

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT****INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART E REQUIREMENT  
AND INDUSTRY CANADA RSS 210  
OF**

**Product Name:** Vehicle Mount Terminal  
**Brand Name:** Honeywell  
**Marketing Name:** Thor VM2  
**Model No.:** VM2C  
**Model Difference:** N/A  
**FCC ID:** KDZVM2C01  
**IC:** 1693B-VM2C01  
**Report No.:** EH/2012/A0024  
**Issue Date:** Jan. 21, 2013  
**FCC Rule Part:** §15.407  
**IC Rule Part:** RSS-210 issue 8:2010, Annex 9  
**Prepared for:** Honeywell International Inc.,  
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## VERIFICATION OF COMPLIANCE

**Applicant:** Honeywell International Inc.,  
Honeywell Scanning and Mobility  
9680 Old Bailes Road, Fort Mill, SC 29707, USA

**Product Name:** Vehicle Mount Terminal

**Brand Name:** Honeywell

**Marketing Name:** Thor VM2

**Model No.:** VM2C

**Model Difference:** N/A

**FCC ID:** KDZVM2C01

**IC:** 1693B-VM2C01

**File Number:** EH/2012/A0024

**Date of test:** Oct. 05, 2012 ~ Jan. 08, 2013

**Date of EUT Received:** Oct. 05, 2012

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407 and RSS-210 issue 8: 2010 Annex 9.

The test results of this report relate only to the tested sample identified in this report.

Test By:

Marcus Tseng

Date

Jan. 21, 2013

Marcus Tseng / Engineer

Prepared By:

Violetta Tang

Date

Jan. 21, 2013

Violetta Tang / Clerk

Approved By:

Jim Chang

Date

Jan. 21, 2013

Jim Chang / Supervisor

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## Version

Version No.	Date	Description
00	Jan. 21, 2013	Initial creation of document

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## Table of Contents

<b>1. GENERAL INFORMATION</b>	<b>6</b>
1.1. Product Description	6
1.2. Related Submittal(s) / Grant (s)	8
1.3. Test Methodology	8
1.4. Test Facility	8
1.5. Special Accessories	8
1.6. Equipment Modifications	8
<b>2. SYSTEM TEST CONFIGURATION</b>	<b>9</b>
2.1. EUT Configuration	9
2.2. EUT Exercise	9
2.3. Test Procedure	9
2.4. Configuration of Tested System	10
<b>3. SUMMARY OF TEST RESULT</b>	<b>11</b>
<b>4. DESCRIPTION OF TEST MODES</b>	<b>12</b>
<b>5. MEASUREMENT UNCERTAINTY FOR FIELD STRENGTH OF SPURIOUS RADIATION</b>	<b>12</b>
<b>6. CONDUCTED EMISSION TEST</b>	<b>13</b>
6.1. Standard Applicable	13
6.2. EUT Setup	13
6.3. Measurement Procedure	13
6.4. Measurement Equipment Used:	14
6.5. Measurement Result	14
<b>7. 26dB and 99%EMISSION BANDWIDTH MEASUREMENT</b>	<b>17</b>
7.1. Standard Applicable	17
7.2. Measurement Procedure	17
7.3. Measurement Equipment Used:	17
7.4. Measurement Result	18
7.5. Measurement Result	25
<b>8. AVERAGE OUTPUT POWER MEASUREMENT</b>	<b>32</b>
8.1. Standard Applicable	32
8.2. Measurement Procedure	33
8.3. Measurement Equipment Used:	33
8.4. Measurement Result	34
<b>9. PEAK POWER SPECTRAL DENSITY</b>	<b>41</b>
9.1. Standard Applicable	41
9.2. Measurement Procedure	42
9.3. Measurement Equipment Used:	42
9.4. Measurement Result	43
<b>10. PEAK EXCURSION MEASUREMENT</b>	<b>49</b>
10.1. Standard Applicable	49
10.2. Measurement Procedure	49
10.3. Measurement Equipment Used:	49
10.4. Test Results:	50

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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<b>11.UNDESIRABLE EMISSION - CONDUCTED MEASUREMENT .....</b>	<b>56</b>
11.1 Standard Applicable .....	56
11.2 Measurement Procedure .....	58
11.3 Measurement Equipment Used: .....	58
11.4 Measurement Result: .....	58
<b>12.UNDESIRABLE EMISSION - RADICTED MEASUREMENT.....</b>	<b>75</b>
12.1 Standard Applicable .....	75
12.2 EUT Setup .....	78
12.3 Measurement Procedure .....	78
12.4 Test SET-UP (Block Diagram of Configuration) .....	79
12.5 Measurement Equipment Used: .....	80
12.6 Field Strength Calculation.....	81
12.7 Measurement Result.....	81
<b>13.TRANSMISSION IN THE ABSENCE OF DATA.....</b>	<b>124</b>
13.1 Standard Applicable .....	124
13.2 Result: .....	124
<b>14.FREQUENCY STABILITY .....</b>	<b>125</b>
14.1 Standard Applicable .....	125
14.2 Result: .....	125
<b>15.ANTENNA REQUIREMENT.....</b>	<b>126</b>
15.1 Standard Applicable .....	126
15.2 Antenna Connected Construction .....	126
<b>16.TPC and DFS MEASUREMENT .....</b>	<b>127</b>
16.1 TPC: Standard Applicable .....	127
16.2 DFS: Standard Applicable .....	128
<b>17.MAXIMUM PERMISSIBLE EXPOSURE (MPE) .....</b>	<b>139</b>
17.1 Standard Applicable .....	139
17.2 Maximum Permissible Exposure (MPE) Evaluation .....	140

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## 1. GENERAL INFORMATION

### 1.1. Product Description

#### General:

Product Name:	Vehicle Mount Terminal	
Brand Name:	Honeywell	
Marketing Name:	Thor VM2	
Model No.:	VM2C	
Model Difference:	N/A	
Hardware Version:	N/A	
Software Version:	N/A	
Power Supply:	10.8Vdc Li-ion battery or 100-240Vdc from AC/DC adapter	
	Battery:	Model No.: OVT310L1R00 Supplier: TOTEX International Limited
	Adapter:	Model No.:GT-81081-6015-T3, Supplier: GlobTek, Inc.

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**WLAN: 802.11 a**

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology	Type of Emission
11a	5150~5250	4	15.06dBm(Avg.) 18.98dBm(EIRP)	OFDM	17M0D1D
	5250~5350	4	15.27dBm(Avg.) 19.19dBm(EIRP)		17M0D1D
	5470~5725	11	15.08dBm(Avg.) 20.05dBm(EIRP)		17M1D1D
Antenna Designation			Internal: PIFA Antenna, Model No.: 40120512 3.92dBi (5.2GHz) 4.97dBi (5.5GHz) External: Dipole Antenna, Model No.: WTS 2450 0.83dBi (5.2GHz) 0.77dBi (5.5GHz) Model No.: R380500314 3.88dBi (5.2GHz) 4.85dBi (5.5GHz)		
Modulation type			64QAM, 16QAM, QPSK, BPSK for OFDM		
Transition Rate:			802.11 a: 6/9/12/18/24/36/48/54 Mbps		

The EUT is compliance with IEEE 802.11 a Standard.

This report applies for frequency bands 5150 MHz– 5250 MHz, 5250MHz-5350MHz and 5470 MHz–5725MHz.

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## 1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: KDZVM2C01** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules and **IC: 1693B-VM2C01** filing to comply with Industry Canada RSS-210 issue 8: 2010 Annex 9. The composite system (digital device) is compliance with Subpart B is authorized under a DoC procedure.

## 1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 2009 & DA 02 2138 published on 08, 30, 2002. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with FCC Public Notice DA 02-2138 for compliance to FCC 47CFR 15.407 requirements

## 1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2009. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-4.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

## 1.5. Special Accessories

Not available for this EUT intended for grant.

