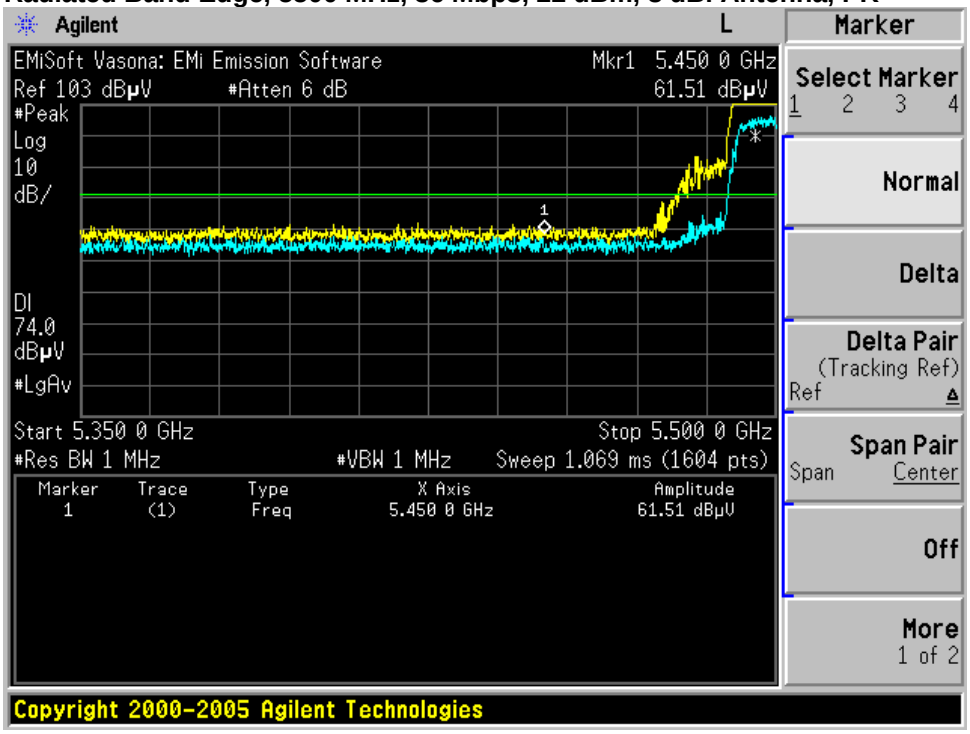
Radiated Band Edge, 5500 MHz, 36 Mbps, 13 dBm, 14 dBi Antenna, PK



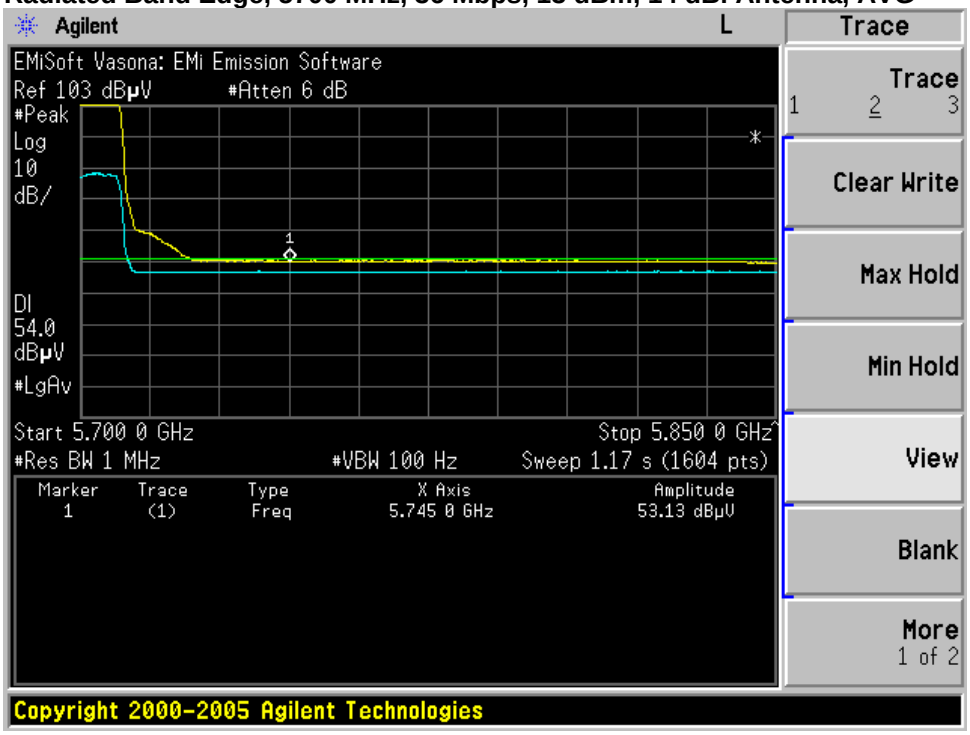
Radiated Band Edge, 5500 MHz, 36 Mbps, 22 dBm, 8 dBi Antenna, AVG



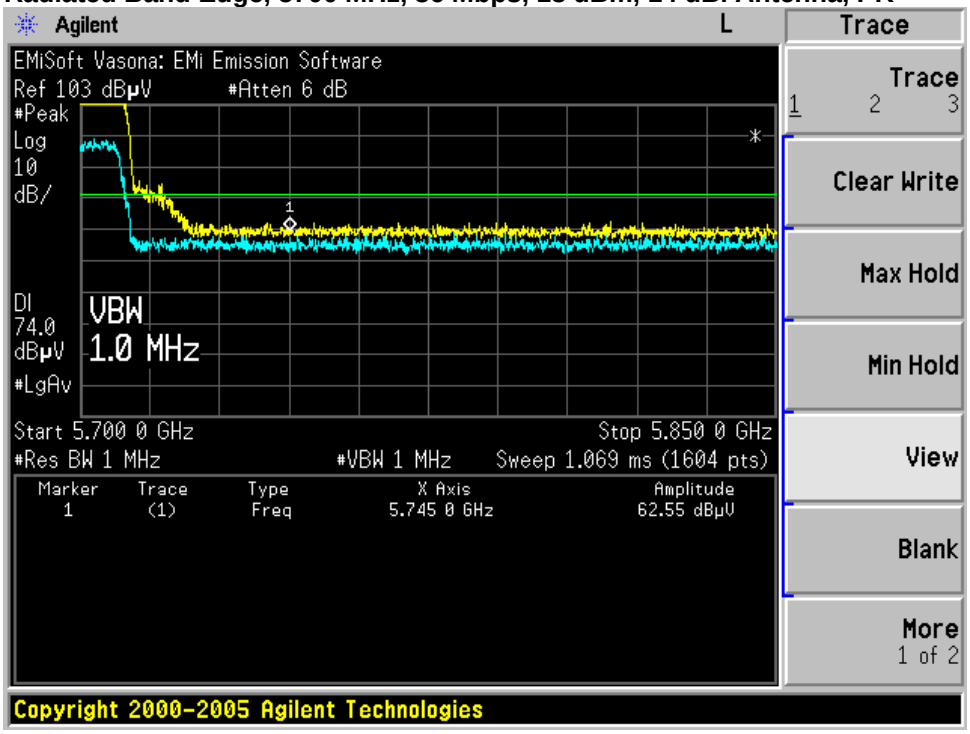
Radiated Band Edge, 5500 MHz, 36 Mbps, 22 dBm, 8 dBi Antenna, PK



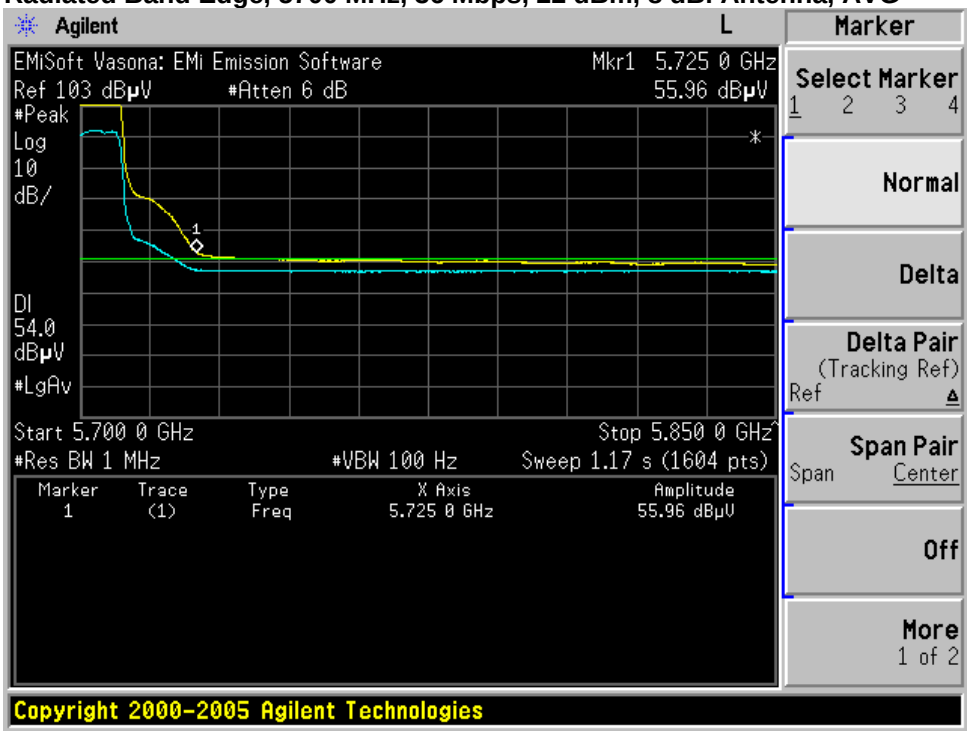
Radiated Band Edge, 5700 MHz, 36 Mbps, 13 dBm, 14 dBi Antenna, AVG



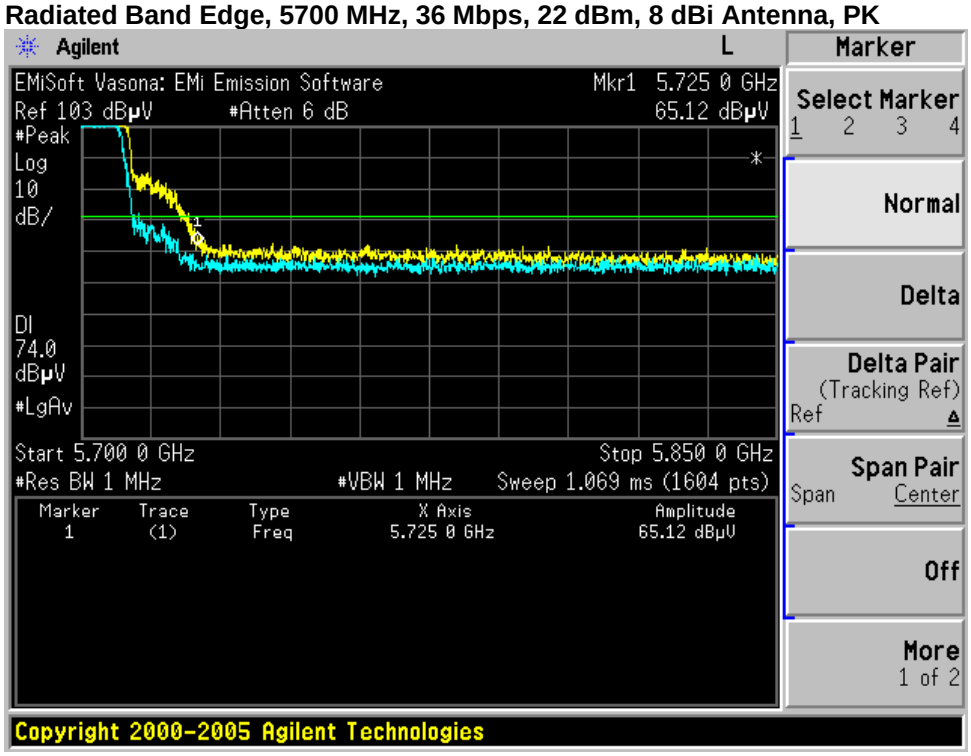
Radiated Band Edge, 5700 MHz, 36 Mbps, 13 dBm, 14 dBi Antenna, PK



Radiated Band Edge, 5700 MHz, 36 Mbps, 22 dBm, 8 dBi Antenna, AVG



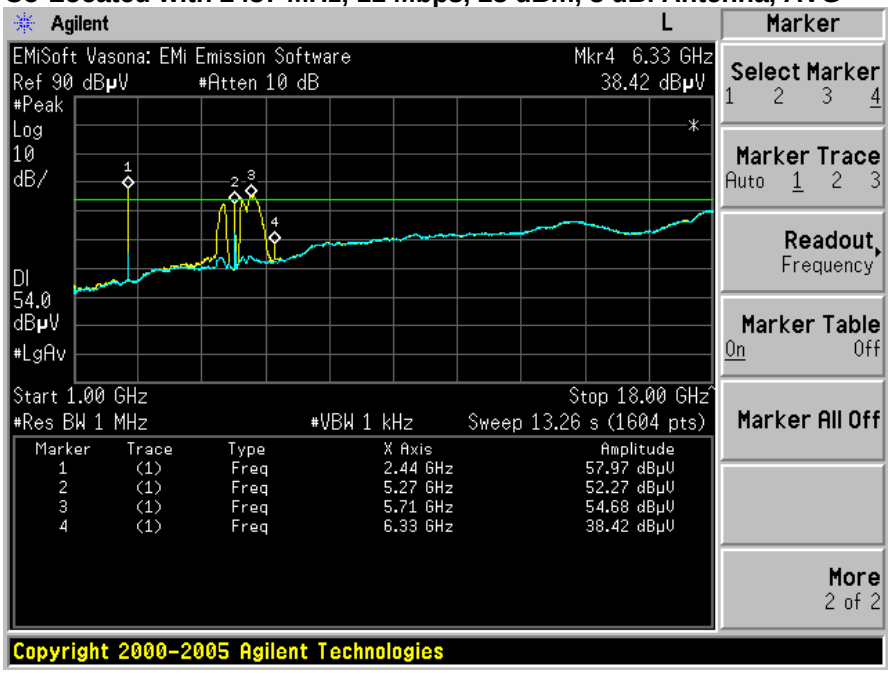
Radiated Band Edge, 5700 MHz, 36 Mbps, 22 dBm, 8 dBi Antenna, PK



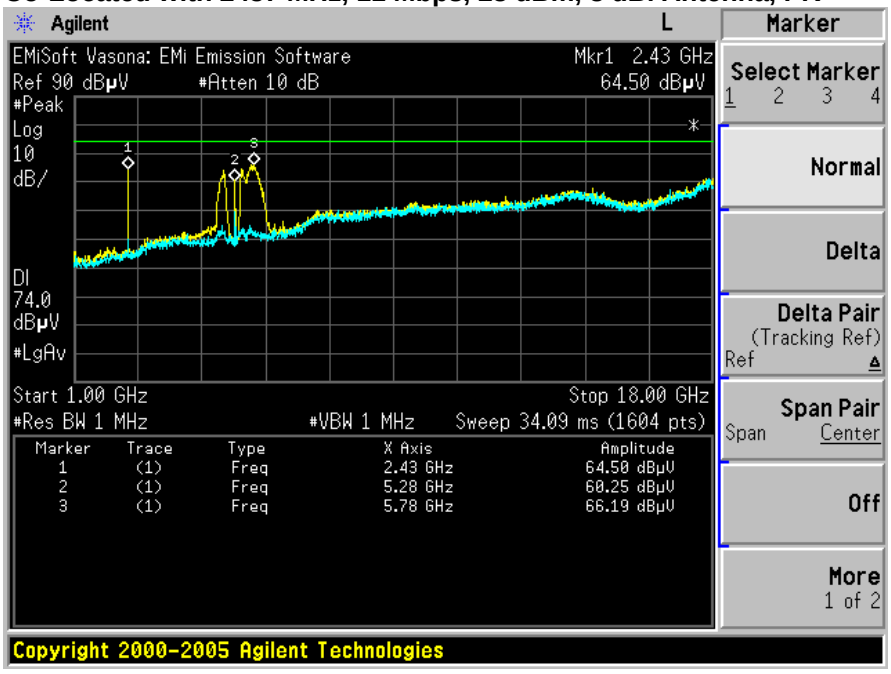
Radiated Spurs and Harmonics with All Antennas

There were no measurable emissions above 18GHz for any of the channel/antenna combinations. The data is a worst case representation of all configurations.