## 1.6. Equipment Modifications

Not available for this EUT intended for grant.

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## 2. SYSTEM TEST CONFIGURATION

### 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2. EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

### 2.3. Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2009, conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and Average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." Is still within the 3Db illumination BW of the measurement antenna. According to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4-2009.

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## 2.4. Configuration of Tested System

**Fig. 2-1 Radiated Emission Configuration**

EUT

**Table 2-1 Equipment Used in Tested System**

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	SCU	v3.03.08	N/A	N/A	N/A

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### 3. SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207 RSS-Gen §7.2.4	AC Power Line Conducted Emission	Compliant
§15.407(a) RSS 210 A9.2 RSS-Gen §4.6.3	26 dB Emission Bandwidth	Compliant
§15.407(a) RSS 210 A9.2(1)(2)(3)	Peak Output Power Measurement	Compliant
§15.407(a) RSS 210 A9.2(1)(2)(3)	Peak Power Spectral Density Measurement	Compliant
15.407(a)(6)	Peak Excursion Measurement	Compliant
§15.407(b) RSS 210 A9.2(1)(2)(3)	Undesirable Emission – Conducted Measurement	Compliant
§15.407(b) RSS 210 A9.2(1)(2)(3)	Undesirable Emission – Radiated Measurement	Compliant
§15.407(c) RSS 210 A9.4(4)	Transmission in case of Absence of Information	Compliant
§15.407(g) RSS 210 A9.5(5)	Frequency Stability	Compliant
§15.407(a)	Antenna Requirement	Compliant
§15.407(d) RSS 210 A9.3	TPC and DFS Measurement	Compliant

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#### 4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting mode is programmed.

802.11 a mode:

5150MHz-5250MHz: Channel lowest (5180MHz)、Mid (5220MHz) and Highest (5240MHz).

5250MHz-5350MHz: Channel lowest (5260MHz)、Mid (5300MHz) and Highest (5320MHz).

5470MHz-5725MHz: Channel lowest (5500MHz)、Mid (5580MHz) and Highest (5700MHz) and with 6Mbps data rate are chosen for full testing.

Pre-scanned was done on external antenna: WTS 2450 and antenna R380500314, and antenna R380500314 results higher emission at 5GHz. Therefore, the completed set of measurement was done on antenna: R380500314 to be presented on this test report.

#### 5. MEASUREMENT UNCERTAINTY FOR FIELD STRENGTH OF SPURIOUS RADIATION

Measurement uncertainty (Polarization : <b>Vertical</b> )	30MHz - 180MHz: 3.37dB
	180MHz -417MHz: 3.19dB
	0.417GHz-1GHz: 3.19dB
	1GHz - 18GHz: 4.04dB
	18GHz - 40GHz: 4.04dB

Measurement uncertainty (Polarization : <b>Horizontal</b> )	30MHz - 167MHz: 4.22dB
	167MHz -500MHz: 3.44dB
	0.5GHz-1GHz: 3.39dB
	1GHz - 18GHz: 4.08dB
	18GHz - 40GHz: 4.08dB

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## 6. CONDUCTED EMISSION TEST

### 6.1. Standard Applicable

According to §15.207 and RSS-Gen §7.2.4, frequency range within 150 KHz to 30 MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note		
1.The lower limit shall apply at the transition frequencies		
2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

### 6.2. EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2009.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz power source.

### 6.3. Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

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#### 6.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100759	05/20/2011	05/19/2013
EMI Receiver	R&S	ESCS 30	828985/004	09/23/2012	09/22/2013
LISN	Rolf-Heine	NNB-2/16Z	99012	03/23/2012	03/22/2013
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/23/2012	03/22/2013
Coaxial Cables	N/A	WK CE Cable	N/A	01/05/2013	01/04/2014

#### 6.5. Measurement Result

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode			Test Date:	Jan. 08, 2013
Temperature:	26	Humidity:	60 %	Test By:	Marcus

Site: ConductionRoom

Phase: L1

Temperature: 26 °C

Limit: FCC Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 60%

EUT: Vehicle Mount Terminal

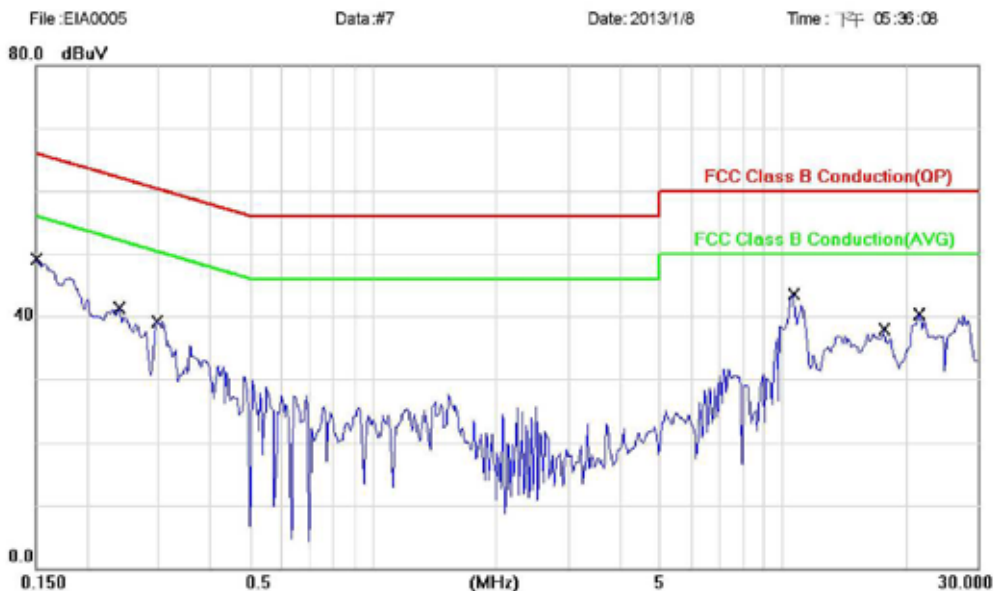
Distance:

M/N: VM2C

Mode:

Note: operationmode

### ConductedEmission



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1524	48.21	0.25	48.46	65.87	-17.41	QP	
2		0.2400	41.18	0.22	41.40	62.10	-20.70	QP	
3		0.2986	38.93	0.23	39.16	60.28	-21.12	QP	
4	*	10.6304	43.08	0.46	43.54	60.00	-16.46	QP	
5		17.8365	37.11	0.78	37.89	60.00	-22.11	QP	
6		21.6253	39.27	0.94	40.21	60.00	-19.79	QP	

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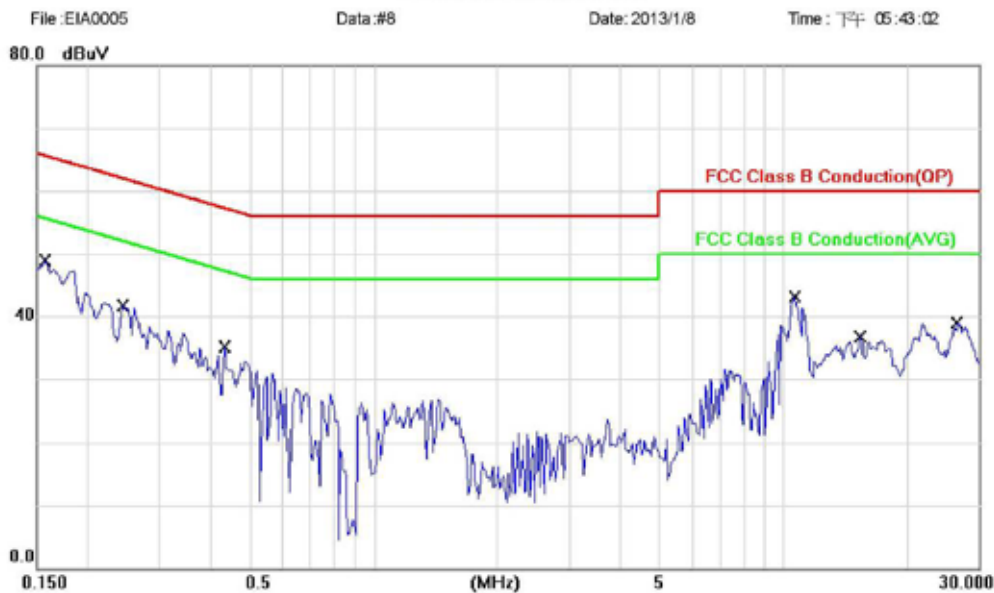
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Site: ConductionRoom  
Limit: FCC Class B Conduction(QP)  
EUT: Vehicle Mount Terminal  
M/N: VM2C  
Note: operationmode