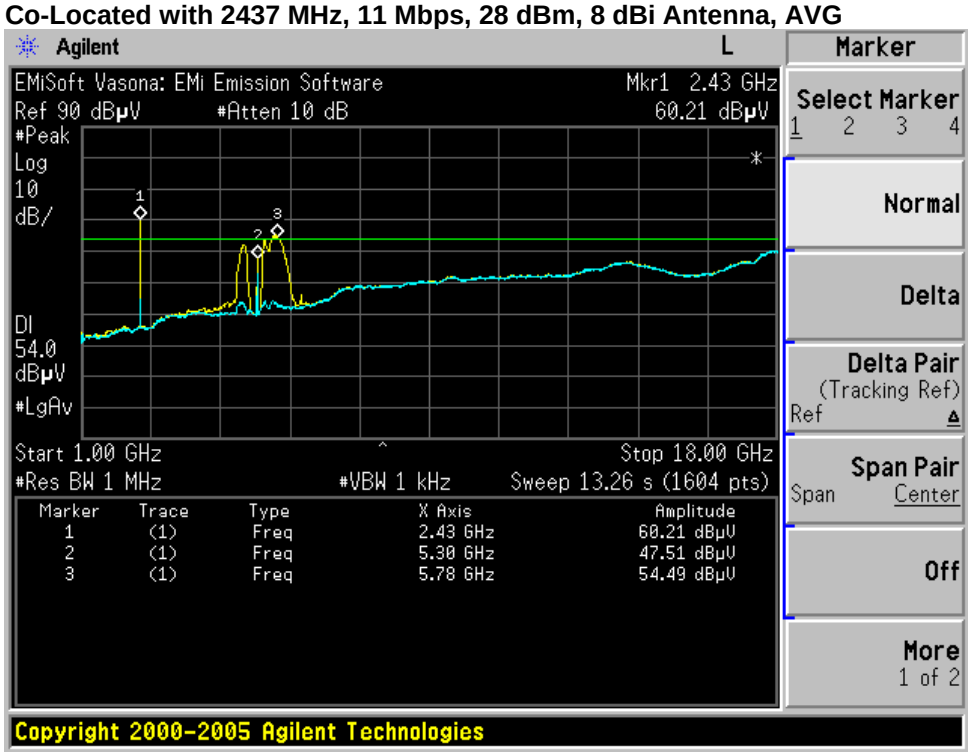
Radiated Spurious Emissions, 5280 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, AVG



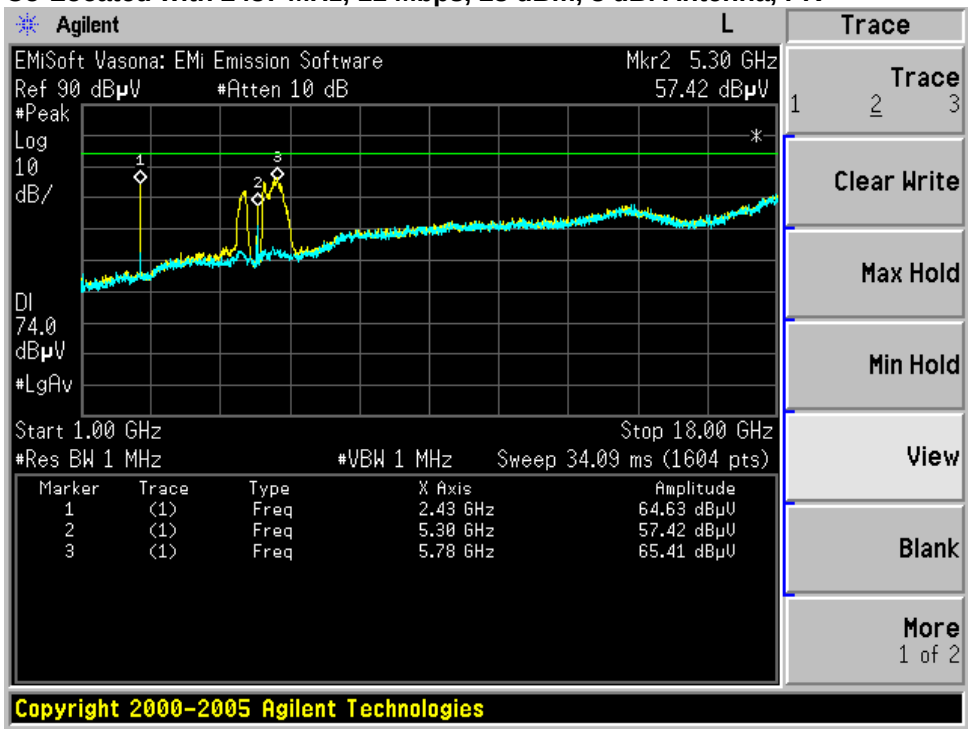
Radiated Spurious Emissions, 5280 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, PK



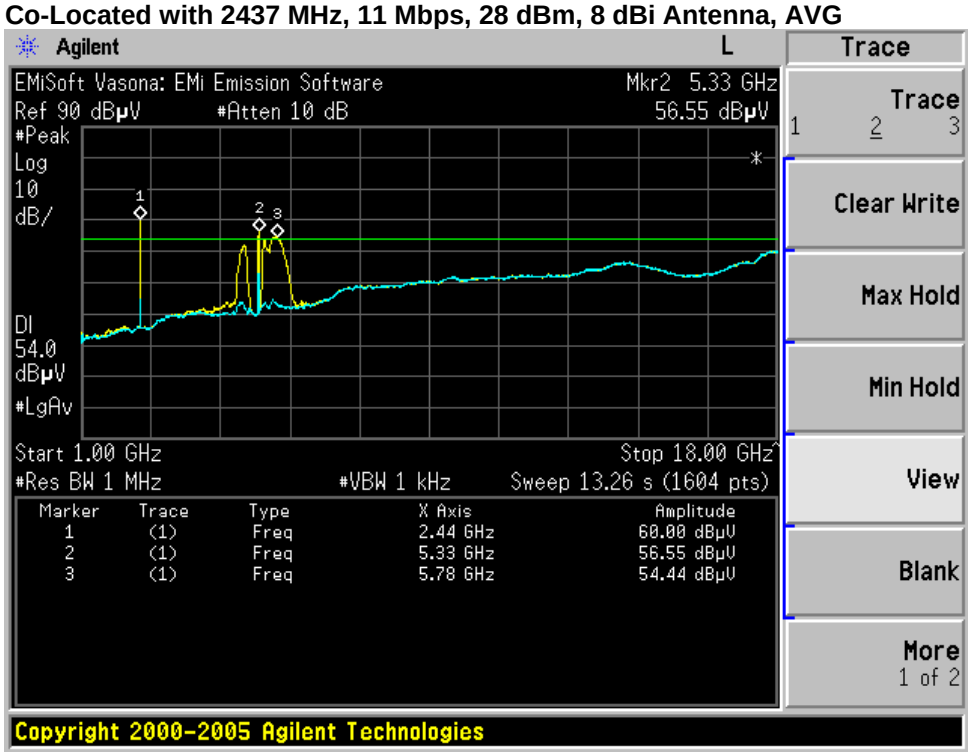
Radiated Spurious Emissions, 5300 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, AVG



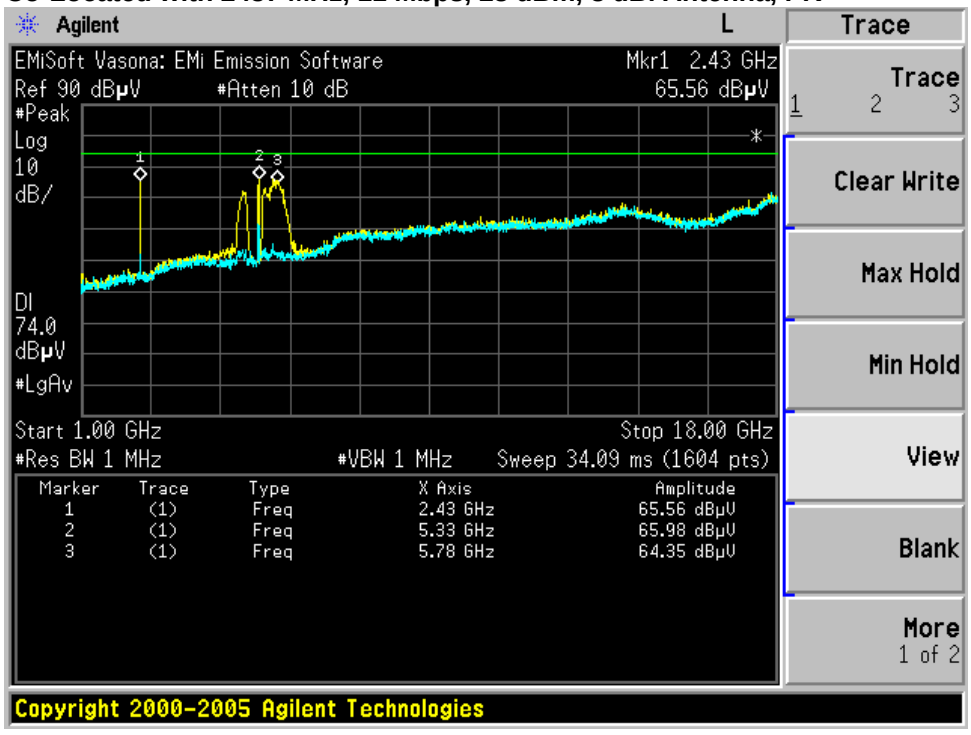
Radiated Spurious Emissions, 5300 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, PK



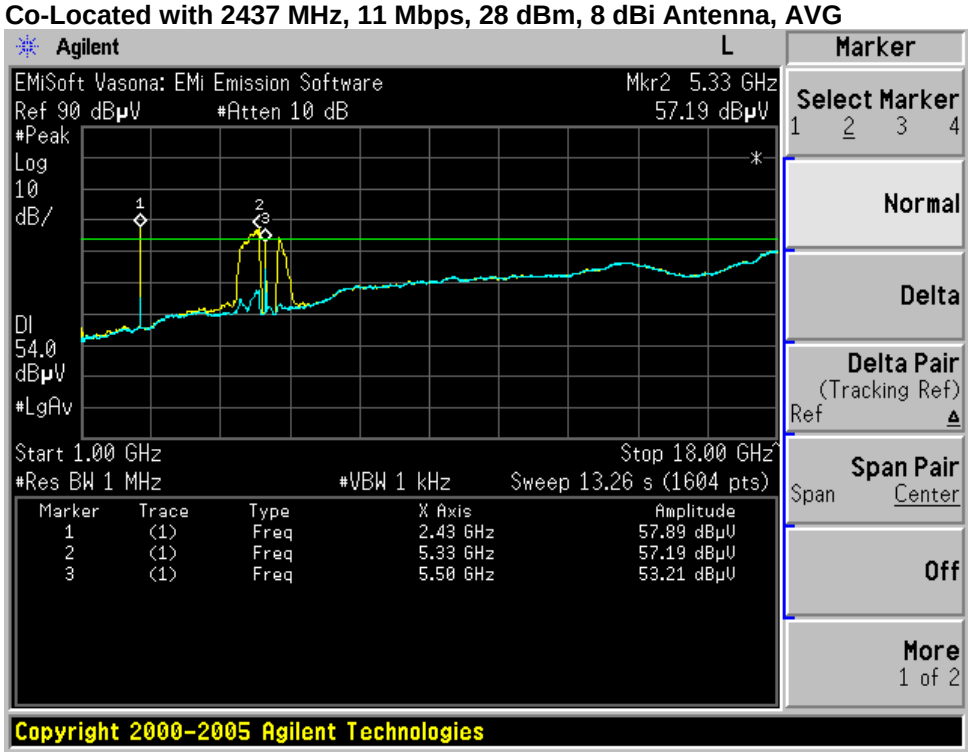
Radiated Spurious Emissions, 5320 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, AVG



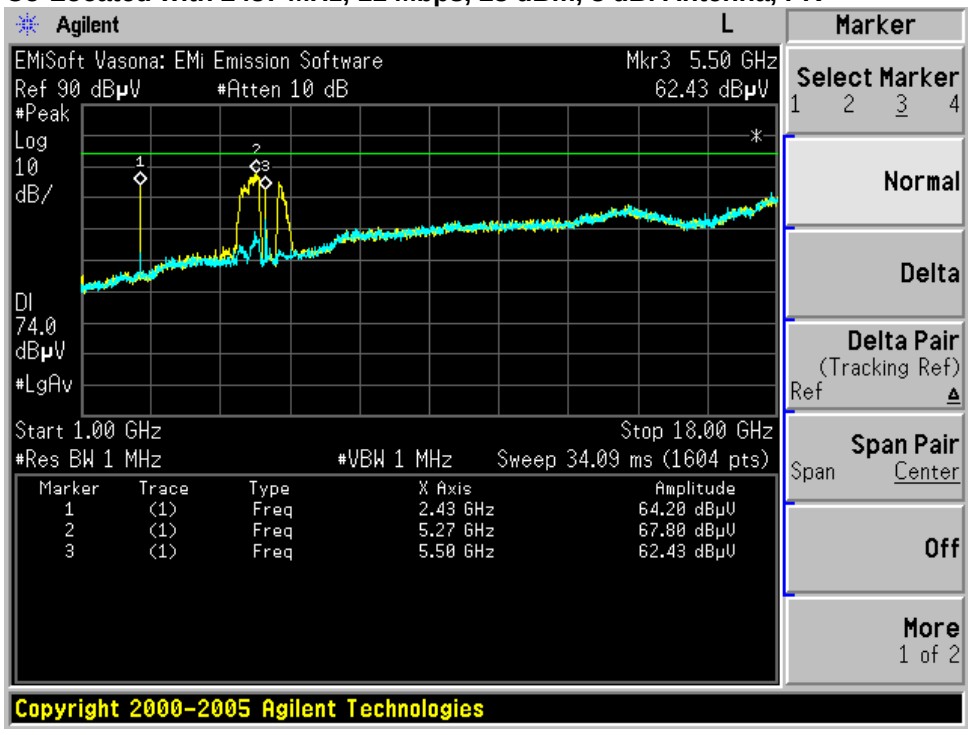
Radiated Spurious Emissions, 5320 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, PK



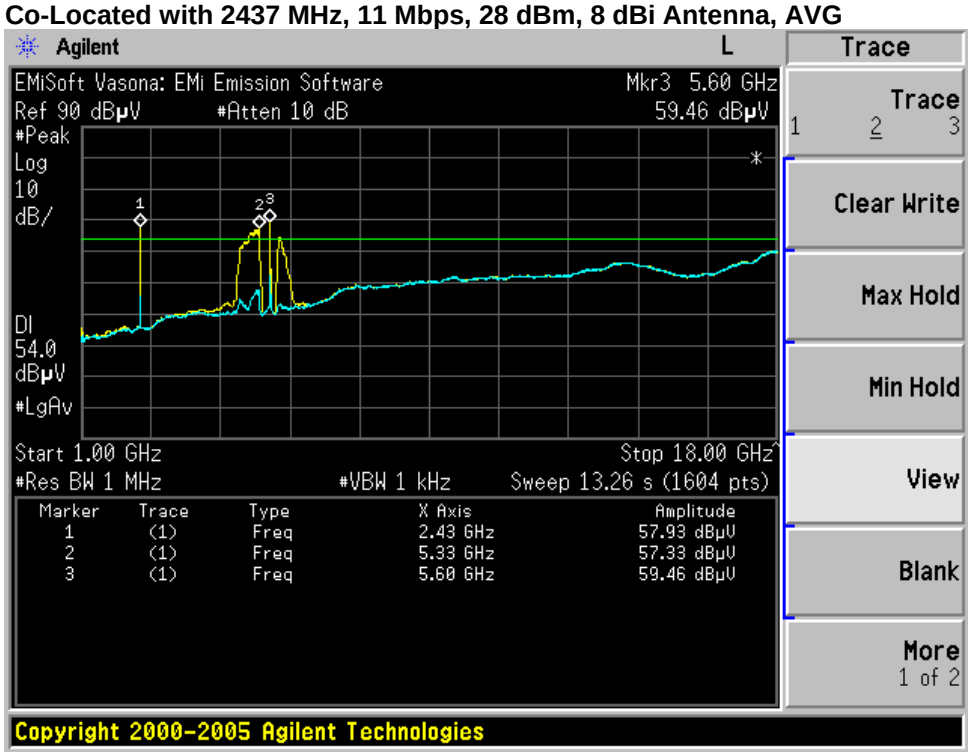
Radiated Spurious Emissions, 5500 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, AVG



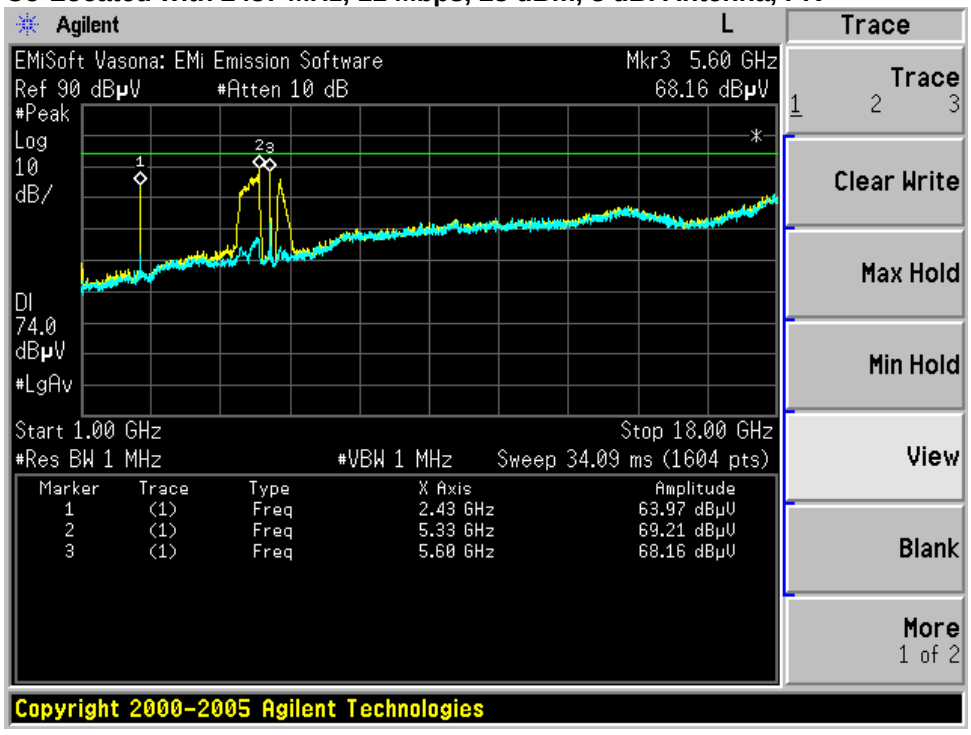
Radiated Spurious Emissions, 5500 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, PK



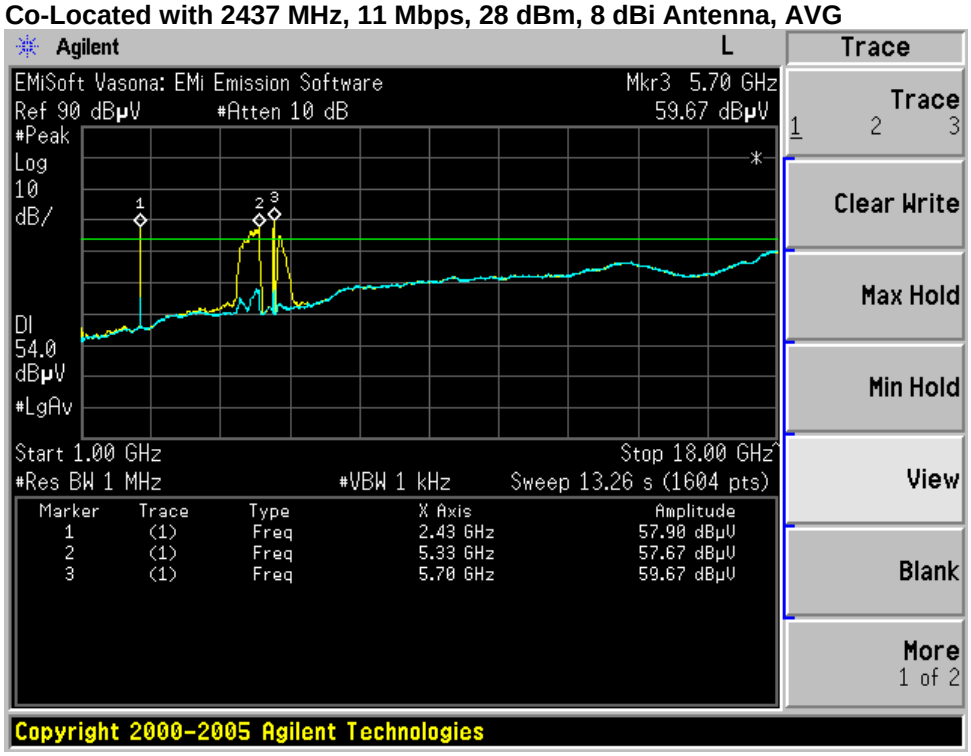
Radiated Spurious Emissions, 5600 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, AVG