Phase: N  
Power: AC 120V/60Hz  
Distance:  
Mode:

Temperature: 26 °C  
Humidity: 60%

## Conducted Emission



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1578	48.49	0.35	48.84	65.58	-16.74	QP	
2		0.2438	41.36	0.32	41.68	61.97	-20.29	QP	
3		0.4315	34.82	0.35	35.17	57.22	-22.05	QP	
4		10.6343	42.64	0.48	43.12	60.00	-16.88	QP	
5		15.4475	36.06	0.64	36.70	60.00	-23.30	QP	
6		26.6340	37.95	0.91	38.86	60.00	-21.14	QP	

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## 7. 26dB and 99%EMISSION BANDWIDTH MEASUREMENT

### 7.1 Standard Applicable

According to §15.407(a). No Limit required.

According to RSS 210 A9.2(1), No Limit required

RSS-Gen §4.4.1, the transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

### 7.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as 1% of emission BW RBW= 200kHz for a mode, RBW=200kHz for n\_HT20, VBW =620KHz for a, n\_HT20, Span= 50MHz for a, n\_HT20, Sweep=auto
4. Set Detector = Peak, and Trace Mode = max hold
5. Set Marker at the frequency where -26dB (upper and lower) frequency.
6. Repeat above procedures until all frequency (low, middle, and high) was complete.

### 7.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Sensor	Anritsu	ML2495A	1005007	02/08/2012	02/07/2014
Power Meter	Anritsu	MA2411B	917032	02/08/2012	02/07/2014
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/17/2012	03/16/2014
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2012	02/27/2013
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2012	01/04/2013
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2012	02/27/2013
Splitter	Agilent	11636B	N/A	02/28/2012	02/27/2013

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## 7.4 Measurement Result

### 26dB Bandwidth

802.11a, 5150~5250 MHz

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5180	23.20	13.65
5220	22.68	13.56
5240	22.40	13.50

802.11a, 5250~5350 MHz

Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5260	22.90	13.60
5300	22.06	13.44
5320	22.96	13.61

802.11a, 5470~5725 MHz

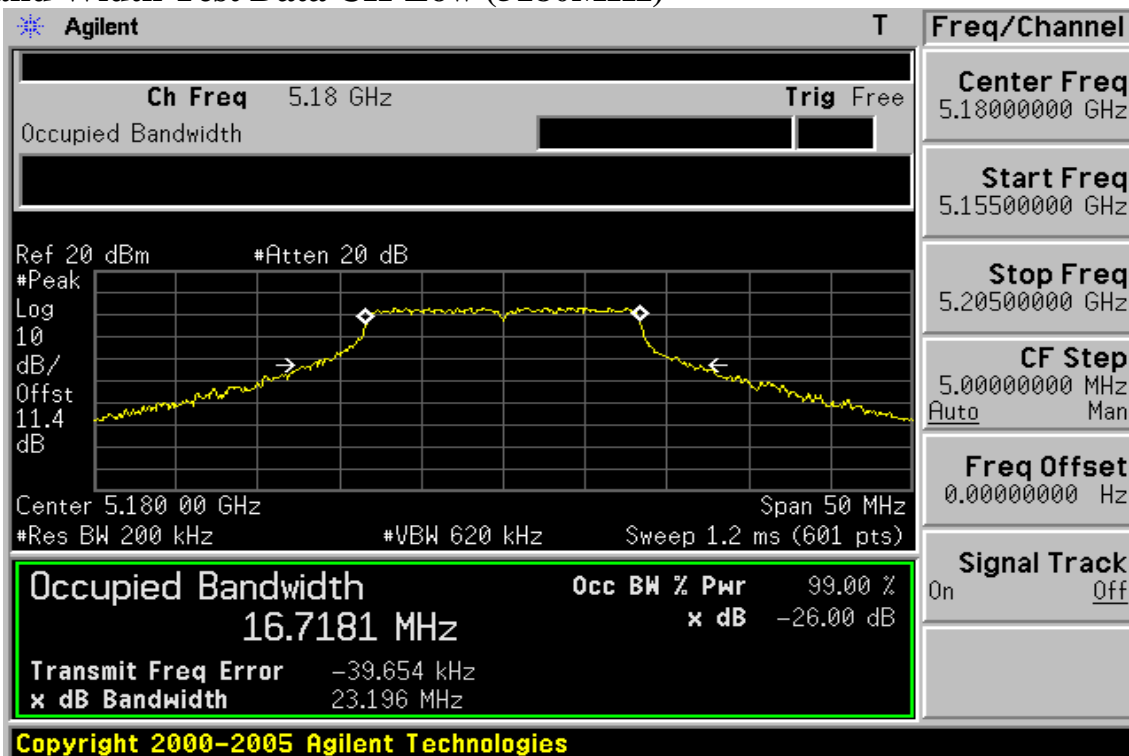
Frequency (MHz)	26dB Bandwidth (B) (MHz)	10 Log (B) (dB)
5500	22.07	13.44
5580	22.75	13.57
5700	23.46	13.70

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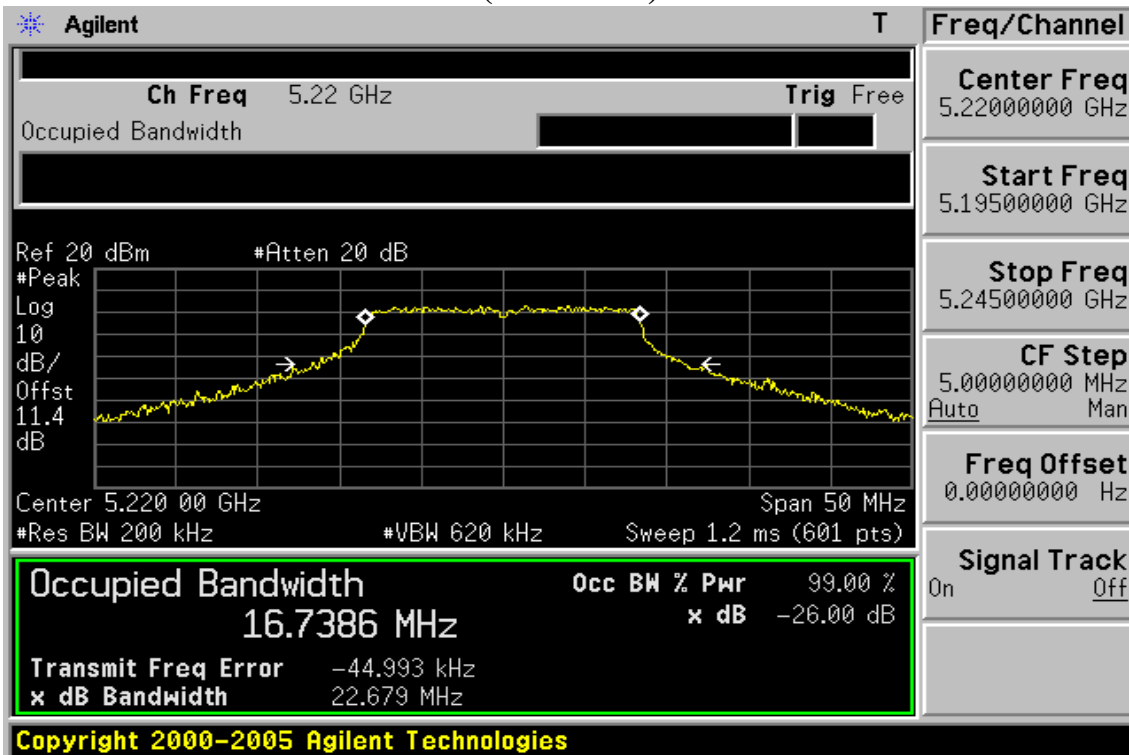
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## 802.11a, 5150~5250 MHz 26dB Band Width Test Data CH-Low (5180MHz)



## 26dB Band Width Test Data CH-Mid (5220MHz)

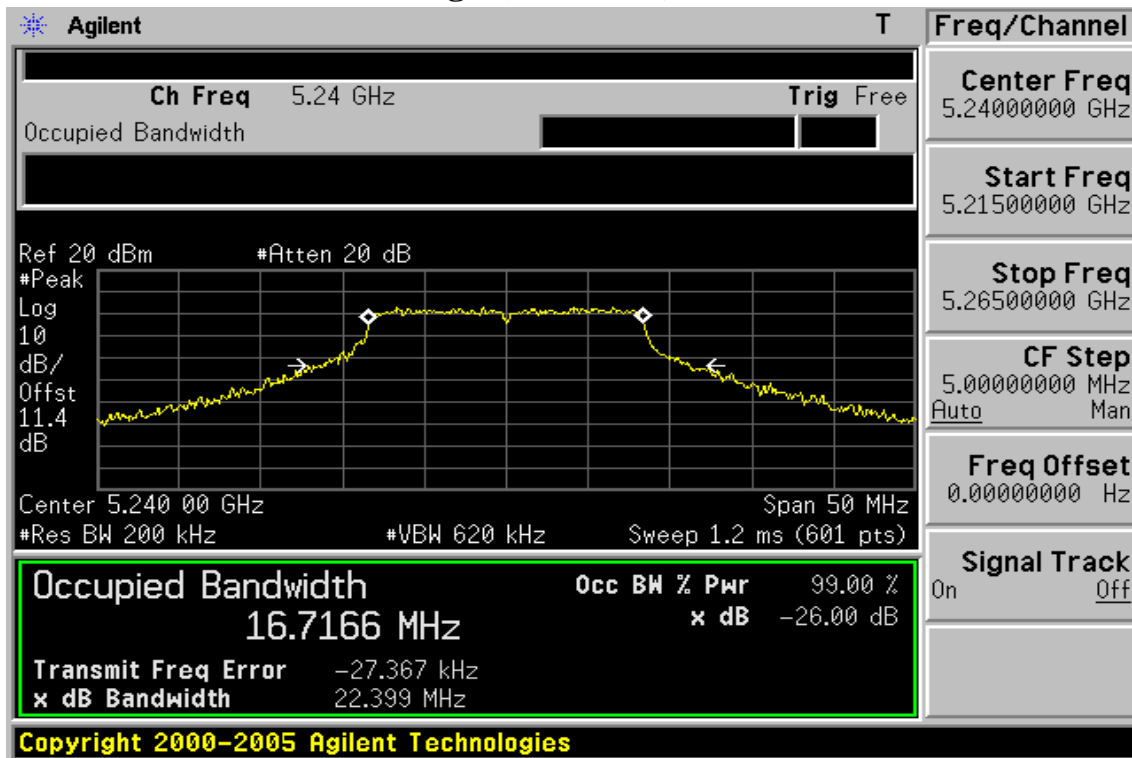


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## 26dB Band Width Test Data CH-High (5240MHz)



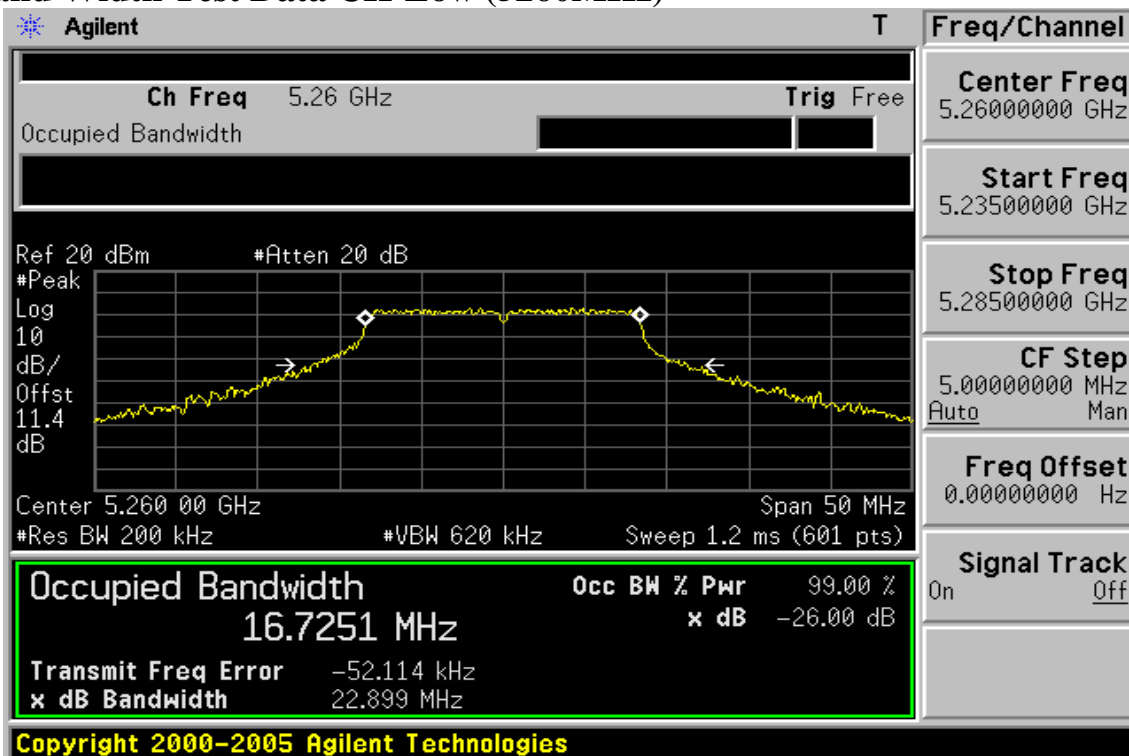
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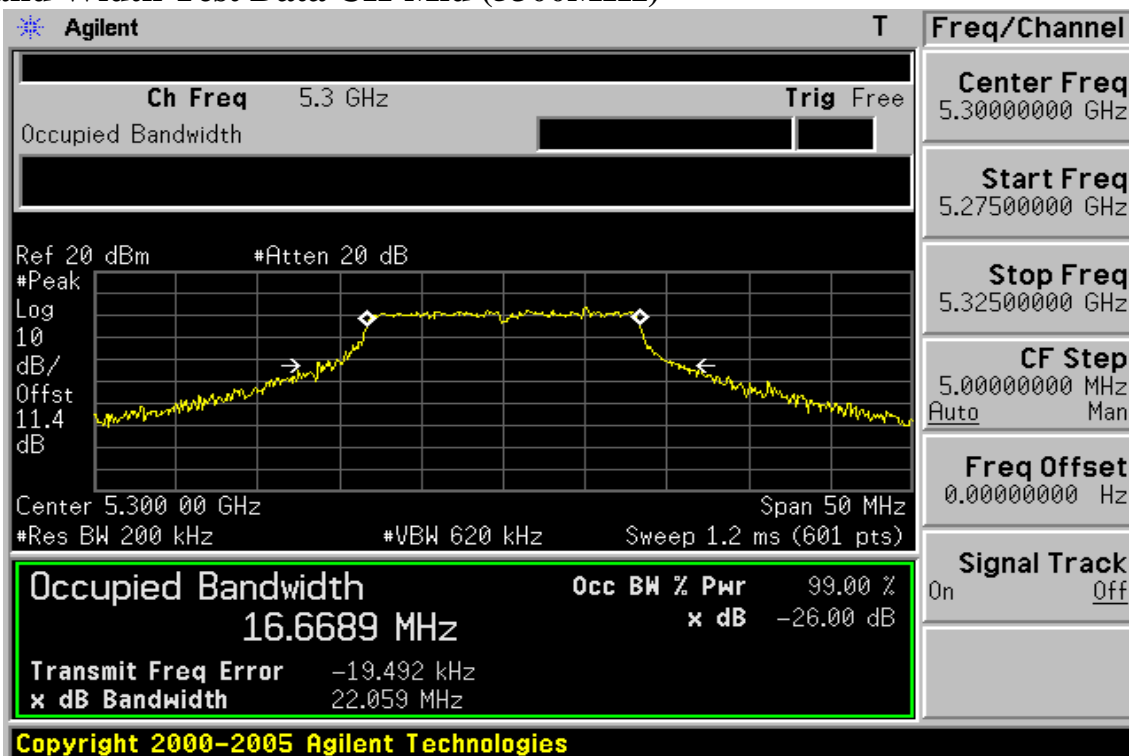
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## 802.11a, 5250~5350 MHz