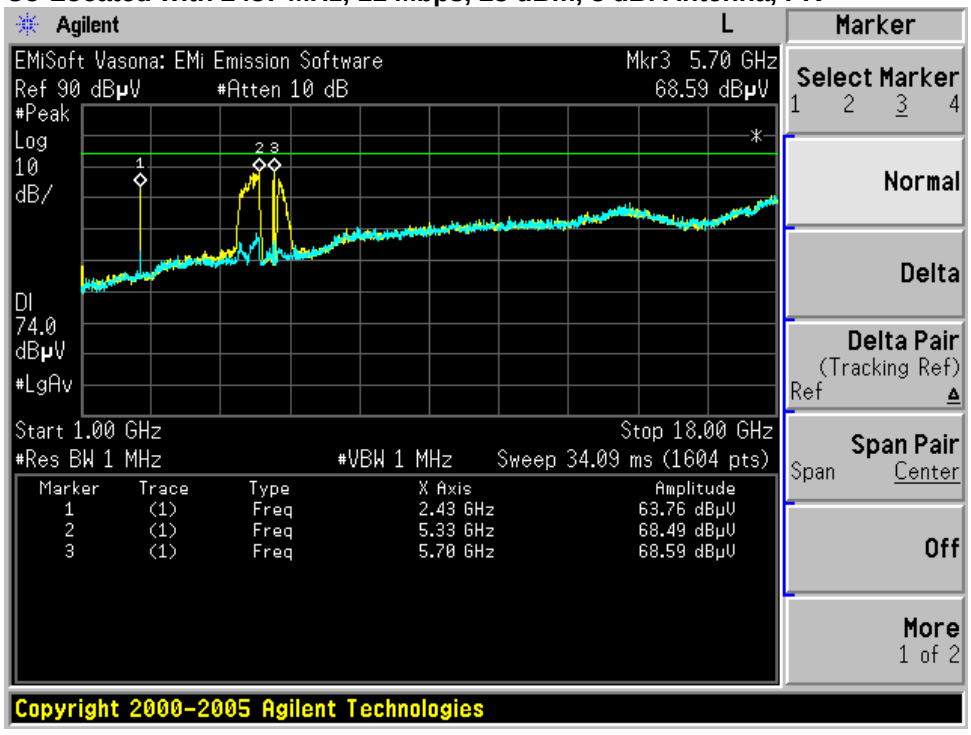
Radiated Spurious Emissions, 5600 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, PK



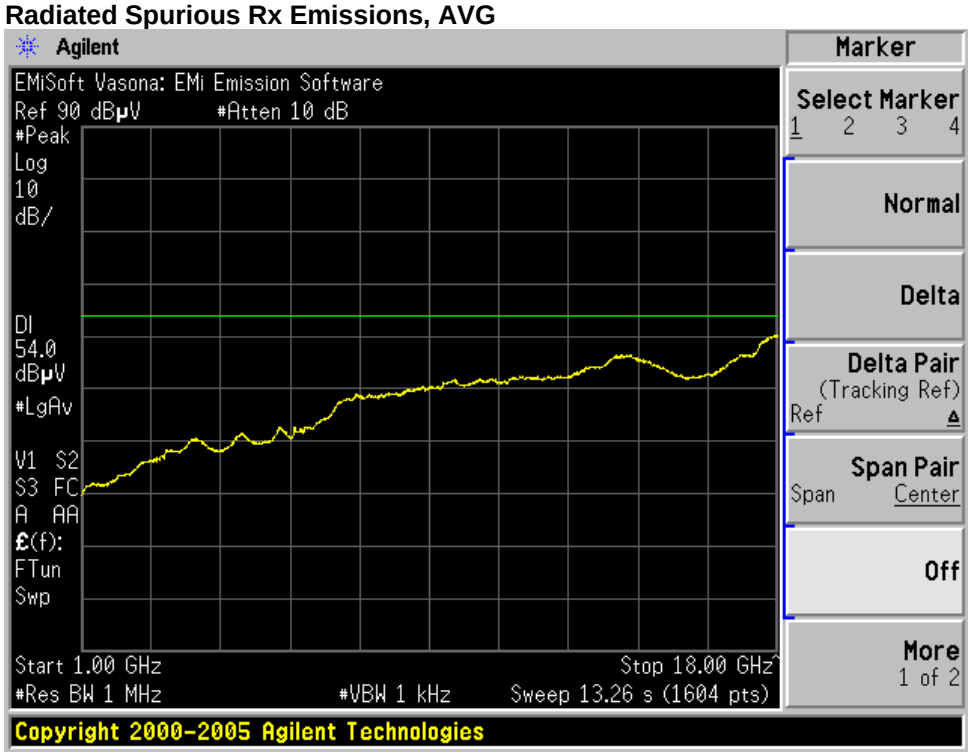
Radiated Spurious Emissions, 5700 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, AVG



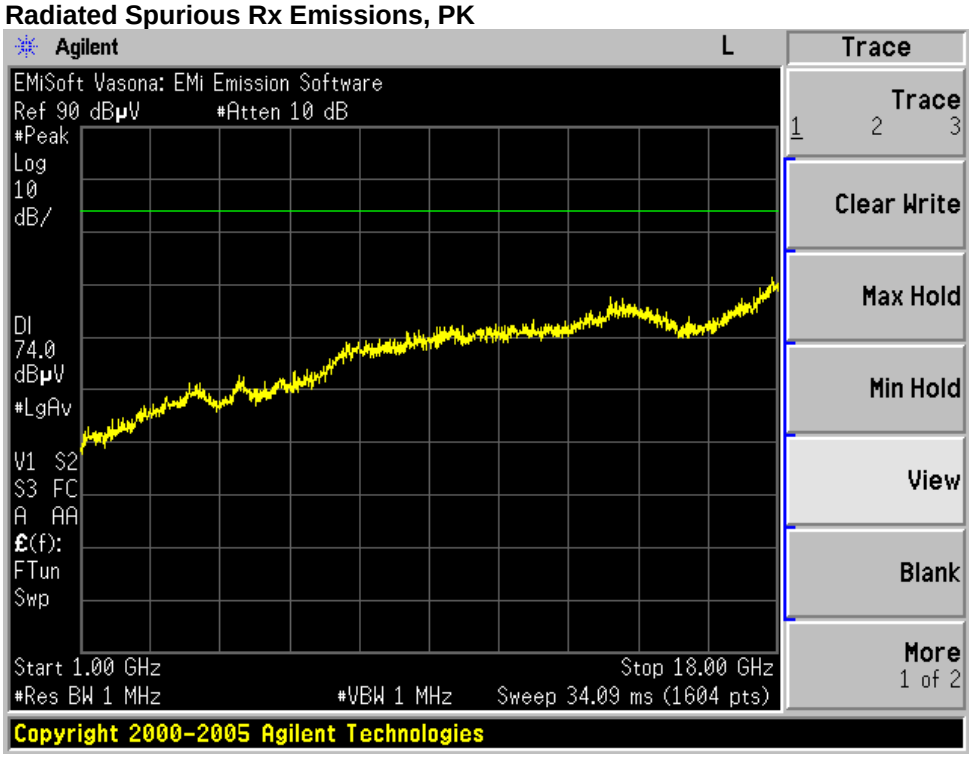
Radiated Spurious Emissions, 5700 MHz, 36 Mbps, 22 dBm, 14 dBi Antenna Co-Located with 2437 MHz, 11 Mbps, 28 dBm, 8 dBi Antenna, PK



Radiated Spurious Rx Emissions, AVG



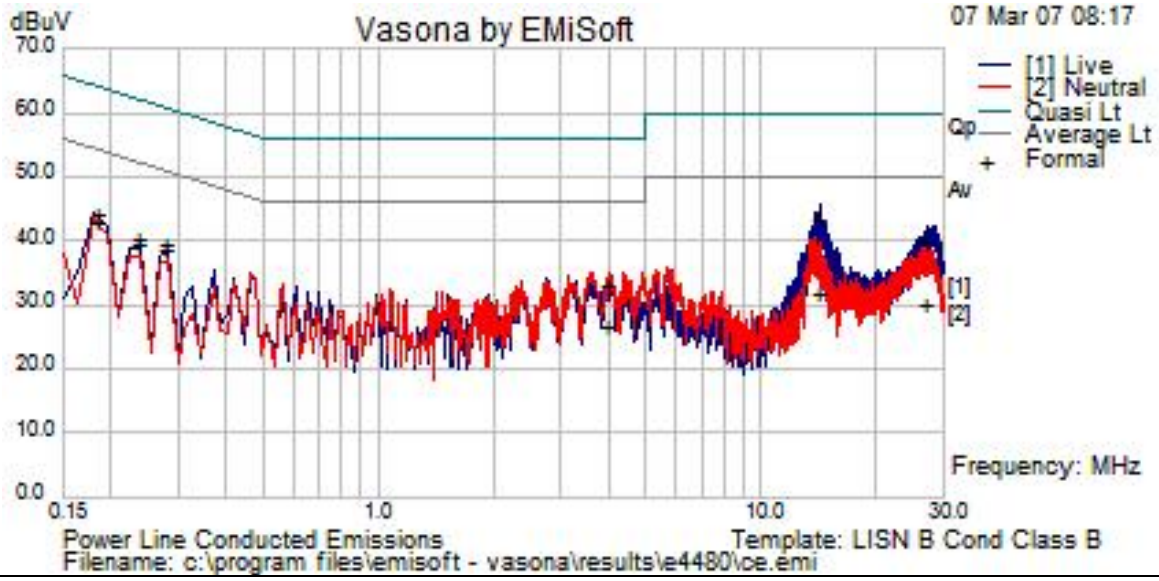
Radiated Spurious Rx Emissions, PK



Powerline Conducted emissions

Test Number: 26067 **Spec ID:** 484				
Basic Standard	**Applied to**	**Class**	**Freq Range**	**Test Details / Comments**
CFR47 Part 15.207 (LP0002 2.2.3, RSS210)	AC Power Line	B	0.150MHz - 30MHz	
Operating Mode	**Mode :** 1, Continuous			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

Subtest Number: 26067 - 1	**Subtest Date:** 07-Mar-2007
Engineer	James Nicholson
Lab Information	Building P, 10m Anechoic
Subtest Results	
Line Under Test	Power Input
Transducer	LISN
Subtest Result	Pass
Highest Frequency	30.0
Lowest Frequency	0.15
Comments on the above Test Results	No further comments



Title: N/A

Test Results Table

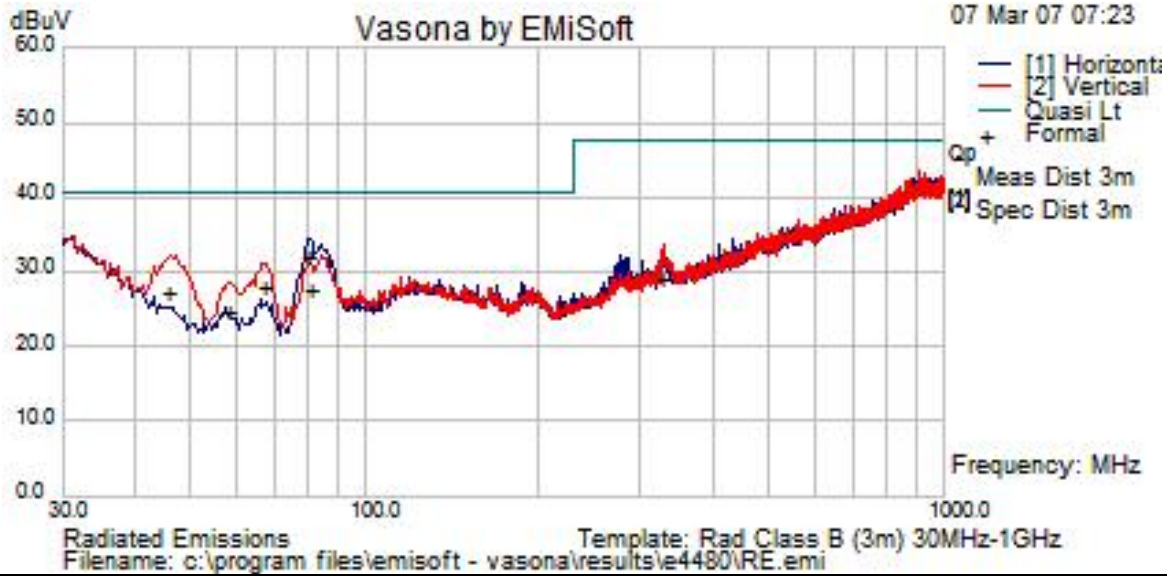
Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.187	20.2	20.3	0.2	40.8	Av	L	54.2	-13.4	Pass	
0.187	21.5	20.3	0.2	42	Qp	L	64.2	-22.1	Pass	
0.236	17.8	20.2	0.1	38.2	Qp	L	62.2	-24	Pass	
0.236	16.9	20.2	0.1	37.3	Av	L	52.2	-14.9	Pass	
0.283	17.2	20.2	0.1	37.6	Qp	L	60.7	-23.2	Pass	
0.283	16.4	20.2	0.1	36.6	Av	L	50.7	-14.1	Pass	
4.03	10.9	20	0.1	31	Qp	N	56	-25	Pass	
4.03	4.3	20	0.1	24.4	Av	N	46	-21.6	Pass	
14.338	20.9	20.2	0.2	41.3	Qp	L	60	-18.7	Pass	
14.338	9.3	20.2	0.2	29.7	Av	L	50	-20.3	Pass	
27.091	16.1	20.5	1.2	37.8	Qp	L	60	-22.2	Pass	
27.091	6.3	20.5	1.2	28	Av	L	50	-22	Pass	

Unintentional Radiated emissions

Subtest Number: 26044 - 1	**Subtest Date:** 07-Mar-2007
Engineer	James Nicholson
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	RE
Subtest Result	Pass
Highest Frequency	1000.0
Lowest Frequency	30.0
Comments on the above Test Results	No further comments

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: N/A

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
46.162	16.9	0.7	7.8	25.4	Qp	V	138	216	40.5	-15.1	Pass	
58.599	16.5	0.7	5.6	22.7	Qp	V	105	241	40.5	-17.8	Pass	
67.554	19	0.7	6.2	26	Qp	V	103	212	40.5	-14.4	Pass	
80.113	23.4	0.8	5.8	30.1	Qp	H	233	249	40.5	-10.4	Pass	
80.778	19.4	0.8	5.8	25.9	Qp	V	107	56	40.5	-14.6	Pass	
328.239	12.5	1.7	13.3	27.4	Qp	V	115	204	47.5	-20.1	Pass	

Maximum Permissible Exposure (MPE) Calculations

15.407: U-NII devices are subject to the radio frequency radiation exposure requirements specified in Sec. 1.1307(b), Sec. 2.1091 and Sec. 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a ``general population/uncontrolled'' environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

Given

E=√(30*P*G)/d and S=E^2/3770

where

E=Field Strength in Volts/meter
P=Power in Watts
G=Numeric Antenna Gain
d=Distance in meters
S=Power Density in mW/cm^2

Combine equations and rearrange the terms to express the distance as a function of the remaining variables:

d=√((30*P*G)/(3770*S))

Changing to units of power in mW and distance in cm, using:

P(mW)=P(W)/1000 d(cm)=100*d(m)

yields

d=100*√((30*(P/1000)*G)/(3770*S))
d=0.282*√(P*G/S)

where

d=Distance in cm
P=Power in mW
G=Numerica Antenna Gain
S=Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P(mW)=10^(P(dBm)/10) G(numeric)=10^(G(dBi)/10)

yields

d=0.282*10^((P+G)/20)/√S Equation (1)

and

s=((0.282*10^((P+G)/20))/d)^2 Equation (2)

where

d=MPE distance in cm
P=Power in dBm
G=Antenna Gain in dBi
S=Power Density in mW/cm^2

Equation (1) and the measured peak power are used to calculate the MPE distance. Note that for mobile or fixed location transmitters such as an access point, the minimum separation distance is 20 cm even if the calculations indicate that the MPE distance may be less.

S=1mW/cm^2 maximum. Using the peak power levels and antenna gains recorded in the test report along with Equation 1 above, the MPE distances are calculated as follows.

Frequency (MHz)	Bit Rate (Mbps)	Power Density (mW/cm^2)	Peak Transmit Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)	Limit (cm)	Margin (cm)
5280	36	1	17.2	8	5.13	20	14.87
5300	36	1	17.1	8	5.07	20	14.93
5320	36	1	17.0	8	5.01	20	14.99
5500	36	1	17.9	8	5.56	20	14.44
5600	36	1	18.3	8	5.82	20	14.18
5700	36	1	17.6	8	5.37	20	14.63

MPE Calculations

To maintain compliance, installations will assure a separation distance of at least 50cm.

Using Equation 2, the MPE levels (s) at 20 cm are calculated as follows:

Frequency (MHz)	Bit Rate (Mbps)	MPE Distance (cm)	Peak Transmit Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Margin (mW/cm^2)
5280	36	20	17.2	8	0.07	1	0.93
5300	36	20	17.1	8	0.06	1	0.94
5320	36	20	17.0	8	0.06	1	0.94
5500	36	20	17.9	8	0.08	1	0.92
5600	36	20	18.3	8	0.08	1	0.92
5700	36	20	17.6	8	0.07	1	0.93

Dynamic Frequency Selection (DFS) Test Results

15.407: U-NII devices operating in the 5.25-5.35 GHz band and the 5.47-5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

U-NII devices operating in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems.

1.0 UNII Device Description

1. The AIR-RM1520A-A-K9 operates in the following bands:

    a. 5250-5350 MHz
    b. 5470-5725 MHz
    c. 5725-5850 MHz

2. The maximum EIRP of the 5GHz equipment is 26.4 dBm, and the minimum possible EIRP is 10 dBm.

    Below are the available 50 ohm antenna assemblies and their corresponding gains. 0dBi gain was used to set the -63 dBm threshold level (-64dBm +1 dB) during calibration of the test setup.

AIR-ANT5180V-N	4900-5850 MHz	8.0 dBi Omni-directional
AIR-ANT5114P-N	4900 -5850 MHz	14.0 dBi Patch
AIR-ANT5117S-N	4900 -5850 MHz	17.0 dBi 90-degree Sector

    Antenna gain measurement plots are included with this filing.