### 26dB Band Width Test Data CH-Low (5260MHz)



### 26dB Band Width Test Data CH-Mid (5300MHz)

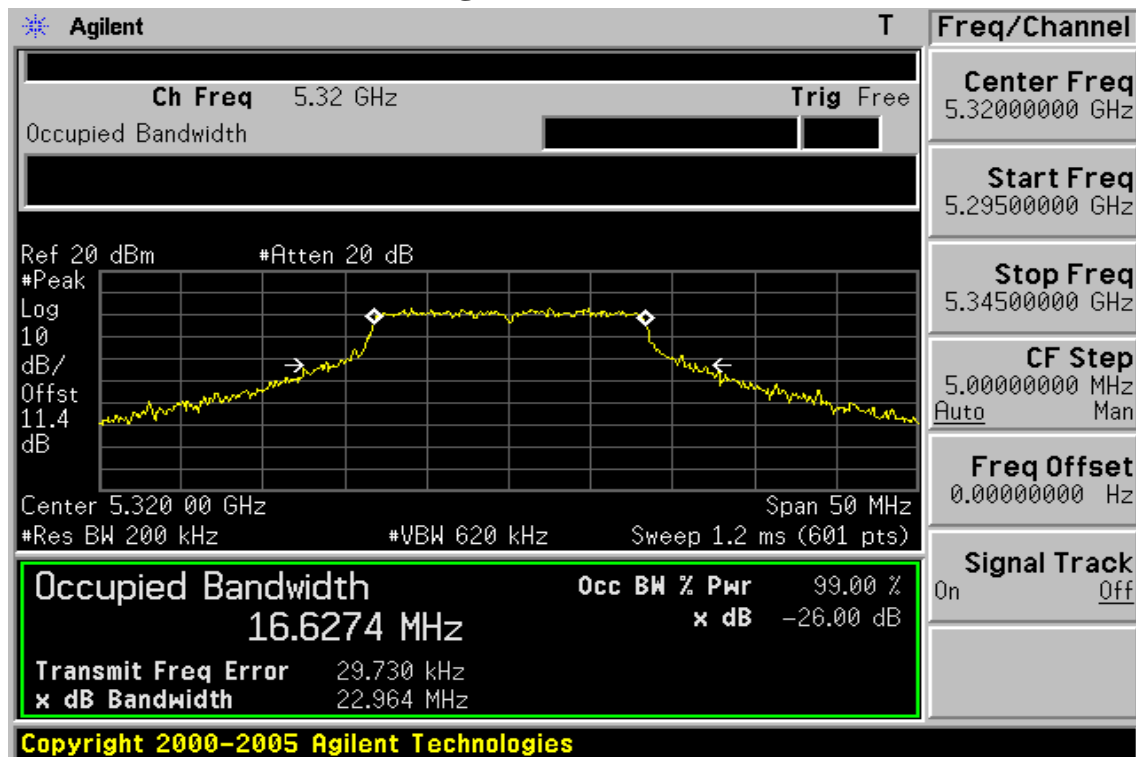


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## 26dB Band Width Test Data CH-High (5320MHz)