3. System testing was performed with the designated MPEG test file that streams full motion video at 30 frames per second from the Master to the Client IP based system.

4. This device does not exceed 27dBm eirp, so no transmit power control is implemented.

5. The Master requires 130 seconds to complete its power-on cycle.

6. Information regarding the parameters of the detected Radar Waveforms is not available to the end user.

7. For the 5250-5350 MHz and 5470-5725 MHz bands, the Master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm.

2.0 DFS Detection Thresholds

1. **Interference Threshold values, Master or Client incorporating In-Service Monitoring**

Maximum Transmit Power	**Value (see note)**
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.	

2. **DFS Response requirement values**

Parameter	**Value**
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 80% of the 99% power bandwidth See Note 3.

Note 1: The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows:

- For the Short pulse radar Test Signals this instant is the end of the *Burst*.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar *Burst* generated.
- For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate *Channel* changes (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the *U-NII Detection Bandwidth* detection test, radar type 1 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.

3.0 Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

1. **Short Pulse Radar Test Waveforms**

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

A minimum of 30 unique waveforms are required for each of the short pulse radar types 2 through 4. For short pulse radar type 1, the same waveform is used a minimum of 30 times. If more than 30 waveforms are used for short pulse radar types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

2. **Long Pulse Radar Test Waveform**

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses per *Burst*	Number of *Bursts*	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse radar test signal. If more than 30 waveforms are used for the Long Pulse radar test signal, then each additional waveform must also be unique and not repeated from the previous waveforms.

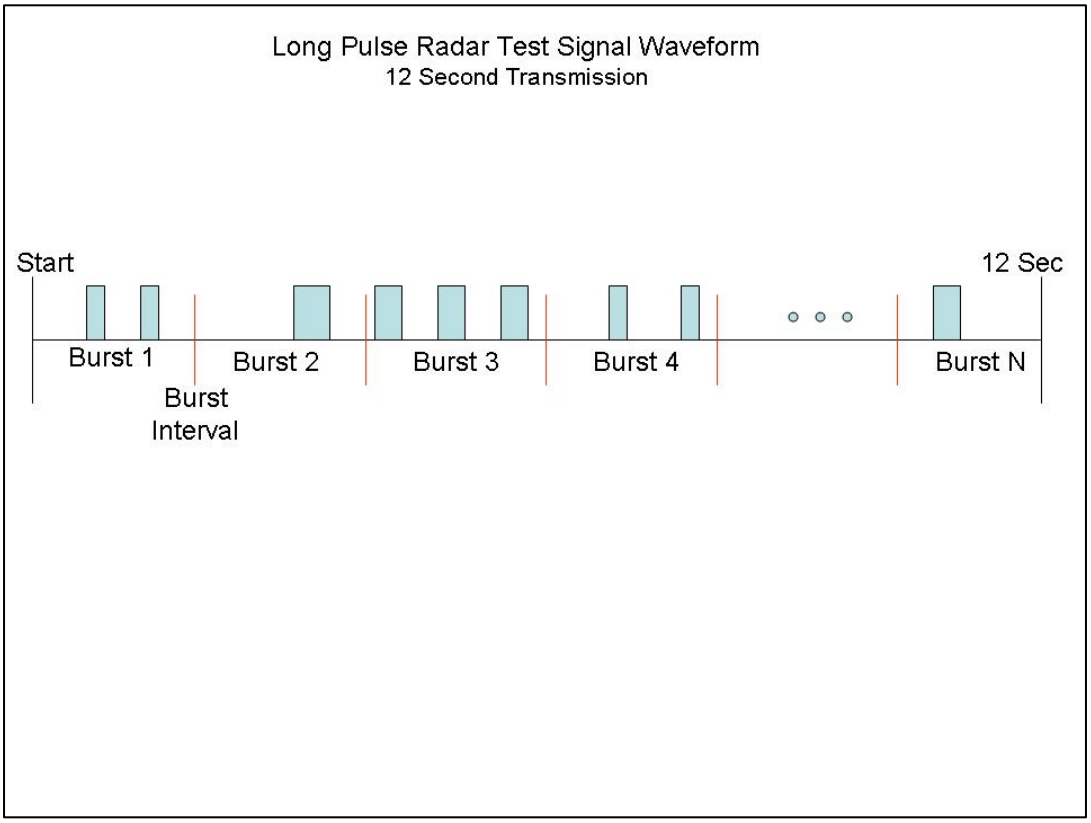
Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst_Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.

4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear FM chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the time between the first and second pulses is chosen independently of the time between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst_Count. Each interval is of length (12,000,000 / Burst_Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst_Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen independently.

A representative example of a Long Pulse radar test waveform:

1) The total test signal length is 12 seconds.
2) 8 Bursts are randomly generated for the Burst_Count.
3) Burst 1 has 2 randomly generated pulses.
4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
5) The PRI is randomly selected to be at 1213 microseconds.
6) Bursts 2 through 8 are generated using steps 3 – 5.
7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecond range).



Graphical Representation of a Long Pulse radar Test Waveform

3. **Frequency Hopping Radar Test Waveform**

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	9	.333	300	70%	30

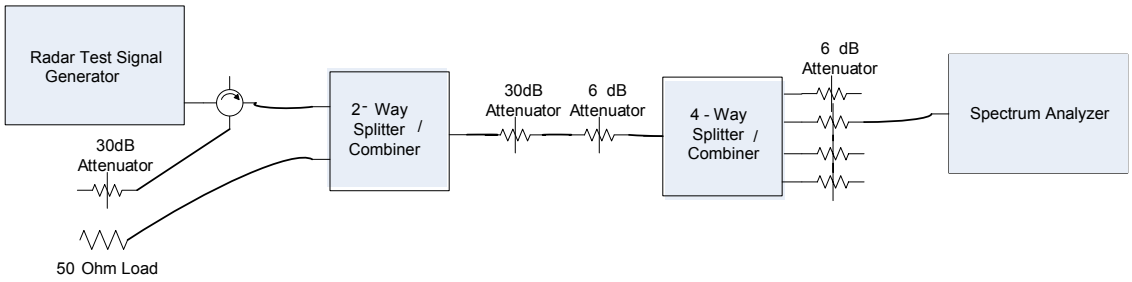
For the Frequency Hopping Radar Type, the same *Burst* parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected[1] from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

4.0 Radar Waveform Calibration

1. The following equipment setup was used to calibrate the conducted Radar Waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were no transmissions by either the Master or Client Device. The spectrum analyzer was switched to the zero span (Time Domain) mode at the frequency of the Radar Waveform generator. Peak detection was utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz.

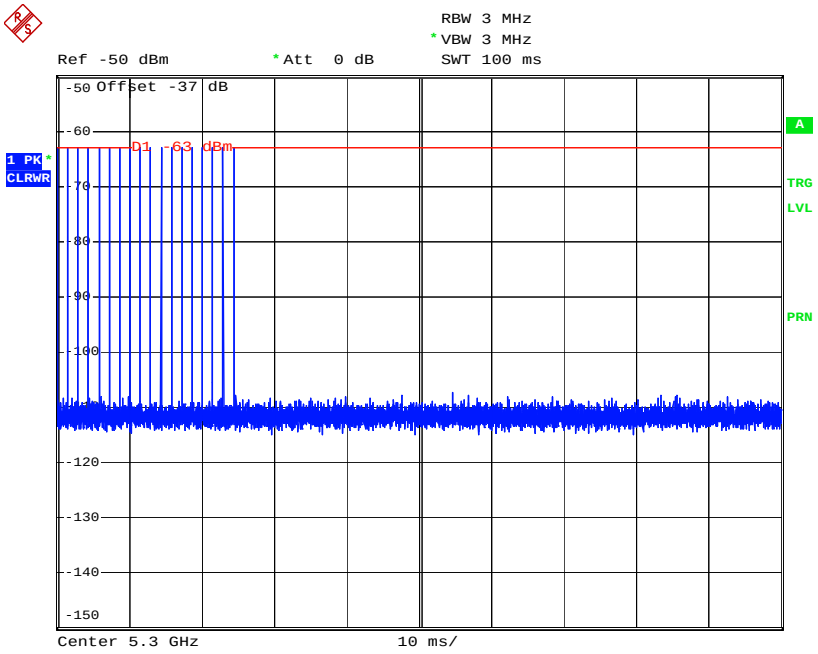
   The signal generator amplitude was set so that the power level measured at the spectrum analyzer was -63dBm.



Conducted Calibration Setup

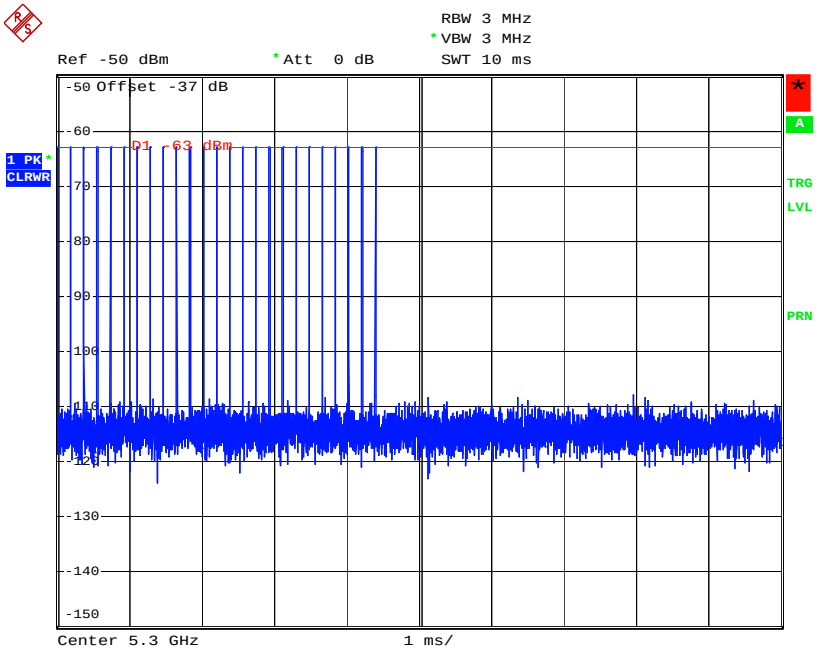
2. Following are the calibration plots for each of the required radar waveforms.