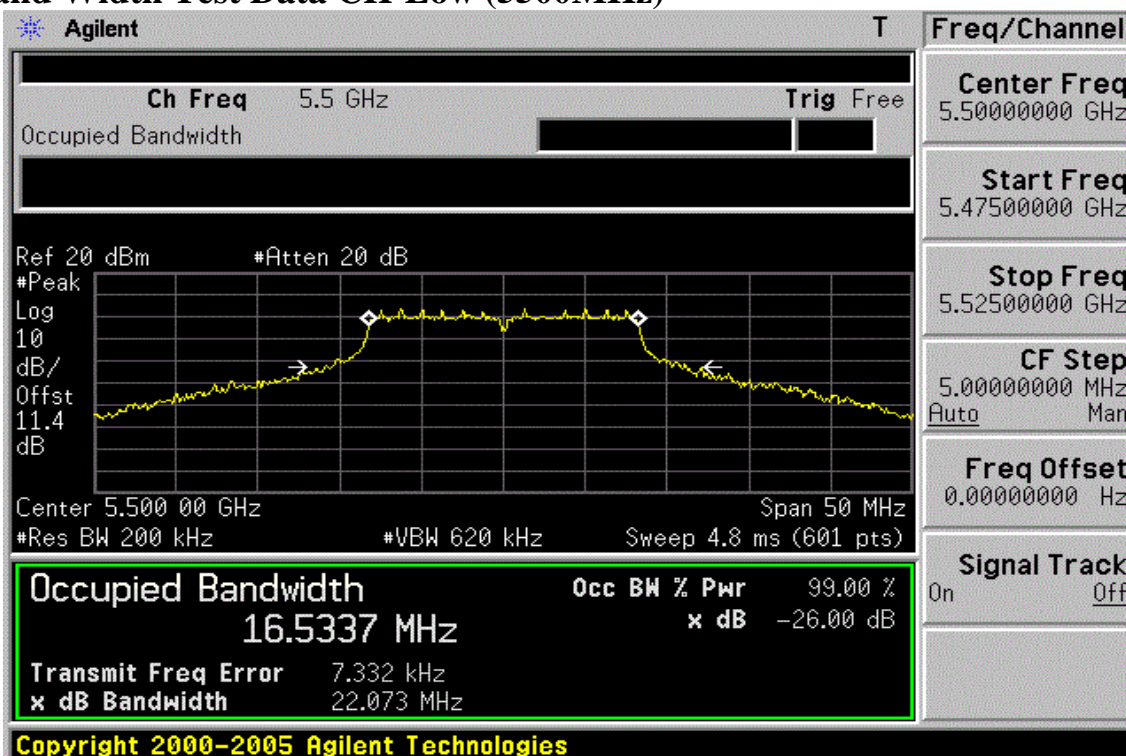


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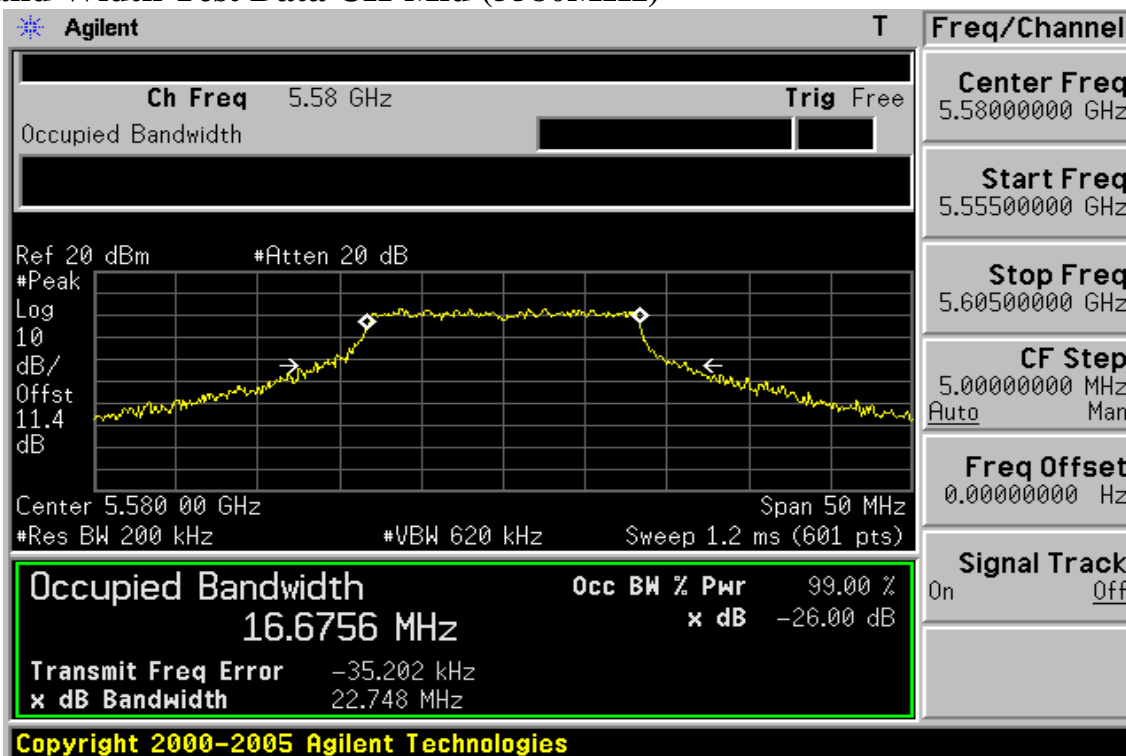
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## 802.11a, 5470~5725 MHz 26dB Band Width Test Data CH-Low (5500MHz)



## 26dB Band Width Test Data CH-Mid (5580MHz)



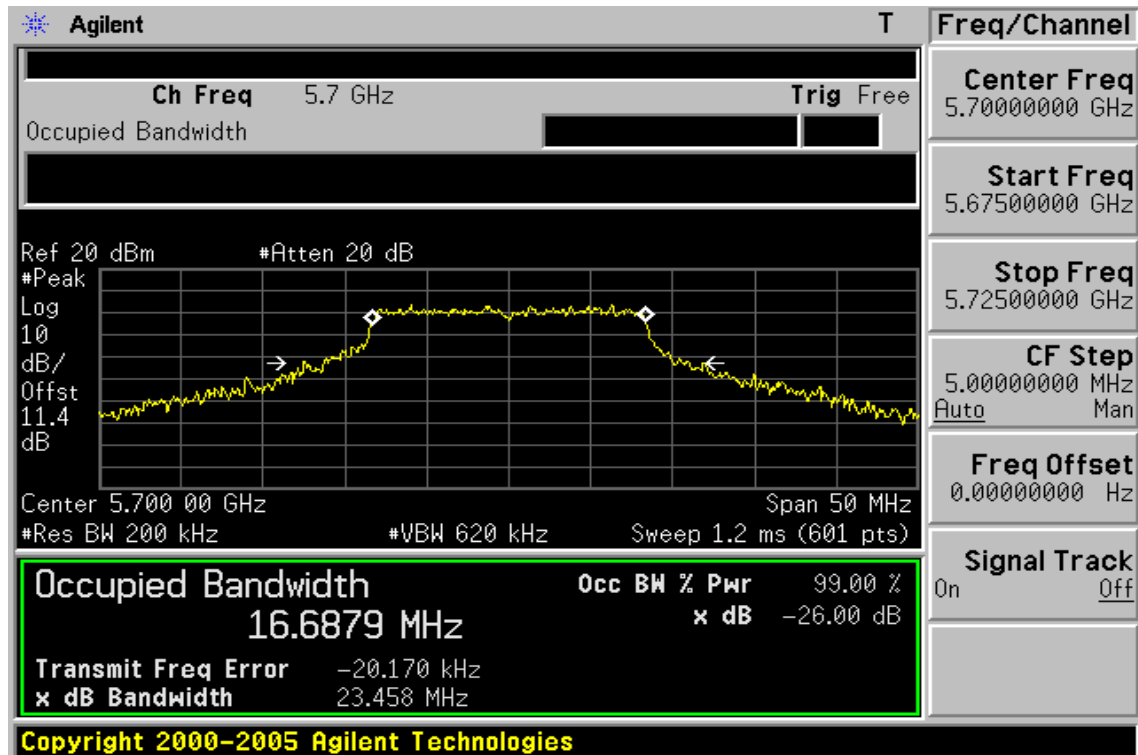
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## 26dB Band Width Test Data CH-High (5700MHz)



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## 7.5 Measurement Result

### 99% Bandwidth

802.11a, 5150~5250 MHz

Frequency (MHz)	99% Bandwidth (B) (MHz)	10 Log (B) (dB)
5180	17.0051	12.31
5220	17.0143	12.31
5240	17.0246	12.31

802.11a, 5250~5350 MHz

Frequency (MHz)	99% Bandwidth (B) (MHz)	10 Log (B) (dB)
5260	17.0450	12.32
5300	17.0300	12.31
5320	17.0206	12.31

802.11a, 5470~5725 MHz

Frequency (MHz)	99% Bandwidth (B) (MHz)	10 Log (B) (dB)
5500	17.0065	12.31
5580	17.0105	12.31
5700	17.0552	12.32