Bin 1 Radar Calibration



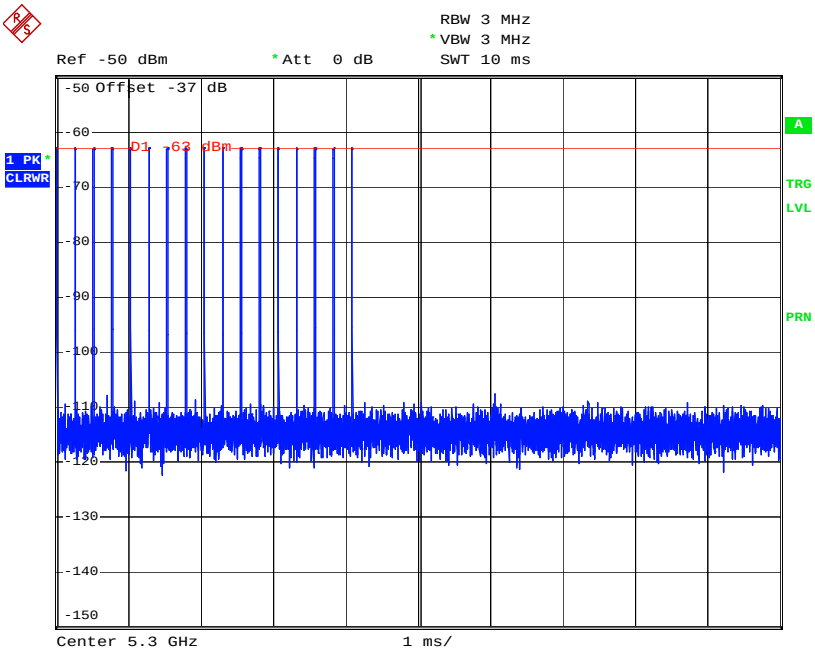
Date: 23.MAR.2007 09:56:40

Bin 2 Radar Calibration



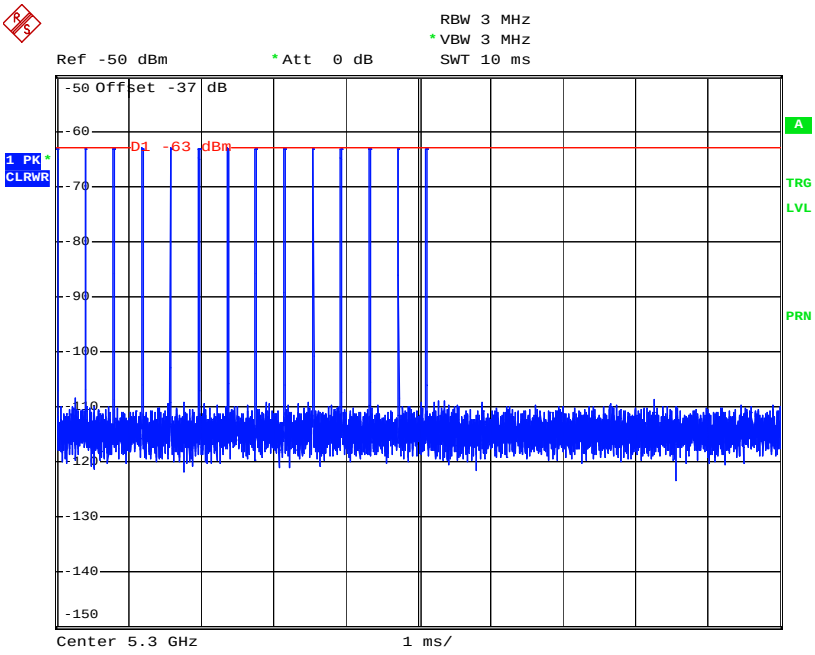
Date: 23.MAR.2007 10:05:58

Bin 3 Radar Calibration



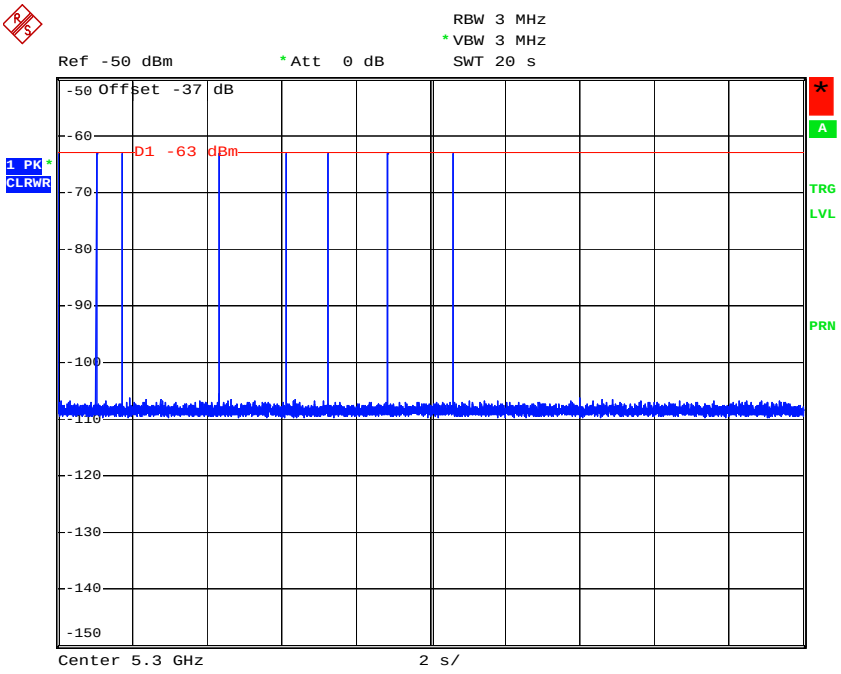
Date: 23.MAR.2007 10:14:59

Bin 4 Radar Calibration



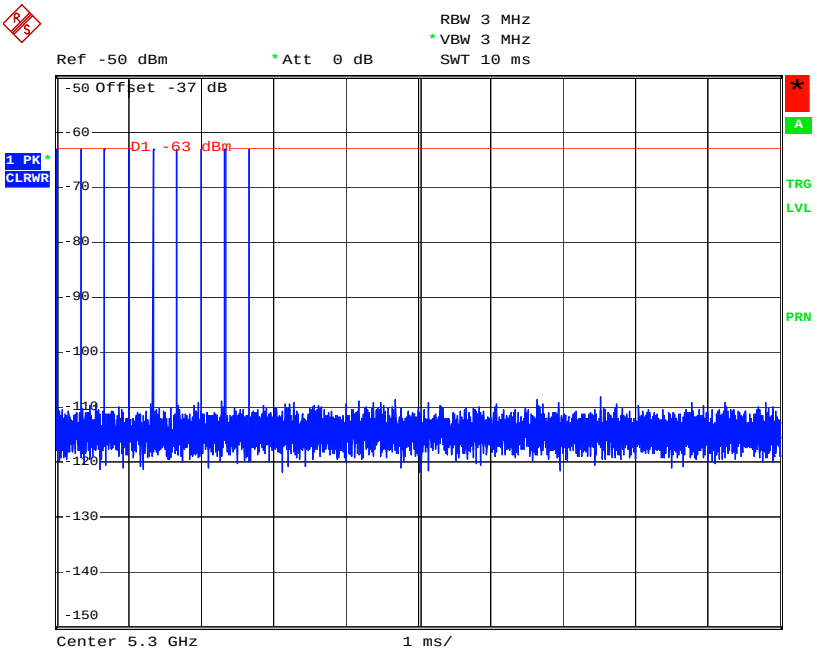
Date: 23.MAR.2007 10:23:07

Bin 5 Radar Calibration



Date: 23.MAR.2007 10:26:45

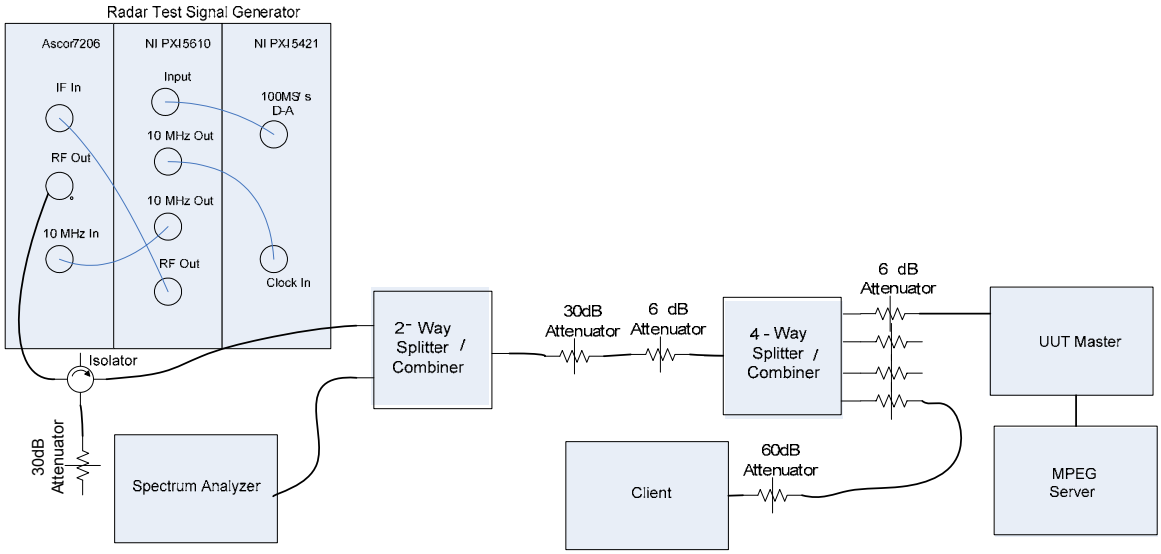
Bin 6 Radar Calibration



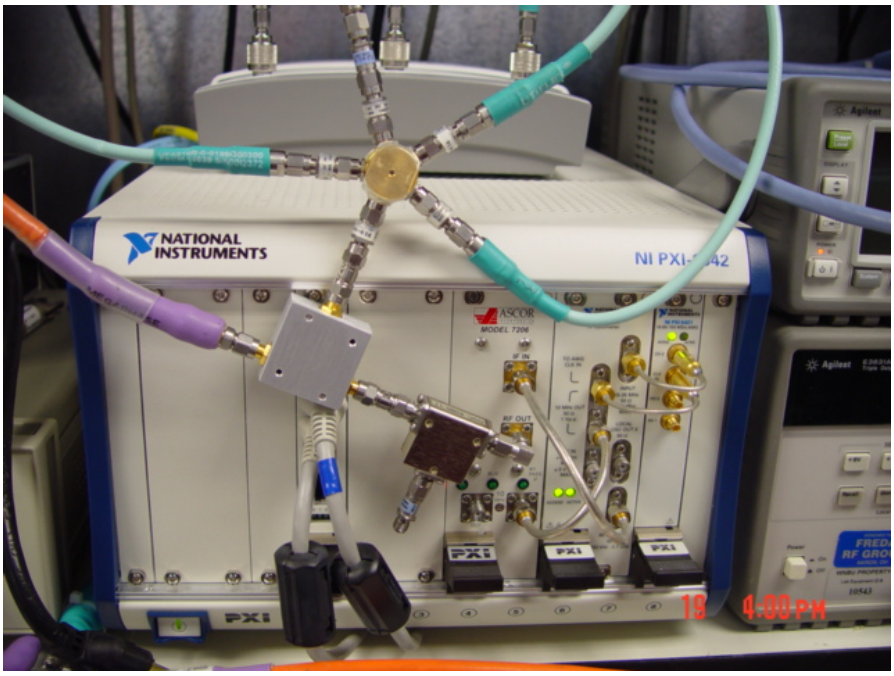
Date: 23.MAR.2007 10:34:10

5.0 Test Procedure/Results

1. A spectrum analyzer is used as a monitor to verify that the UUT has vacated the Channel within the (Channel Closing Transmission Time and Channel Move Time, and does not transmit on a Channel during the Non-Occupancy Period after the detection and Channel move. It is also used to monitor UUT transmissions during the Channel Availability Check Time.
2. Following is the test setup used to generate the Radar Waveforms, and for all DFS tests described herein.



Conducted Setup: Radar Test Waveforms are injected into the Master



Radar Test Signal Generator

The test setup is constructed of the following equipment:

Radar Test Signal Generator
National Instruments NI PXI-1042 8-Slot 3U Chassis
National Instruments NI PXI-5421 16-Bit 100MS/s Arbitrary Waveform Generator
National Instruments NI PXI-5610 2.7GHz RF Upconverter
Ascor 7206 PXI 4.9 to 6GHz Upconverter
Agilent E4448A Spectrum Analyzer
Mini-Circuits ZFSC-2-9G Splitter/Combiner (Qty. 1)
Weinschel 1594 4 to 1 power Splitter/Combiner (Qty. 1)
Ditom Microwave D3C-4080-11 Circulator/Isolator (Qty. 1)
Mini-Circuits BW-S30W2 30dB Attenuator (Qty. 4)
Mini-Circuits BW-S6W2 30dB Attenuator (Qty. 5)
Megaphase SF26 S1S1 36" Coaxial Cable (Qty. 2)
MicroCaox 18" Coaxial Cable (Qty. 3)
Dell 600M Laptop (Qty. 2: 1 for wireless client, 1 for MPEG server)
Cisco AIR-CB21AG 802.11a/b/g NIC card (wireless client)

The waveform parameters from within the bounds of the signal type are selected randomly using uniform distribution.

3. **UNII Detection Bandwidth**: All UNII 20 MHz channels for this device have identical Channel bandwidths. Therefore, all DFS testing was done at 5300 MHz. The 99% channel bandwidth for 20MHz signals is 16.7 MHz. (See the 26dB BW section of the RF report for further measurement details).

   The generating equipment is configured as shown in the Conducted Test Setup above. A single *Burst* of the short pulse radar type 1 is produced at 530MHz at a -63dBm level. The UUT is set up as a standalone device (no associated Client and no traffic).

   A single radar Burst is generated for a minimum of 10 trials, and the response of the UUT is noted. The UUT must detect the Radar Waveform 90% or more of the time.

   The radar frequency is increased in 1 MHz steps, repeating the above test sequence, until the detection rate falls below 90%. The highest frequency at which detection is greater than or equal to 90% is denoted as Fh.

   The radar frequency is decreased in 1 MHz steps, repeating the above test sequence, until the detection rate falls below 90%. The lowest frequency at which detection is greater than or equal to 90% is denoted as Fl.

   The U-NII Detection Bandwidth is calculated as follows:

   U-NII Detection Bandwidth = $F_H - F_L$

   The U-NII Detection Bandwidth must be at least 80% of the UUT transmitter 99% power, otherwise, the UUT does not comply with DFS requirements.

UNII Detection Bandwidth Results

EUT Frequency=5300MHz											
	DFS Detection Trials (1=Detection, Blank= No Detection)										
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
5292 Fl	1	1	1	1	1	1	1	1		1	90
5293	1	1	1	1	1	1	1	1	1	1	100%
5294	1	1	1	1	1	1	1	1	1	1	100%
5295	1	1	1	1	1	1	1	1	1	1	100%
5296	1	1	1	1	1	1	1	1	1	1	100%
5297	1	1	1	1	1	1	1	1	1	1	100%
5298	1	1	1	1	1	1	1	1	1	1	100%
5299	1	1	1	1	1	1	1	1	1	1	100%
5300	1	1	1	1	1	1	1	1	1	1	100%
5301	1	1	1	1	1	1	1	1	1	1	100%
5302	1	1	1	1	1	1	1	1	1	1	100%
5303	1	1	1	1	1	1	1	1	1	1	100%
5304	1	1	1	1	1	1	1	1	1	1	100%
5305	1	1	1	1	1	1	1	1	1	1	100%
5306	1	1	1	1	1	1	1	1	1	1	100%
5307	1	1	1	1	1	1	1	1	1	1	100%
5308 Fh	1	1	1	1	1	1		1	1	1	90%
20 MHz Detection Bandwidth = Fh-Fl = 5308MHz-5292MHz = 16MHz											
EUT 99% Bandwidth = 16.6MHz											
16.6MHz*80% = 13.3MHz											

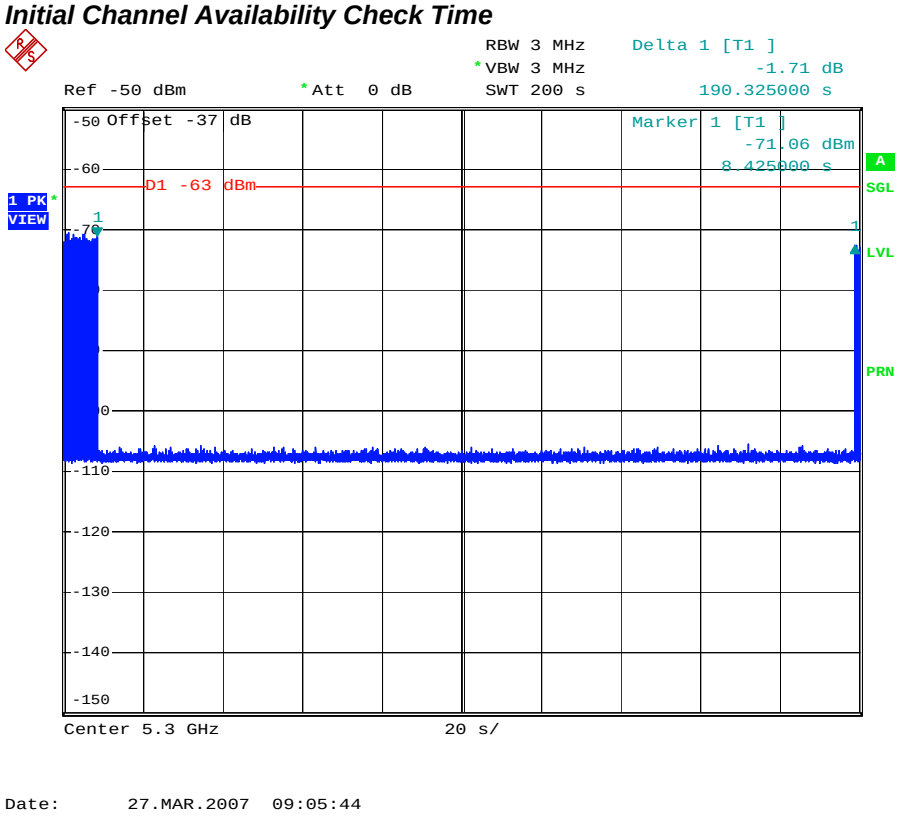
4. The **Initial Channel Availability Check Time** tests that the UUT does not emit beacon, control, or data signals on the test Channel until the power-up sequence has been completed and the U-NII device checks for Radar Waveforms for one minute on the test Channel. This test does not use any Radar Waveforms.

   The U-NII device is powered on and instructed to operate at 5300 MHz. At the same time the UUT is powered on, the spectrum analyzer is set to zero span mode with a 3 MHz resolution bandwidth at 5500MHz with a 2.5 minute sweep time. The analyzer's sweep will be started the same time power is applied to the U-NII device.

   The UUT should not transmit any beacon or data transmissions until at least 1 minute after the completion of the power-on cycle.

   The initial power up time of the UUT is indicated by marker 1 in the plot. Initial beacons/data transmissions are indicated by marker 1R.

Initial Channel Availability Check Time



5. **Radar Burst at the Beginning of the Channel Availability Check Time:** The steps below define the procedure to verify successful radar detection on the selected Channel during a period equal to the Channel Availability Check Time and avoidance of operation on that Channel when a radar Burst with a level equal to the DFS Detection Threshold + 1 dB (-63dBm) occurs at the beginning of the Channel Availability Check Time.

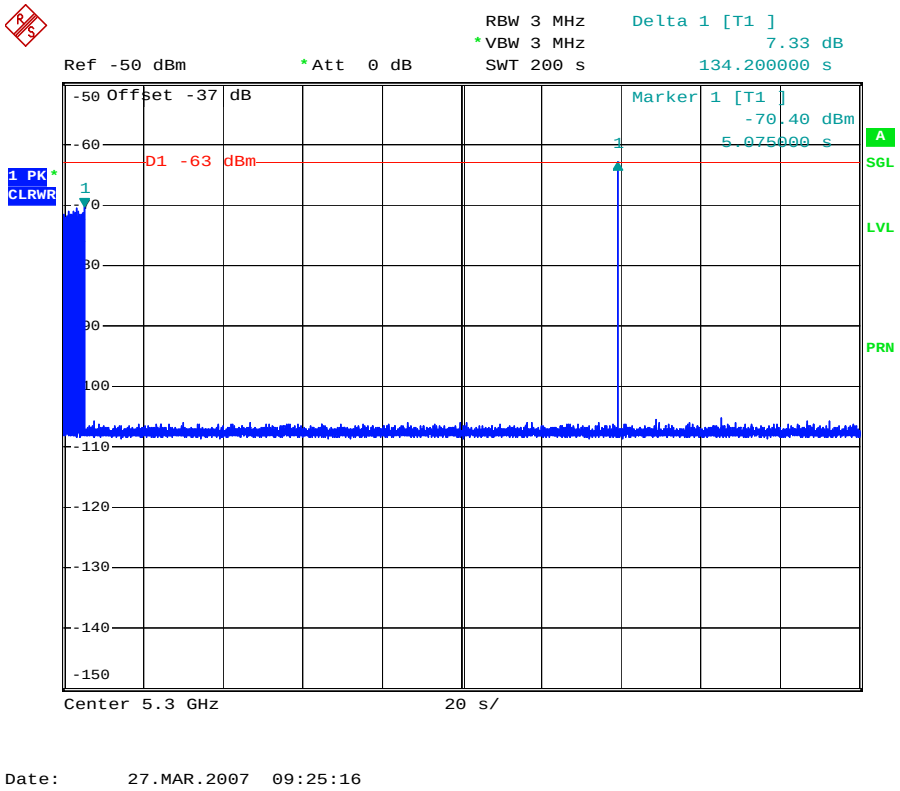
   The UUT is powered on at T_0. T_1 denotes the instant when the UUT has completed its power-up sequence. The Channel Availability Check Time commences at instant T_1 and will end no sooner than T_1 + 60 seconds.

   A single Burst of short pulse of radar type 1 at -63 dBm will commence within a 6 second window starting at T_1.

   Visual indication on the UUT of successful detection of the radar Burst will be recorded and reported. Observation of emissions at 5300MHz will continue for 2.5 minutes after the radar Burst has been generated.

   Verify that during the 2.5 minute measurement window no UUT transmissions occurred at 5300MHz.

Radar Burst at the Beginning of the Channel Availability Check Time



6. **Radar Burst at the End of the Channel Availability Check Time:** The steps below define the procedure to verify successful radar detection on the selected Channel during a period equal to the Channel Availability Check Time and avoidance of operation on that Channel when a radar Burst with a level equal to the DFS Detection Threshold + 1 dB (-63dBm) occurs at the end of the Channel Availability Check Time.

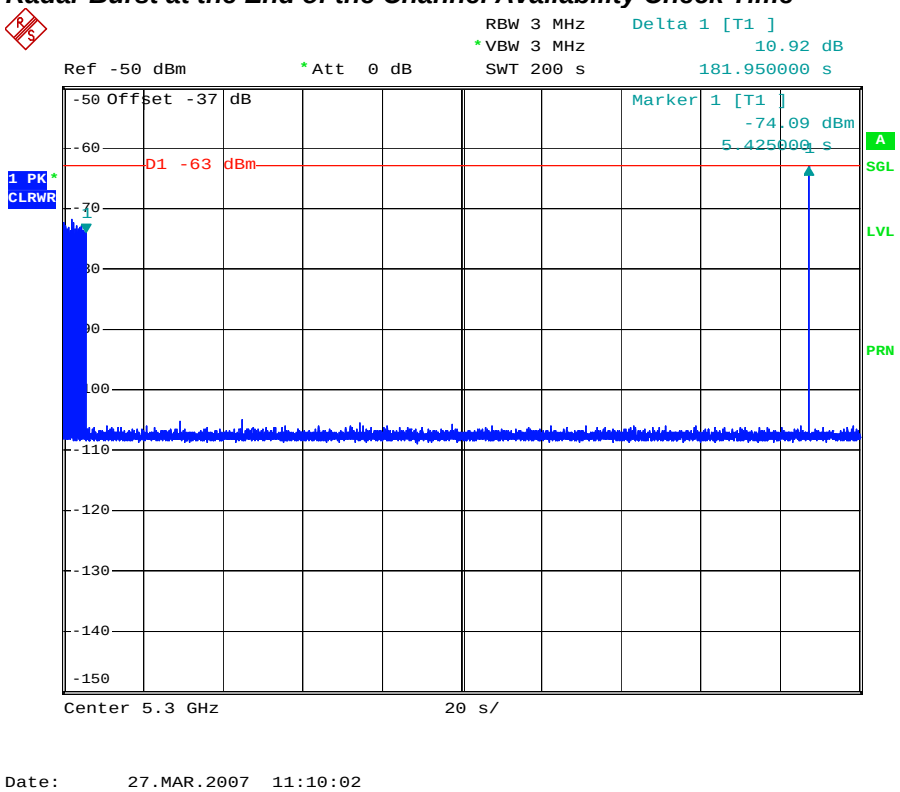
   The UUT is powered on at T_0. T_1 denotes the instant when the UUT has completed its power-up sequence. The Channel Availability Check Time commences at instant T_1 and will end no sooner than T_1 + 60 seconds.

   A single Burst of short pulse of radar type 1 at -63 dBm will commence within a 6 second window starting at T_1+ 54 seconds.

   Visual indication on the UUT of successful detection of the radar Burst will be recorded and reported. Observation of emissions at 5500MHz will continue for 2.5 minutes after the radar Burst has been generated.

   Verify that during the 2.5 minute measurement window no UUT transmissions occurred at 5500MHz.

Radar Burst at the End of the Channel Availability Check Time



6. In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

These tests define how the following DFS parameters are verified during In-Service Monitoring; Channel Closing Transmission Time, Channel Move Time, and Non-Occupancy Period.

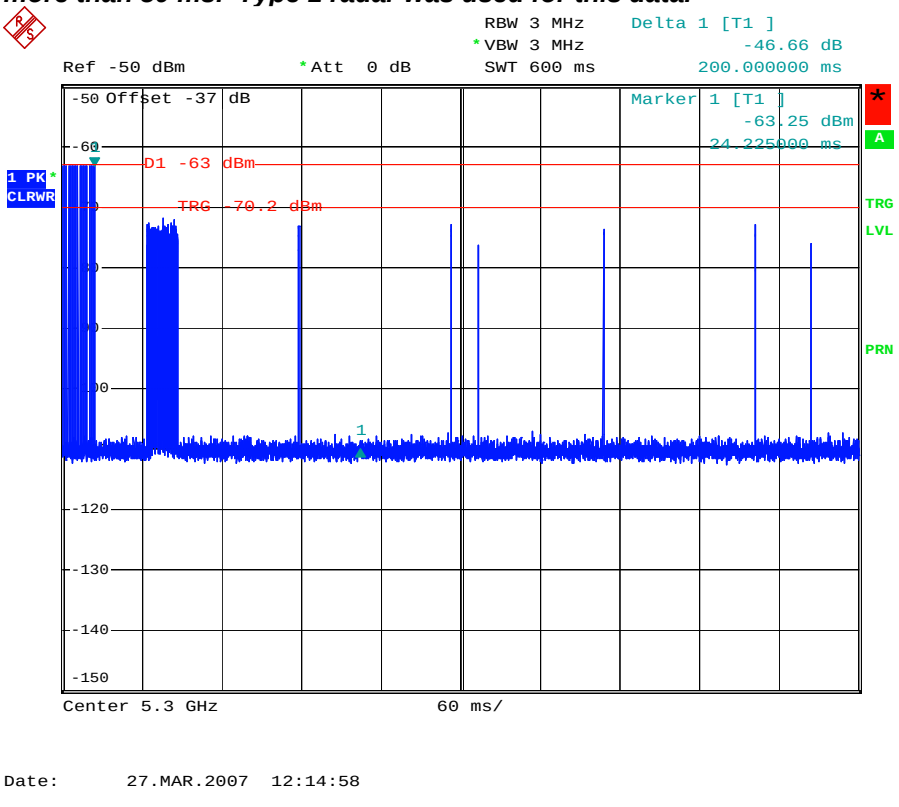
The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB (-63dBm) is generated on the Operating Channel of the U-NII device.

A U-NII device operating as a Client Device will associate with the UUT (Master) at 5300 MHz. Stream the MPEG test file from the Master Device to the Client Device on the selected Channel for the entire period of the test.

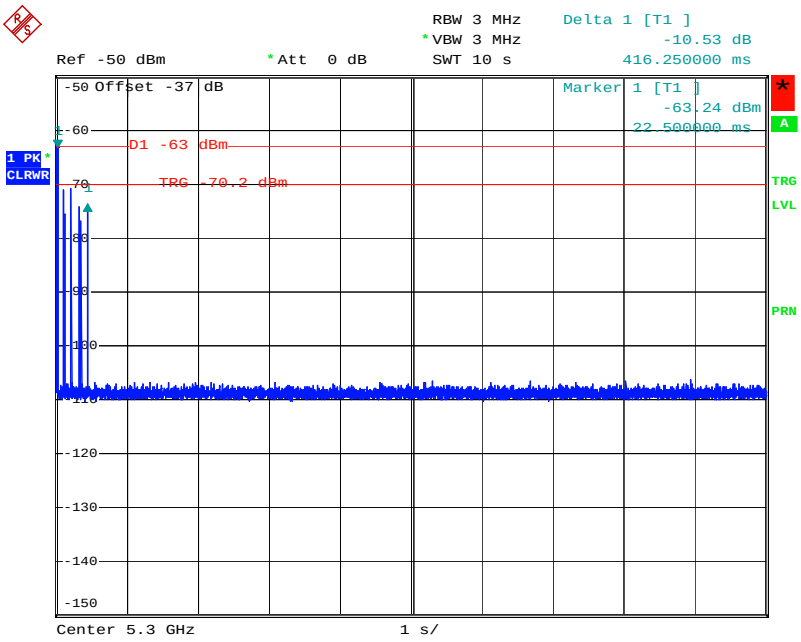
At time T_0 the Radar Waveform generator sends a Burst of pulses for each of the radar types at -63dBm.

Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing Transmission Time results to the limits defined in the *DFS Response requirement values table*.

The following plot demonstrates a channel close time of <200ms, with an aggregate of no more than 50 ms. Type 1 radar was used for this data.

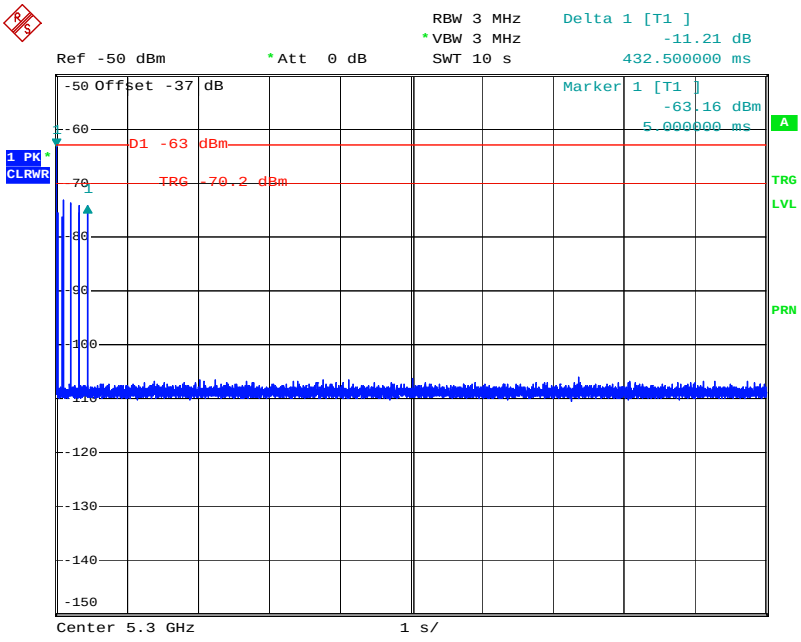


Channel Move Time, Channel Closing Transmission Time for Type 1 radar.



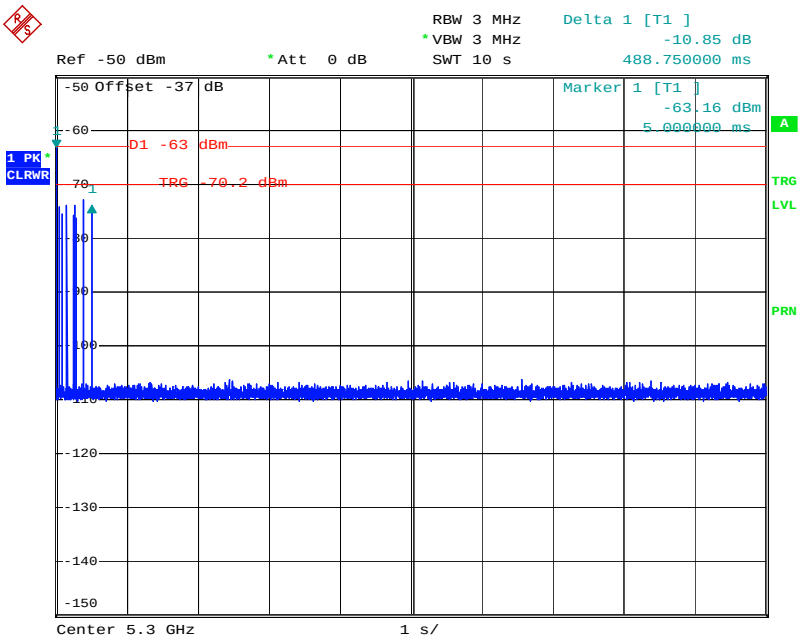
Date: 27.MAR.2007 12:21:48

Channel Move Time, Channel Closing Transmission Time for Type 2 radar.



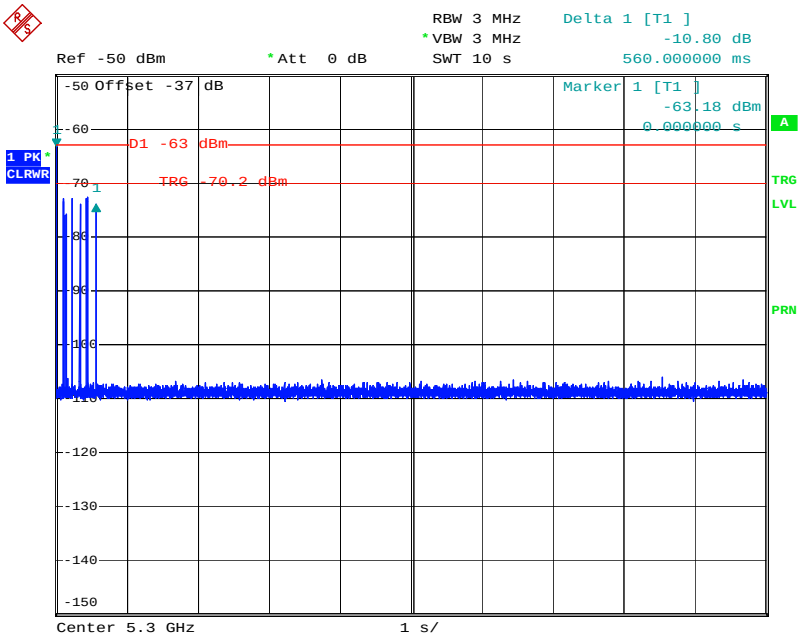
Date: 27.MAR.2007 12:31:33

Channel Move Time, Channel Closing Transmission Time for Type 3 radar.



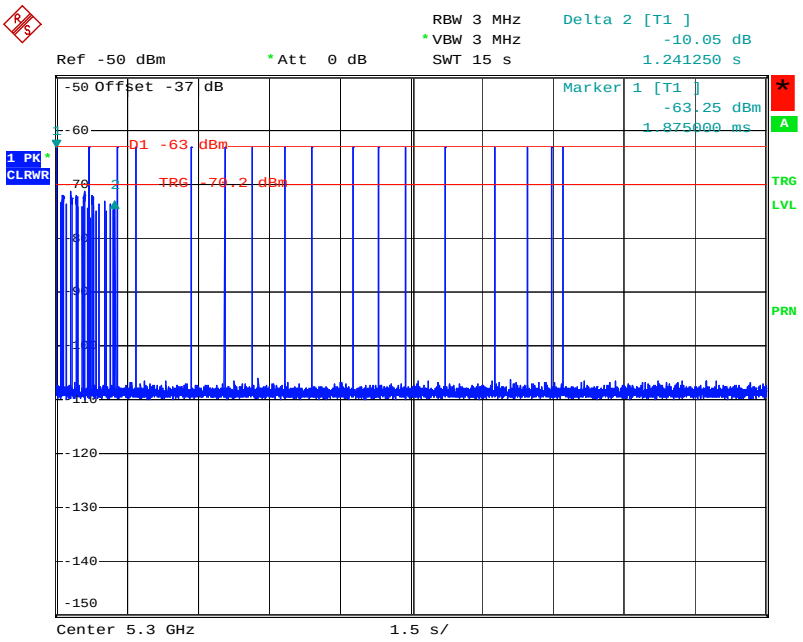
Date: 27.MAR.2007 12:36:31

Channel Move Time, Channel Closing Transmission Time for Type 4 radar.



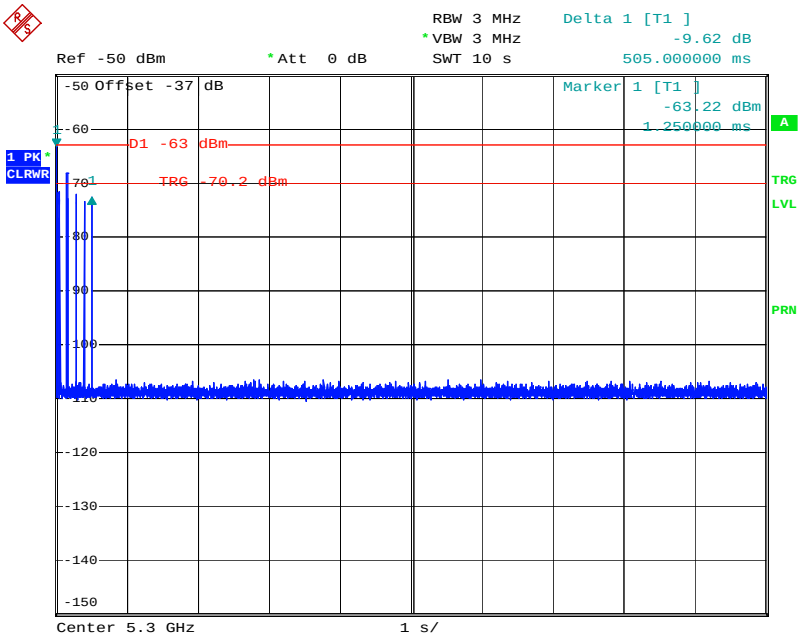
Date: 27.MAR.2007 12:45:02

Channel Move Time, Channel Closing Transmission Time for Type 5 radar.



Date: 27.MAR.2007 13:00:00

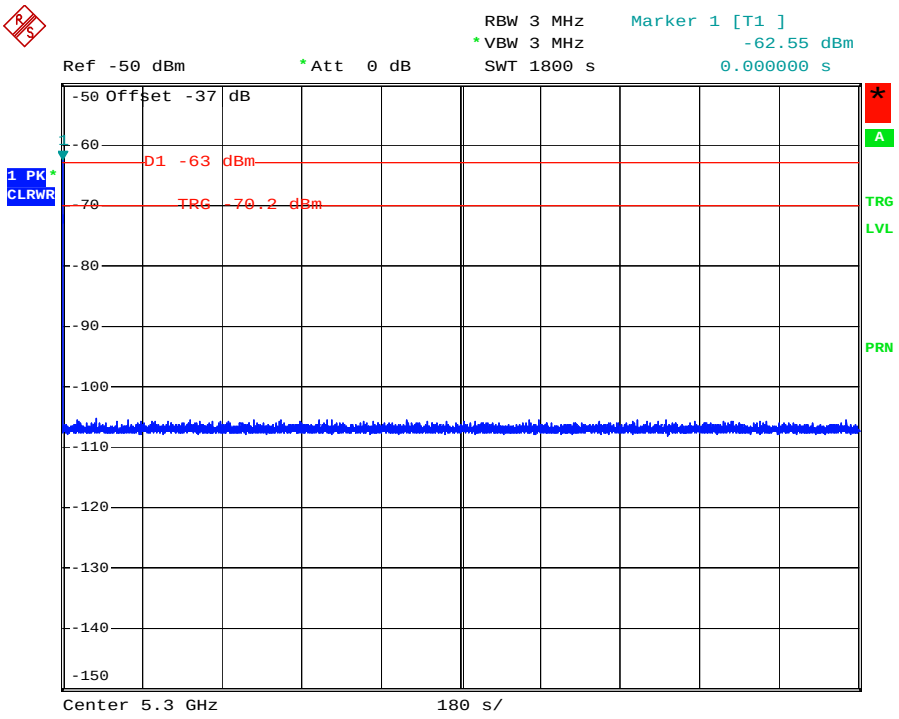
Channel Move Time, Channel Closing Transmission Time for Type 6 radar.



Date: 27.MAR.2007 12:55:11

Measure the UUT for more than 30 minutes following the channel close/move time to verify that the UUT does not resume any transmissions on this Channel.

30 Minute Non-Occupancy Period (using Type 1 radar)



Date: 27.MAR.2007 14:09:12

7. Statistical Performance Check

The steps below define the procedure to determine the minimum percentage of detection when a radar burst with a level equal to the DFS Detection Threshold + 1dB (-63dBm) is generated on the Operating Channel of the U-NII device.

A U-NII device operating as a Client Device will associate with the UUT (Master) at 5500 MHz. Stream the MPEG test file from the Master Device to the Client Device on the selected Channel for the entire period of the test.

The Radar Waveform generator sends the individual waveform for each of the radar types 1-6 at -63dbm. Statistical data will be gathered to determine the ability of the device to detect the radar test waveforms. The device can utilize a test mode to demonstrate when detection occurs to prevent the need to reset the device between trial runs. The percentage of successful detection is calculated by:

$$\frac{TotalWaveformDetections}{TotalWaveformTrials} \times 100$$ = Probability of Detection Radar Waveform

The Minimum number of trails, minimum percentage of successful detection and the average minimum percentage of successful detection are found in the *Radar Test Waveforms* section.

Type 1 Radar Statistical Performance

Trial #	Pulse Width (us)	PRI (us)	Pulses/Burst	1=Detection Blank=No Detection	
1	1	1428	18	1	
2	1	1428	18	1	
3	1	1428	18	1	
4	1	1428	18	1	
5	1	1428	18	1	
6	1	1428	18	1	
7	1	1428	18		
8	1	1428	18	1	
9	1	1428	18	1	
10	1	1428	18	1	
11	1	1428	18	1	
12	1	1428	18	1	
13	1	1428	18	1	
14	1	1428	18	1	
15	1	1428	18		
16	1	1428	18	1	
17	1	1428	18	1	
18	1	1428	18	1	
19	1	1428	18	1	
20	1	1428	18		
21	1	1428	18	1	
22	1	1428	18	1	
23	1	1428	18	1	
24	1	1428	18	1	
25	1	1428	18	1	
26	1	1428	18	1	
27	1	1428	18	1	
28	1	1428	18	1	
29	1	1428	18	1	
30	1	1428	18	1	
			Detection Percentage	90%	>60%

Type 2 Radar Statistical Performance

Trial #	Pulses/Burst	Pulse Width (us)	PRI (us)	1=Detection Blank=No Detection	
1	27	1.1	195	1	
2	29	2.1	165	1	
3	28	2.5	165	1	
4	28	2.9	195	1	
5	29	3.3	208	1	
6	25	2.1	167	1	
7	27	2.4	172	1	
8	25	3.4	202	1	
9	23	1.3	226	1	
10	27	1.0	187		
11	25	3.1	219	1	
12	25	2.1	199	1	
13	27	2.3	156	1	
14	28	2.8	152	1	
15	25	2.3	150	1	
16	29	4.6	164	1	
17	26	1.1	159	1	
18	24	4.9	213	1	
19	27	3.2	161	1	
20	28	4.6	204	1	
21	29	2.0	229	1	
22	23	1.9	220	1	
23	24	4.4	212	1	
24	29	1.3	152	1	
25	27	4.4	178	1	
26	26	1.2	204	1	
27	25	4.5	158	1	
28	25	4.4	196	1	
29	27	1.1	190	1	
30	29	1.5	167	1	
Detection Percentage				97%	>60%

Type 3 Radar Statistical Performance

Trial #	Pulses/Burst	Pulse Width (us)	PRI (us)	1=Detection Blank=No Detection
1	18	9.7	405	1
2	18	9.3	489	1
3	18	9.1	228	1
4	18	7.9	347	1
5	16	9.4	340	1
6	16	6.5	344	1
7	18	9.3	404	1
8	17	9.2	290	
9	17	8.8	378	1
10	16	9.1	320	1
11	18	6.7	482	1
12	18	9.1	321	1
13	17	9.9	479	1
14	18	6.7	451	1
15	16	8.0	355	1
16	16	9.3	490	1
17	18	9.3	248	1
18	18	6.2	425	1
19	18	9.9	220	1
20	18	7.0	477	1
21	16	8.0	431	1
22	17	7.7	401	1
23	17	6.4	478	1
24	18	7.1	456	1
25	18	7.5	481	1
26	18	7.8	471	
27	16	6.5	493	1
28	16	9.8	373	1
29	17	8.6	398	1
30	16	7.3	358	
Detection Percentage				90%

>60%

Type 4 Radar Statistical Performance

Trial #	Pulses/Burst	Pulse Width (us)	PRI (us)	1=Detection Blank=No Detection
1	16	17.4	430	1
2	16	16.6	275	1
3	15	11.0	292	1
4	16	13.6	462	1
5	15	12.8	244	
6	15	16.4	451	1
7	15	13.2	301	1
8	15	11.7	252	1
9	14	16.6	304	
10	12	19.3	260	1
11	15	19.2	403	1
12	14	20.0	325	1
13	12	16.7	214	
14	15	14.2	363	1
15	14	19.8	461	1
16	14	11.8	408	1
17	16	17.2	425	1
18	14	11.1	482	1
19	13	11.2	354	1
20	13	13.9	381	1
21	12	13.7	491	1
22	16	12.3	337	1
23	12	19.0	229	1
24	13	14.0	465	1
25	14	17.6	212	1
26	13	14.5	401	1
27	12	13.1	253	1
28	13	18.4	403	1
29	16	15.6	215	1
30	16	15.6	445	1
Detection Percentage				90%

>60%

In addition an average minimum percentage of successful detection across all four Short pulse radar test waveforms is required and is calculated as follows:

$$\frac{P_d 1 + P_d 2 + P_d 3 + P_d 4}{4}$$ = (90%+97%+90%+90%)/4 = 91.8% (>80%)

Type 5 Radar Statistical Performance

*See the Bin5 Radar Characteristics at the end of this report.