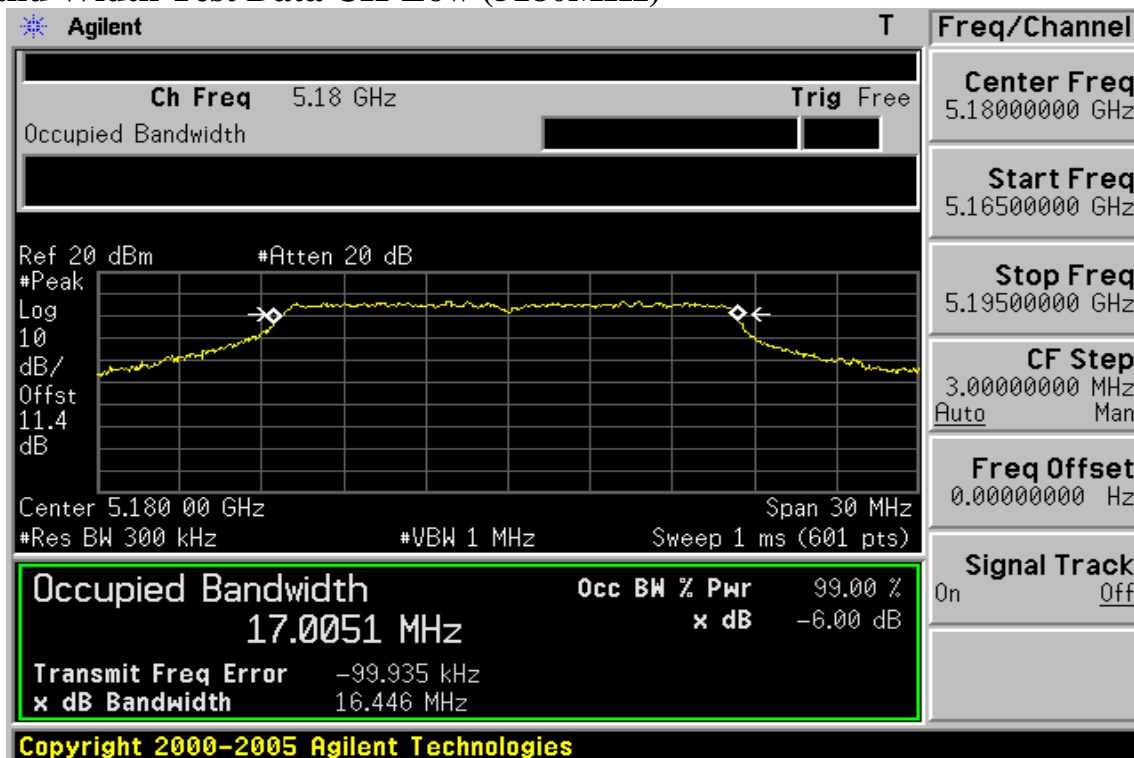
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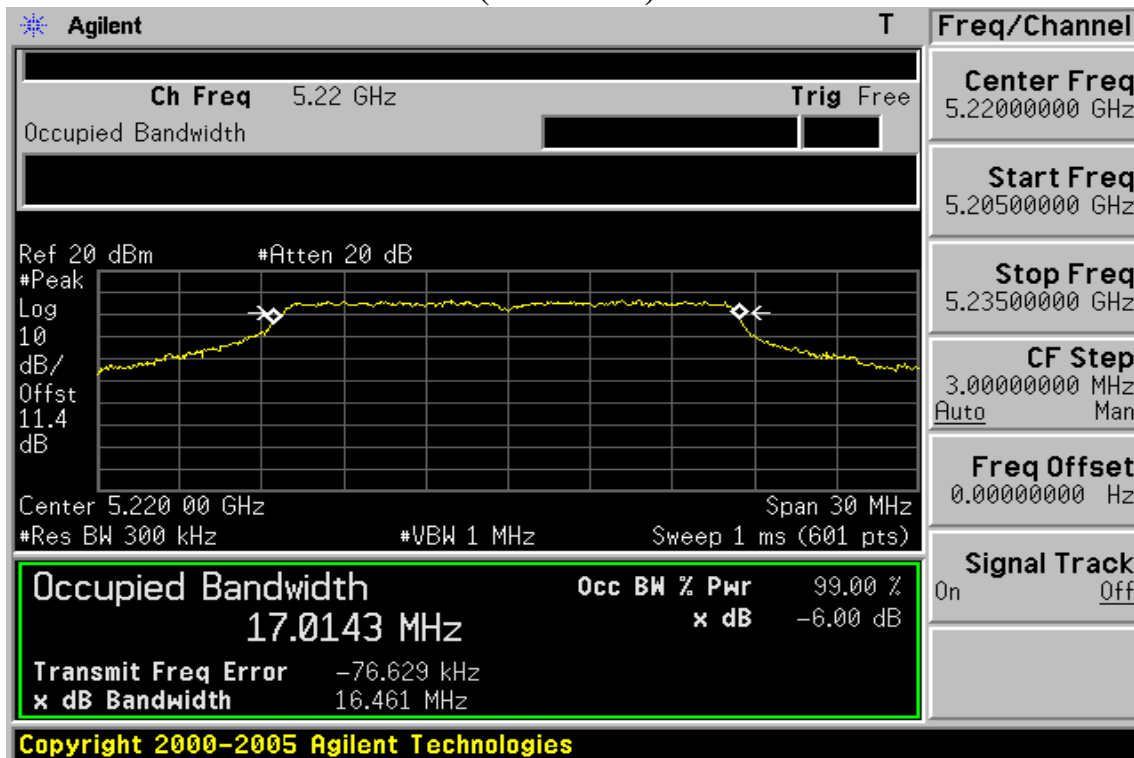
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## 802.11a, 5150~5250 MHz

### 99% Band Width Test Data CH-Low (5180MHz)



### 99% Band Width Test Data CH-Mid (5220MHz)

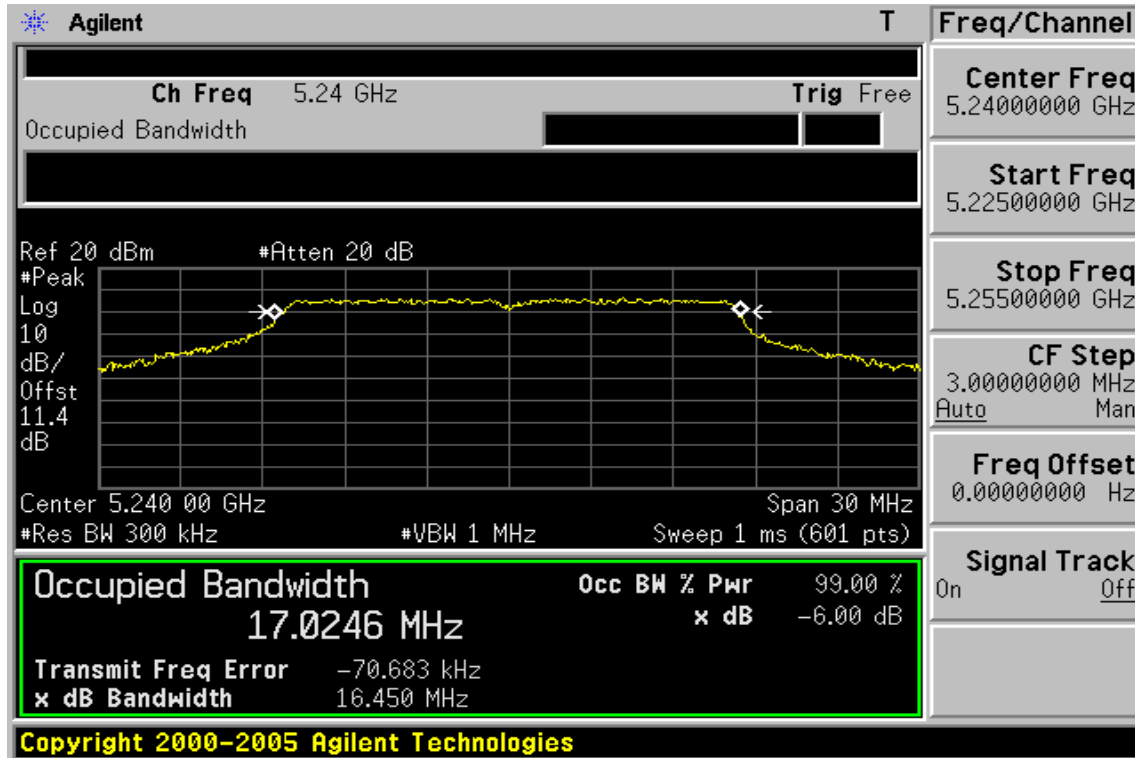


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## 99% Band Width Test Data CH-High (5240MHz)