Trial #	Filename	1=Detection Blank=No Detection	
1	Bin5Statistics_1	1	
2	Bin5Statistics_2	1	
3	Bin5Statistics_3	1	
4	Bin5Statistics_4	1	
5	Bin5Statistics_5	1	
6	Bin5Statistics_6	1	
7	Bin5Statistics_7	1	
8	Bin5Statistics_8	1	
9	Bin5Statistics_9	1	
10	Bin5Statistics_10	1	
11	Bin5Statistics_11	1	
12	Bin5Statistics_12	1	
13	Bin5Statistics_13	1	
14	Bin5Statistics_14	1	
15	Bin5Statistics_15	1	
16	Bin5Statistics_16	1	
17	Bin5Statistics_17	1	
18	Bin5Statistics_18	1	
19	Bin5Statistics_19	1	
20	Bin5Statistics_20	1	
21	Bin5Statistics_21	1	
22	Bin5Statistics_22	1	
23	Bin5Statistics_23	1	
24	Bin5Statistics_24	1	
25	Bin5Statistics_25	1	
26	Bin5Statistics_26	1	
27	Bin5Statistics_27	1	
28	Bin5Statistics_28	1	
29	Bin5Statistics_29	1	
30	Bin5Statistics_30	1	
Detection Percentage		100%	>80%

Type 6 Radar Statistical Performance

*See the Bin6 Radar Characteristics at the end of this report.

Trial #	Filename	1=Detection Blank=No Detection
1	Bin6Statistics_1	
2	Bin6Statistics_2	1
3	Bin6Statistics_3	1
4	Bin6Statistics_4	1
5	Bin6Statistics_5	1
6	Bin6Statistics_6	1
7	Bin6Statistics_7	1
8	Bin6Statistics_8	
9	Bin6Statistics_9	
10	Bin6Statistics_10	
11	Bin6Statistics_11	
12	Bin6Statistics_12	1
13	Bin6Statistics_13	1
14	Bin6Statistics_14	
15	Bin6Statistics_15	1
16	Bin6Statistics_16	1
17	Bin6Statistics_17	
18	Bin6Statistics_18	1
19	Bin6Statistics_19	1
20	Bin6Statistics_20	1
21	Bin6Statistics_21	1
22	Bin6Statistics_22	1
23	Bin6Statistics_23	1
24	Bin6Statistics_24	1
25	Bin6Statistics_25	1
26	Bin6Statistics_26	1
27	Bin6Statistics_27	
28	Bin6Statistics_28	1
29	Bin6Statistics_29	1
30	Bin6Statistics_30	1
Detection Percentage		73%

>70%

Bin5Statistics_1.txt

USA Bin 5 Radar Test
3/23/2007 12:19:57 PM
Bursts: 11

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	2	11	80	1981	0.037484
2	3	17	50	1960,1497	1.633237
3	1	7	95	NA	2.868750
4	3	19	50	1520,1411	3.434758
5	2	17	75	1506	5.111194
6	2	6	50	1976	6.291852
7	2	10	50	1155	7.369004
8	2	19	90	1660	8.547102
9	2	7	50	1410	9.406783
10	2	6	80	1952	10.198849
11	1	16	95	NA	11.814275

Bin5Statistics_2.txt

USA Bin 5 Radar Test
3/23/2007 12:21:56 PM
Bursts: 14

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	1	9	75	NA	0.185507
2	1	9	50	NA	1.178761
3	1	8	95	NA	2.192806
4	3	8	90	1905,1545	3.269488
5	3	20	100	1380,1105	3.933829
6	1	6	95	NA	4.606817
7	2	17	65	1815	5.954000
8	1	12	90	NA	6.711672
9	3	7	65	1329,1124	7.596995
10	3	13	90	1059,1162	7.812747
11	3	15	65	1975,1084	8.684787
12	1	5	85	NA	9.553987
13	1	16	50	NA	10.843827
14	2	12	85	1457	11.792117

Bin5Statistics_3.txt

USA Bin 5 Radar Test
3/23/2007 12:23:52 PM
Bursts: 15

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	2	15	90	1724	0.712437
2	3	5	60	1536,1899	1.576737
3	2	5	70	1006	1.768701
4	2	18	60	1991	2.952292
5	1	5	65	NA	3.545851
6	2	13	60	1857	4.434954
7	1	7	90	NA	5.420530
8	2	11	50	1484	6.223985
9	2	12	100	1075	6.961296
10	2	13	55	1689	7.549141
11	2	17	55	1619	8.205897
12	1	10	75	NA	9.375778
13	2	16	85	1834	10.270015
14	3	16	70	1726,1843	10.622162
15	2	17	100	1571	11.319442

Bin5Statistics_4.txt

USA Bin 5 Radar Test
3/23/2007 12:24:45 PM
Bursts: 14

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	2	14	75	1444	0.243614
2	1	17	100	NA	0.982399
3	2	20	50	1060	1.893291
4	1	18	50	NA	2.673072
5	1	12	70	NA	4.011217
6	3	15	75	1674,1184	4.698982
7	1	8	70	NA	5.263938
8	2	11	90	1051	6.182733
9	2	5	90	1850	7.175789
10	2	7	85	1611	7.720874
11	1	8	55	NA	8.677322
12	3	10	70	1577,1203	10.116503
13	2	6	95	1724	11.098641
14	3	10	55	1251,1248	11.730755

Bin5Statistics_5.txt

USA Bin 5 Radar Test
3/23/2007 12:25:42 PM
Bursts: 19

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	16	95	1228,1568	0.445785
2	3	17	50	1119,1176	0.677355
3	2	7	95	1070	1.266428
4	3	13	90	1280,1983	2.203706
5	1	5	55	NA	2.655857
6	2	20	55	1221	3.332947
7	2	7	80	1433	4.415000
8	1	8	85	NA	4.621331
9	2	12	80	1075	5.574178
10	2	13	95	1058	5.878408
11	3	7	95	1166,1759	6.460182
12	1	20	80	NA	7.015949
13	3	15	60	1800,1213	8.124499
14	2	6	100	1169	8.632615
15	2	18	60	1799	9.113270
16	1	6	80	NA	9.895726
17	2	9	90	1692	10.388537
18	2	13	85	1879	11.159414
19	3	14	70	1763,1290	11.821957

Bin5Statistics_6.txt

USA Bin 5 Radar Test
3/23/2007 12:26:40 PM
Bursts: 9

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	17	50	1095,1570	0.733084
2	1	10	100	NA	2.428160
3	2	6	60	1793	2.992945
4	2	20	70	1937	4.142020
5	3	18	90	1029,1786	5.496162
6	1	16	90	NA	7.963260
7	2	19	70	1132	8.664546
8	1	7	75	NA	9.801931
9	2	17	100	1859	11.388291

Bin5Statistics_7.txt

USA Bin 5 Radar Test
3/23/2007 12:29:03 PM
Bursts: 8

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	18	90	1399,1549	1.038831
2	1	15	50	NA	2.096594
3	2	8	60	1067	3.037772
4	3	16	60	1379,1242	5.056739
5	1	16	70	NA	6.751222
6	2	11	70	1273	7.522743
7	2	19	55	1983	10.414420
8	2	14	100	1943	10.622491

Bin5Statistics_8.txt

USA Bin 5 Radar Test
3/23/2007 12:29:56 PM
Bursts: 16

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	2	14	55	1581	0.535830
2	2	10	85	1453	1.345811
3	1	5	85	NA	2.242398
4	3	11	80	1465,1324	2.621963
5	2	9	85	1314	3.154268
6	1	5	85	NA	4.322383
7	1	5	60	NA	4.919653
8	1	10	60	NA	5.767989
9	3	8	60	1437,1845	6.031702
10	2	6	75	1789	7.167756
11	3	13	75	1377,1292	7.803938
12	1	16	65	NA	8.627266
13	1	11	75	NA	9.322822
14	3	15	100	1269,1618	9.920776
15	1	13	90	NA	10.950314
16	2	8	60	1022	11.914439

Bin5Statistics_9.txt

USA Bin 5 Radar Test
3/23/2007 12:30:36 PM
Bursts: 20

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	2	14	70	1740	0.126777
2	1	7	50	NA	0.928885
3	2	14	65	1197	1.516894
4	1	15	85	NA	1.933661
5	2	12	50	1109	2.920867
6	2	16	65	1267	3.299516
7	1	11	95	NA	4.199640
8	2	10	75	1468	4.271774
9	3	10	85	1666,1215	4.815410
10	3	10	60	1561,1701	5.461742
11	1	7	65	NA	6.074463
12	3	5	100	1540,1266	6.925245
13	1	9	65	NA	7.466442
14	2	16	75	1285	7.824209
15	1	20	70	NA	8.928365
16	1	9	65	NA	9.281566
17	1	18	60	NA	9.694928
18	1	7	85	NA	10.772562
19	3	19	90	1387,1487	11.010138
20	1	16	55	NA	11.780232

Bin5Statistics_10.txt

USA Bin 5 Radar Test
3/23/2007 12:31:14 PM
Bursts: 18

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	1	11	85	NA	0.166145
2	3	12	65	1350,1136	1.232902
3	1	17	85	NA	1.994359
4	3	13	95	1838,1765	2.281072
5	3	15	55	1392,1321	2.918976
6	3	13	100	1777,1965	3.456522
7	2	19	65	1070	4.468666
8	1	20	75	NA	5.043642
9	1	12	70	NA	5.411441
10	2	20	95	1135	6.114130
11	1	13	95	NA	7.020182
12	3	14	90	1207,1625	7.553928
13	2	14	55	1800	8.458072
14	2	18	85	1724	8.822554
15	1	9	80	NA	9.836846
16	3	6	85	1075,1700	10.246506
17	3	16	75	1415,1868	10.732979
18	3	14	85	1308,1833	11.727463

Bin5Statistics_11.txt

USA Bin 5 Radar Test
3/23/2007 12:31:54 PM
Bursts: 16

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	2	5	90	1030	0.570669
2	2	5	80	1362	1.257596
3	2	16	95	1940	2.041055
4	3	13	80	1203,1583	2.479717
5	2	20	55	1866	3.411284
6	1	6	95	NA	4.221138
7	2	19	80	1754	5.051850
8	2	18	65	1564	5.914364
9	3	13	100	1114,1477	6.521314
10	3	11	85	1856,1381	7.273616
11	3	15	50	1790,1070	8.078814
12	1	14	60	NA	8.686528
13	2	12	55	1467	9.234024
14	2	8	100	1561	9.813747
15	3	8	60	1716,1405	11.049863
16	3	11	70	1457,1558	11.665459

Bin5Statistics_12.txt

USA Bin 5 Radar Test
3/23/2007 12:32:44 PM
Bursts: 8

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	1	11	85	NA	0.179914
2	3	13	90	1081,1634	2.055036
3	2	18	80	1939	3.952631
4	2	11	50	1429	5.875254
5	2	8	75	1161	7.131552
6	2	19	95	1134	8.861578
7	1	14	85	NA	9.935158
8	3	10	60	1052,1458	10.744057

Bin5Statistics_13.txt

USA Bin 5 Radar Test
3/23/2007 12:33:24 PM
Bursts: 15

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	10	90	1890,1483	0.576165
2	1	16	50	NA	1.433337
3	1	16	55	NA	1.762459
4	3	19	55	1793,1110	2.640076
5	3	9	75	1265,1209	3.962920
6	1	12	50	NA	4.096960
7	2	9	55	1143	5.256824
8	1	15	100	NA	6.129630
9	3	11	70	1849,1024	7.196250
10	1	17	95	NA	7.879353
11	2	18	85	1889	8.106478
12	2	18	75	1315	9.484001
13	1	5	70	NA	10.232106
14	3	13	85	1048,1671	10.948476
15	2	7	95	1840	11.797939

Bin5Statistics_14.txt

USA Bin 5 Radar Test
3/23/2007 12:39:54 PM
Bursts: 14

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	13	75	1622,1190	0.583739
2	1	18	85	NA	1.115417
3	2	9	65	1271	2.308191
4	2	14	65	1461	3.149636
5	3	16	55	1078,1253	3.459921
6	2	18	55	1088	4.661603
7	1	18	90	NA	5.340629
8	1	10	55	NA	6.216092
9	3	14	75	1795,1689	7.410188
10	1	10	55	NA	8.076387
11	2	12	90	1246	8.727230
12	2	6	70	1079	10.151801
13	2	12	85	1338	10.564350
14	2	7	70	1327	11.584951

Bin5Statistics_15.txt

USA Bin 5 Radar Test
3/23/2007 12:40:46 PM
Bursts: 20

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	1	15	55	NA	0.490994
2	1	18	75	NA	0.890784
3	1	5	100	NA	1.532361
4	2	10	90	1245	2.047576
5	2	11	100	1624	2.990797
6	1	12	95	NA	3.014580
7	3	13	65	1358,1386	4.086774
8	1	5	75	NA	4.422116
9	2	8	90	1599	5.307758
10	3	20	100	1839,1959	5.682711
11	3	16	50	1711,1298	6.204549
12	3	14	50	1933,1338	6.881761
13	2	15	95	1028	7.735720
14	3	9	65	1388,1205	7.975064
15	1	20	100	NA	8.592011
16	2	16	75	1143	9.161444
17	3	16	80	1416,1552	10.006465
18	2	6	85	1443	10.573739
19	2	8	90	1614	10.981327
20	3	6	70	1836,1276	11.809949

Bin5Statistics_16.txt

USA Bin 5 Radar Test
3/23/2007 12:41:50 PM
Bursts: 14

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	14	100	1760,1595	0.615665
2	2	6	100	1667	1.028983
3	2	12	75	1075	2.461534
4	3	8	85	1915,1602	2.625426
5	3	20	75	1104,1666	3.908903
6	3	5	65	1985,1814	4.401061
7	2	10	75	1548	5.682023
8	2	11	65	1284	6.576967
9	1	5	95	NA	7.117205
10	2	15	90	1572	7.757961
11	3	16	95	1349,1221	9.385047
12	2	9	60	1496	9.884560
13	3	17	80	1332,1847	10.860454
14	1	7	80	NA	11.676378

Bin5Statistics_17.txt

USA Bin 5 Radar Test
3/23/2007 12:42:54 PM
Bursts: 17

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	10	85	1455,1179	0.168768
2	1	20	100	NA	1.372719
3	1	18	80	NA	1.613305
4	3	14	65	1680,1736	2.662759
5	3	13	80	1287,1313	2.990469
6	2	19	55	1773	3.658356
7	2	20	75	1661	4.718692
8	2	8	100	1535	5.348223
9	3	11	65	1231,1254	6.035149
10	2	17	65	1801	6.771575
11	2	19	65	1132	7.133290
12	2	16	85	1419	8.290098
13	1	5	80	NA	9.169301
14	2	13	80	1726	9.385239
15	1	11	85	NA	10.479982
16	1	11	90	NA	10.731514
17	3	16	60	1265,1026	11.798341

Bin5Statistics_18.txt

USA Bin 5 Radar Test
3/23/2007 12:44:01 PM
Bursts: 12

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	2	13	50	1155	0.304431
2	2	18	90	1756	1.849785
3	2	6	65	1797	2.012216
4	2	20	60	1638	3.523527
5	1	14	80	NA	4.978001
6	3	16	85	1344,1203	5.765376
7	2	20	75	1346	6.392857
8	1	19	100	NA	7.144928
9	2	20	90	1970	8.929246
10	3	8	60	1553,1855	9.336081
11	3	10	95	1131,1371	10.120998
12	2	8	95	1640	11.472101

Bin5Statistics_19.txt

USA Bin 5 Radar Test
3/23/2007 12:44:49 PM
Bursts: 12

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	10	50	1108,1313	0.198573
2	2	12	65	1835	1.197231
3	1	6	90	NA	2.563803
4	2	5	65	1752	3.865620
5	3	14	75	1006,1022	4.905859
6	1	6	85	NA	5.086068
7	2	10	60	1986	6.758807
8	3	14	75	1328,1838	7.235856
9	2	14	65	1667	8.000572
10	2	17	60	1610	9.399996
11	3	14	100	1276,1306	10.100601
12	3	17	90	1457,1858	11.610866

Bin5Statistics_20.txt

USA Bin 5 Radar Test
3/23/2007 12:45:27 PM
Bursts: 19

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	2	6	70	1536	0.012032
2	2	13	80	1569	1.182409
3	1	13	60	NA	1.508105
4	2	5	95	1935	2.341240
5	2	7	75	1041	2.728798
6	2	16	80	1182	3.599748
7	1	7	100	NA	4.329113
8	3	20	95	1333,1113	4.901131
9	2	18	95	1078	5.485614
10	1	6	90	NA	6.158018
11	1	11	90	NA	6.552764
12	2	9	60	1744	7.389928
13	2	16	60	1063	7.798644
14	3	13	90	1884,1689	8.712041
15	2	20	70	1991	9.441749
16	3	8	90	1988,1402	9.582532
17	1	13	100	NA	10.394793
18	1	6	50	NA	11.067366
19	2	11	100	1824	11.980266

Bin5Statistics_21.txt

USA Bin 5 Radar Test
3/23/2007 12:46:03 PM
Bursts: 20

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	1	15	90	NA	0.096302
2	1	5	85	NA	1.188628
3	2	7	60	1162	1.396648
4	3	20	50	1167,1934	2.200246
5	1	9	90	NA	2.965765
6	3	12	75	1279,1767	3.410917
7	3	15	65	1616,1923	4.016158
8	2	16	80	1503	4.209814
9	3	6	85	1815,1541	5.117722
10	3	19	85	1240,1578	5.843636
11	3	9	60	1600,1987	6.542831
12	2	9	55	1837	6.746965
13	3	12	95	1532,1663	7.499239
14	1	12	100	NA	7.816919
15	2	20	60	1471	8.737409
16	3	11	55	1045,1768	9.577350
17	1	14	100	NA	9.772510
18	3	12	70	1786,1792	10.450488
19	1	9	80	NA	10.802866
20	3	6	100	1961,1551	11.566497

Bin5Statistics_22.txt

USA Bin 5 Radar Test
3/23/2007 12:46:41 PM
Bursts: 20

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	19	100	1627,1990	0.170724
2	3	17	100	1877,1368	0.770783
3	3	6	85	1669,1383	1.202654
4	3	19	55	1949,1070	2.059850
5	1	6	85	NA	2.677550
6	2	18	75	1224	3.453260
7	2	15	50	1679	4.175937
8	3	16	60	1586,1362	4.678741
9	1	7	55	NA	4.825332
10	2	6	65	1887	5.615579
11	3	5	95	1048,1735	6.486328
12	1	8	90	NA	6.791459
13	2	8	85	1549	7.590535
14	3	17	55	1063,1860	7.874790
15	3	6	55	1118,1940	8.853832
16	3	5	50	1500,1547	9.335492
17	3	6	85	1266,1903	9.688939
18	1	13	70	NA	10.540298
19	3	11	60	1876,1679	10.872737
20	1	12	80	NA	11.675398

Bin5Statistics_23.txt

USA Bin 5 Radar Test
3/23/2007 12:47:21 PM
Bursts: 15

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	1	10	95	NA	0.460970
2	2	19	60	1882	0.913805
3	3	18	100	1852,1160	2.025349
4	1	11	95	NA	2.607165
5	1	18	50	NA	3.497854
6	3	9	95	1879,1591	4.542697
7	3	16	100	1126,1196	5.054251
8	1	14	60	NA	6.074442
9	2	12	80	1078	6.731253
10	1	8	55	NA	7.781589
11	2	8	95	1370	8.176358
12	1	10	60	NA	9.316447
13	3	7	90	1343,1639	10.096506
14	2	6	75	1010	10.715697
15	2	15	85	1390	11.681785

Bin5Statistics_24.txt

USA Bin 5 Radar Test
3/23/2007 12:47:58 PM
Bursts: 18

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	2	7	65	1888	0.565275
2	1	7	85	NA	1.053609
3	2	12	85	1044	1.812089
4	1	14	70	NA	2.489962
5	2	17	100	1640	2.799350
6	3	5	100	1974,1431	3.948890
7	3	17	95	1105,1368	4.379038
8	3	10	100	1525,1932	4.671442
9	2	13	70	1112	5.823276
10	1	18	65	NA	6.162759
11	1	9	85	NA	7.001499
12	2	5	60	1301	7.623399
13	2	16	55	1391	8.215389
14	1	7	55	NA	8.826514
15	1	15	85	NA	9.689025
16	2	17	55	1816	10.392313
17	3	13	50	1183,1672	10.813615
18	1	6	100	NA	11.564360

Bin5Statistics_25.txt

USA Bin 5 Radar Test
3/23/2007 12:48:45 PM
Bursts: 17

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	2	11	75	1293	0.036031
2	2	12	55	1022	0.946593
3	3	8	60	1248,1836	1.829538
4	2	10	70	1438	2.472533
5	2	7	60	1350	3.396974
6	3	7	75	1747,1273	4.204604
7	1	17	75	NA	4.901395
8	2	18	60	1305	5.457126
9	3	17	50	1472,1305	5.682996
10	2	19	85	1543	6.746012
11	3	19	65	1348,1658	7.716268
12	1	10	50	NA	8.118644
13	1	8	85	NA	8.937627
14	3	11	70	1113,1120	9.738656
15	1	19	60	NA	10.330476
16	1	11	70	NA	10.740876
17	2	16	90	1154	11.523743

Bin5Statistics_26.txt

USA Bin 5 Radar Test
3/23/2007 12:49:28 PM
Bursts: 9

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	1	8	90	NA	0.139529
2	3	14	75	1552,1067	2.147182
3	3	18	55	1088,1611	3.284401
4	2	18	65	1257	5.263728
5	1	20	55	NA	6.068111
6	1	5	90	NA	7.355972
7	3	14	75	1038,1101	9.167703
8	1	10	80	NA	9.346852
9	3	7	75	1591,1619	10.742389

Bin5Statistics_27.txt

USA Bin 5 Radar Test
3/23/2007 12:50:14 PM
Bursts: 19

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	14	80	1330,1432	0.421843
2	3	8	60	1108,1118	0.678772
3	3	13	65	1067,1615	1.297242
4	3	11	85	1352,1389	2.396724
5	1	19	65	NA	2.769071
6	3	14	65	1246,1639	3.671602
7	2	8	90	1366	3.868754
8	1	17	65	NA	4.961820
9	2	12	95	1449	5.378385
10	3	10	80	1546,1718	5.860041
11	2	6	75	1191	6.429379
12	2	11	50	1212	6.997768
13	3	19	100	1658,1222	8.079013
14	2	8	70	1328	8.471291
15	3	16	75	1366,1859	9.034753
16	2	7	50	1435	9.773646
17	2	17	65	1060	10.613473
18	2	10	70	1264	11.093273
19	1	16	90	NA	11.396766

Bin5Statistics_28.txt

USA Bin 5 Radar Test
3/23/2007 12:50:51 PM
Bursts: 11

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	1	17	95	NA	0.622726
2	1	10	65	NA	2.108608
3	1	9	95	NA	3.106006
4	1	15	85	NA	3.425195
5	2	7	85	1119	4.526347
6	2	15	60	1535	5.893845
7	3	11	70	1799,1623	6.649786
8	1	7	55	NA	8.485263
9	1	6	65	NA	9.764858
10	1	15	60	NA	10.540765
11	1	19	60	NA	11.069165

Bin5Statistics_29.txt

USA Bin 5 Radar Test
3/23/2007 12:51:30 PM
Bursts: 16

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	3	13	65	1500,1261	0.578904
2	1	14	60	NA	1.337748
3	3	14	55	1621,1940	1.565267
4	1	11	75	NA	2.955637
5	2	8	85	1493	3.017281
6	2	18	55	1884	4.025690
7	2	12	85	1605	4.833492
8	2	13	100	1319	5.633404
9	2	12	70	1308	6.138693
10	3	12	55	1054,1384	7.435851
11	1	19	85	NA	8.075478
12	1	12	60	NA	8.975789
13	3	11	80	1602,1691	9.383672
14	2	10	60	1004	9.935407
15	3	9	90	1219,1943	10.780361
16	1	18	90	NA	11.505092

Bin5Statistics_30.txt

USA Bin 5 Radar Test
3/23/2007 12:52:19 PM
Bursts: 16

Burst#	Pulses	Chirp(MHz)	PW(uS)	Inter-pulse spacing/s(uS)	Pulse Start(S)
1	1	8	65	NA	0.034687
2	1	13	85	NA	0.865758
3	3	10	90	1635,1323	2.101734
4	1	11	100	NA	2.752906
5	1	14	55	NA	3.578778
6	1	17	95	NA	4.011932
7	1	6	65	NA	4.787407
8	1	6	85	NA	5.410143
9	3	11	60	1818,1005	6.343019
10	1	11	90	NA	6.857404
11	1	17	65	NA	7.737165
12	2	17	85	1968	8.432924
13	3	19	50	1842,1136	9.641061
14	2	13	60	1856	10.299492
15	1	15	100	NA	10.871086
16	2	10	70	1333	11.741992

Bin6Statistics_1.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:25:50 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  11        5.294000               33
  16        5.296000               48
  39        5.295000              117
  72        5.292000              216
  98        5.308000              294
```

Bin6Statistics_2.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:27:07 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   5        5.301000               15
  12        5.298000               36
  30        5.300000               90
  31        5.304000               93
  38        5.302000              114
  50        5.305000              150
```

Bin6Statistics_3.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:27:33 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  10        5.300000               30
  13        5.292000               39
  29        5.291000               87
  33        5.297000               99
  34        5.302000              102
  40        5.298000              120
  49        5.301000              147
```

Bin6Statistics_4.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:27:53 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   9        5.292000               27
  11        5.300000               33
  41        5.299000              123
  53        5.291000              159
  62        5.295000              186
```

Bin6Statistics_5.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:28:16 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  33        5.299000               99
```

Bin6Statistics_6.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:28:35 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   0        5.309000                0
   2        5.294000                6
  23        5.293000               69
  30        5.305000               90
  39        5.291000              117
  61        5.300000              183
  91        5.308000              273
```

Bin6Statistics_7.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:28:55 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   8        5.291000               24
  20        5.299000               60
  27        5.301000               81
  58        5.298000              174
```

Bin6Statistics_8.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:29:16 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   0        5.301000                0
  35        5.292000              105
```

Bin6Statistics_9.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:29:36 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  18        5.295000               54
  71        5.304000              213
  81        5.306000              243
```

Bin6Statistics_10.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:29:58 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   3        5.297000                9
  30        5.299000               90
  78        5.291000              234
  87        5.308000              261
```

Bin6Statistics_11.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:30:26 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  32        5.292000               96
  61        5.303000              183
```

Bin6Statistics_12.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:30:49 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  30        5.308000               90
  71        5.302000              213
  87        5.300000              261
```

Bin6Statistics_13.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:31:10 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   4        5.298000               12
  12        5.306000               36
  68        5.300000              204
  75        5.307000              225
  90        5.304000              270
```

Bin6Statistics_14.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:31:37 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  47        5.295000              141
  50        5.309000              150
```

Bin6Statistics_15.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:32:00 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  31        5.300000               93
  56        5.298000              168
  63        5.296000              189
```

Bin6Statistics_16.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:32:40 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  16        5.307000               48
  64        5.305000              192
  67        5.293000              201
  71        5.292000              213
```

Bin6Statistics_17.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:33:33 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  16        5.291000               48
  21        5.295000               63
  27        5.296000               81
  62        5.309000              186
  90        5.306000              270
  95        5.298000              285
```

Bin6Statistics_18.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:34:10 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  80        5.304000              240
  88        5.298000              264
  92        5.307000              276
```

Bin6Statistics_19.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:34:31 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  60        5.291000              180
  63        5.296000              189
  78        5.307000              234
```

Bin6Statistics_20.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:34:51 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   2        5.309000                6
   7        5.302000               21
  11        5.301000               33
  20        5.304000               60
  60        5.294000              180
  65        5.295000              195
  80        5.297000              240
```

Bin6Statistics_21.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:35:10 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  12        5.292000               36
  36        5.307000              108
  50        5.294000              150
  71        5.298000              213
  76        5.293000              228
  81        5.301000              243
```

Bin6Statistics_22.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:35:32 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  13        5.291000               39
  16        5.308000               48
  18        5.305000               54
  21        5.301000               63
  63        5.302000              189
  75        5.296000              225
  96        5.307000              288
```

Bin6Statistics_23.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:35:57 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  34        5.301000              102
  50        5.293000              150
  58        5.294000              174
  92        5.292000              276
```

Bin6Statistics_24.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:36:17 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   7        5.303000               21
  25        5.292000               75
  44        5.305000              132
```

Bin6Statistics_25.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:36:39 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   3        5.302000                9
  65        5.304000              195
  87        5.308000              261
  95        5.292000              285
  99        5.295000              297
```

Bin6Statistics_26.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:36:56 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  36        5.305000              108
  59        5.297000              177
  92        5.292000              276
```

Bin6Statistics_27.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:37:14 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  24        5.304000               72
  46        5.297000              138
```

Bin6Statistics_28.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:37:37 PM
Hop#  Frequency(GHz) Pulse Start (mS)
  11        5.301000               33
  26        5.300000               78
  46        5.305000              138
  57        5.292000              171
  74        5.306000              222
```

Bin6Statistics_29.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:37:59 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   2        5.303000                6
  20        5.295000               60
  56        5.307000              168
  86        5.309000              258
```

Bin6Statistics_30.txt

```
USA Frequency Hopping Radar Test
3/27/2007   2:38:18 PM
Hop#  Frequency(GHz) Pulse Start (mS)
   8        5.299000               24
  16        5.300000               48
  35        5.291000              105
  78        5.293000              234
  93        5.304000              279
  99        5.295000              297
```

Appendix C: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	RMS	Root mean square
EDCS	Engineering Document Control System	Qp	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Pk	Peak
Cal	Calibration	kHz	Kilohertz ($1x10^3$)
EN	European Norm	MHz	Megahertz ($1x10^6$)
IEC	International Electro technical Commission	GHz	Gigahertz ($1x10^9$)
CISPR	International Special Committee on Radio Interference	H	Horizontal
CDN	Coupling/Decoupling Network	V	Vertical
LISN	Line Impedance Stabilization Network	dB	decibel
PE	Protective Earth	V	Volt
GND	Ground	kV	Kilovolt ($1x10^3$)
L1	Line 1	µV	Microvolt ($1x10^{-6}$)
L2	Line2	A	Amp
L3	Line 3	µA	Micro Amp ($1x10^{-6}$)
DC	Direct Current	mS	Milli Second ($1x10^{-3}$)
RAW	Uncorrected measurement value, as indicated by the measuring device	µS	Micro Second ($1x10^{-6}$)
RF	Radio Frequency	µS	Micro Second ($1x10^{-6}$)
SLCE	Signal Line Conducted Emissions	m	Meter
Meas dist	Measurement distance	Spec dist	Specification distance
N/A or NA	Not Applicable	SL	Signal Line (or Telecom Line)
P	Power Line	L	Live Line
N	Neutral Line	R	Return
S	Supply	AC	Alternating Current

Appendix E: Test Equipment/Software Used to perform the test

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due	Test Number(s)
004883	EMC Test Systems/ 3115	Double Ridged Guide Horn Antenna	19-APR-06	19-APR-07	[26022], [26032], [26044]
005568	HP/ 8449B	PreAmplifier (1-26.5GHz)	08-SEP-06	08-SEP-07	[26044]
005691	Miteq/ NSP1800-25-S1	Broadband Preamplifier (1-18GHz)	09-OCT-06	09-OCT-07	[26022], [26032], [26044]
008136	Huber + Suhner/ SF106A	7m Sucoflex cable	05-JAN-07	05-JAN-08	[26044]
008370	Andrew/ F4A-PNMNM	49 ft Heliax Cable	16-MAR-06	16-MAR-07	[26067]
008591	Fischer Custom Communications/ FCC-RFM2F-520R	LISN AC Adaptor - Std 120V outlet	16-MAR-06	16-MAR-07	[26067]
019209	TTE/ H785-150K-50-21378	Hi Pass Filter 150KHz	02-JAN-07	02-JAN-08	[26067]
020975	Micro-Coax/ UFB311A-0-1344-520520	RF Coaxial Cable, to 18GHz, 134.4 in	16-MAR-06	16-MAR-07	[26022], [26032], [26044]
024905	Agilent/ E4440A	Precision Spectrum Analyzer	14-FEB-07	14-FEB-08	[26022], [26032], [26044]
025640	Micro-Coax/ UFB311A-0-2720-520520	RF Coaxial Cable, to 18GHz, 272 in	05-JAN-07	05-JAN-08	[26044]
025655	Micro-Coax/ UFB311A-1-0840-504504	RF Coaxial Cable, to 18GHz, 84 in	17-MAR-06	17-MAR-07	[26022], [26032], [26044]
025657	Micro-Coax/ UFB311A-1-0840-504504	RF Coaxial Cable, to 18GHz, 84 in	19-AUG-06	19-AUG-07	[26022], [26032], [26044], [26067]
025660	Micro-Coax/ UFB311A-1-0840-504504	Coaxial Cable, 84.0 in. to 18GHz	05-JAN-07	05-JAN-08	[26044]
030495	Agilent/ 8761B	SPDT RF Switch, to 18GHz	07-APR-06	07-APR-07	[26022], [26032], [26044]
030496	Agilent/ 8761B	SPDT RF Switch, to 18GHz	08-SEP-06	08-SEP-07	[26044]
030563	Micro-Coax/ UFB311A-1-0950-504504	RF Coaxial Cable, to 18GHz, 95 in	05-JAN-07	05-JAN-08	[26044]
030652	Sunol Sciences/ JB1	Combination Antenna, 30MHz-2GHz	06-JUL-06	06-JUL-07	[26044]
032455	Midwest Microwave/ CSY-MNMN-82-273001	RF Coaxial Cable to 18 GHz	11-SEP-06	11-MAR-07	[26022], [26032], [26044]

032801	ETS-Lindgren/ 3117	Double Ridged Waveguide Horn Antenna	28-JUL-06	28-JUL-07	[26044]
034188	Micro-Tronics/ BRC50703-02	Notch Filter, SB:5.150-5.350GHz, to 11GHz	17-JUL-06	17-JUL-07	[26044]
034189	Micro-Tronics/ BRC50704-02	Notch Filter, SB:5.470-5.725GHz, to 12GHz	17-JUL-06	17-JUL-07	[26044]
034304	Micro-Tronics/ BRM50702-02	Notch Filter, SB:2.4-2.5GHz, to 18GHz	17-JUL-06	17-JUL-07	[26044]
034974	Midwest Microwave/ ATT-0640-20-29M-02	Attenuator, 20dB, DC-40GHz	09-MAY-06	09-MAY-07	[26022], [26032]
035040	Micro-Tronics/ HPM50112-02	High pass Filter, 6.4-18GHz	17-JUL-06	17-JUL-07	[26044]
035624	Rohde & Schwarz/ ESCI	EMI Test Receiver	28-JUN-06	28-JUN-07	[26044], [26067]
036716	Cisco/ RF Coaxial Cable-SMA	Radio Test Cable, SMA-SMA	11-DEC-06	11-DEC-07	[26022], [26032], [26044]
038396	Micro-Coax/ UFB293C-Q-1200-50U50L	RF Coaxial Cable, 120 Inches, to 18GHz	13-JUL-06	13-JUL-07	[26044]