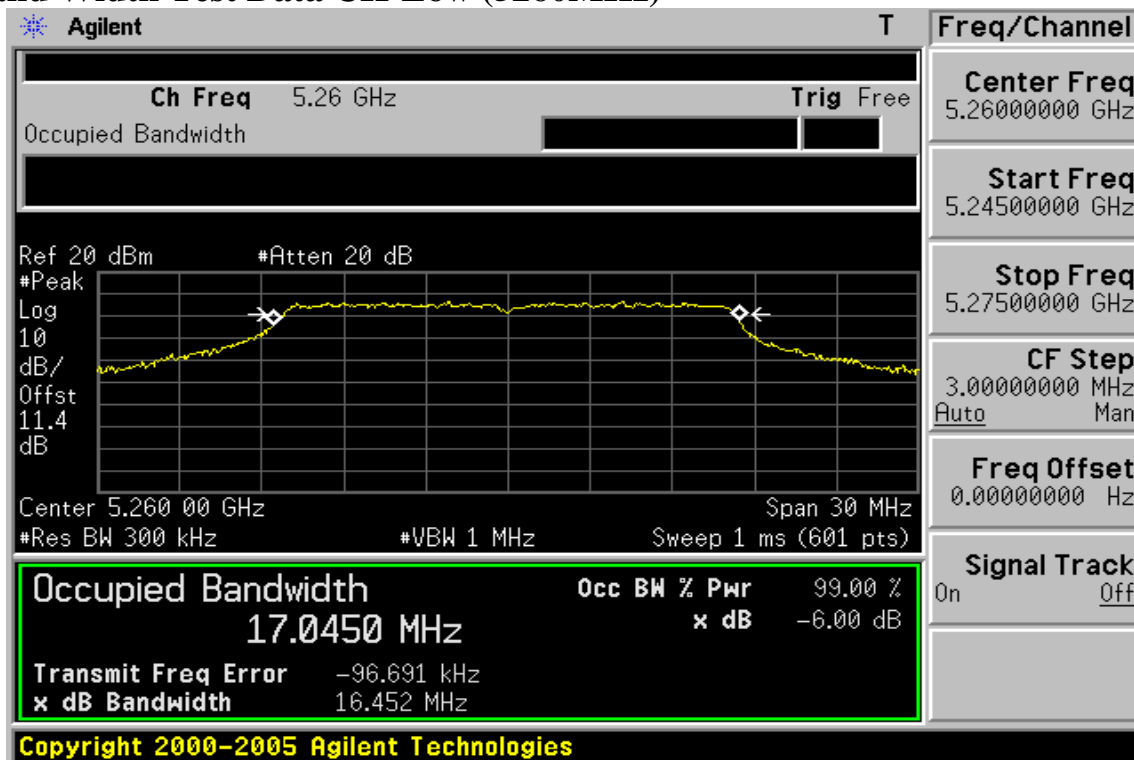
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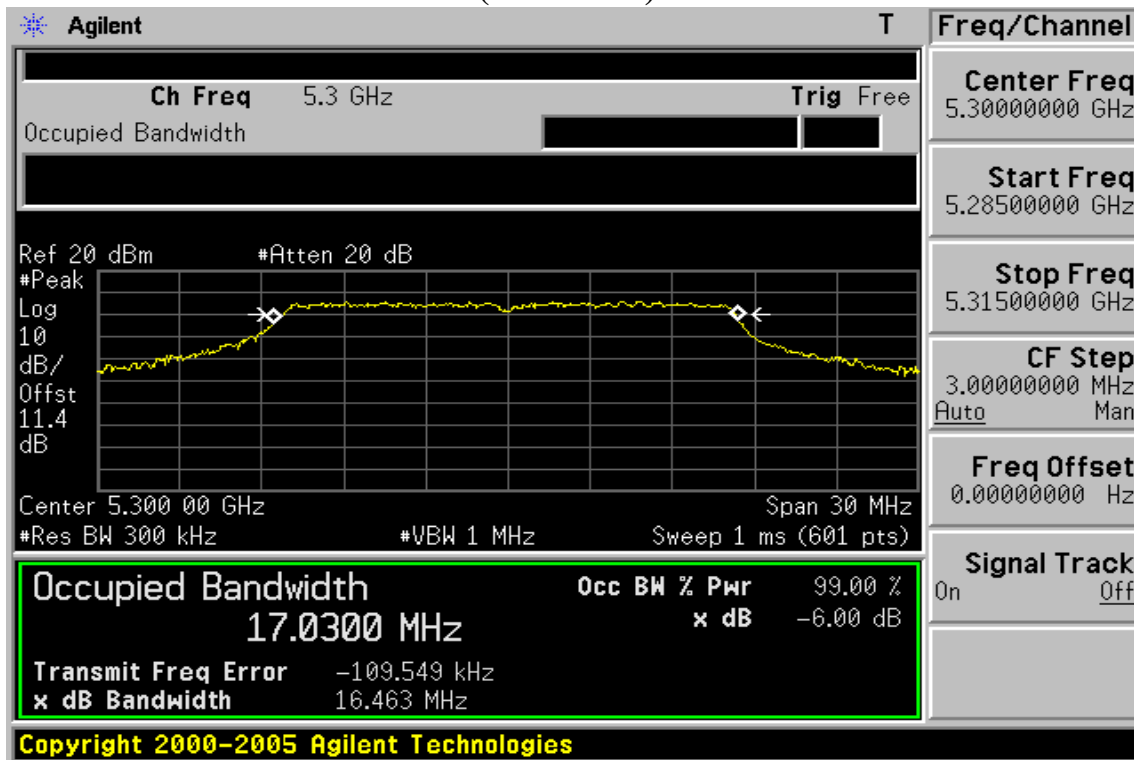
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## 802.11a, 5250~5350 MHz

### 99% Band Width Test Data CH-Low (5260MHz)



### 99% Band Width Test Data CH-Mid (5300MHz)

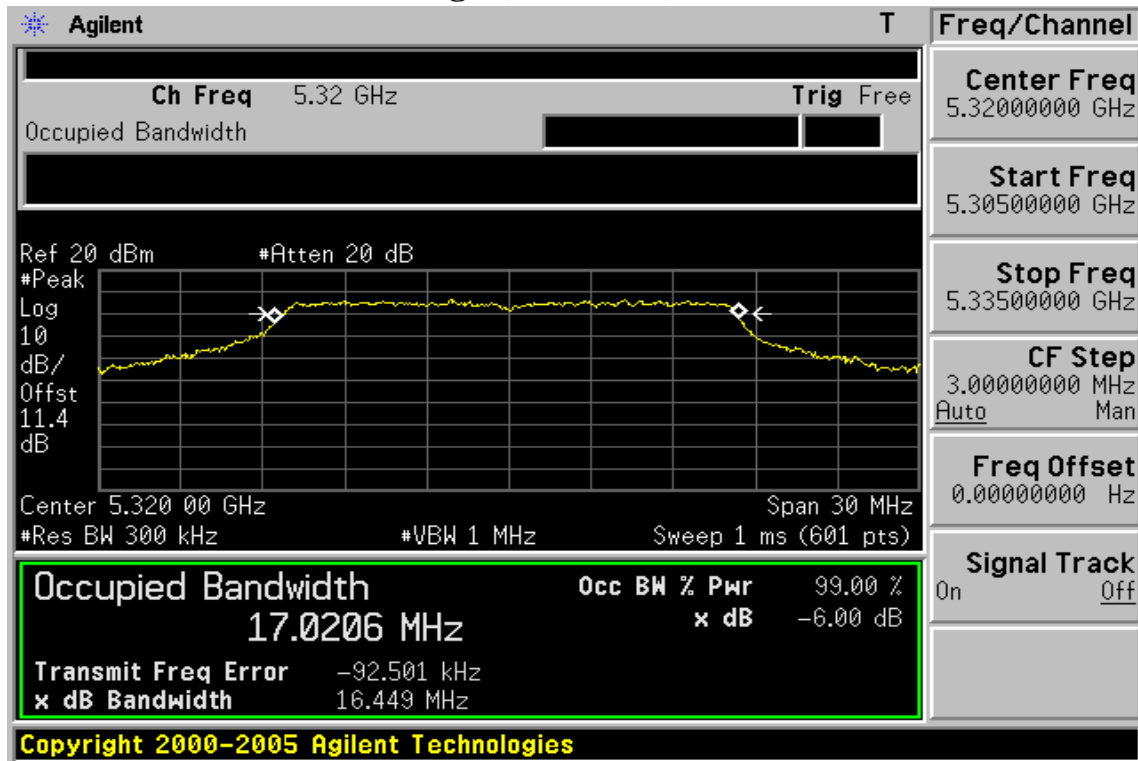


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## 99% Band Width Test Data CH-High (5320MHz)



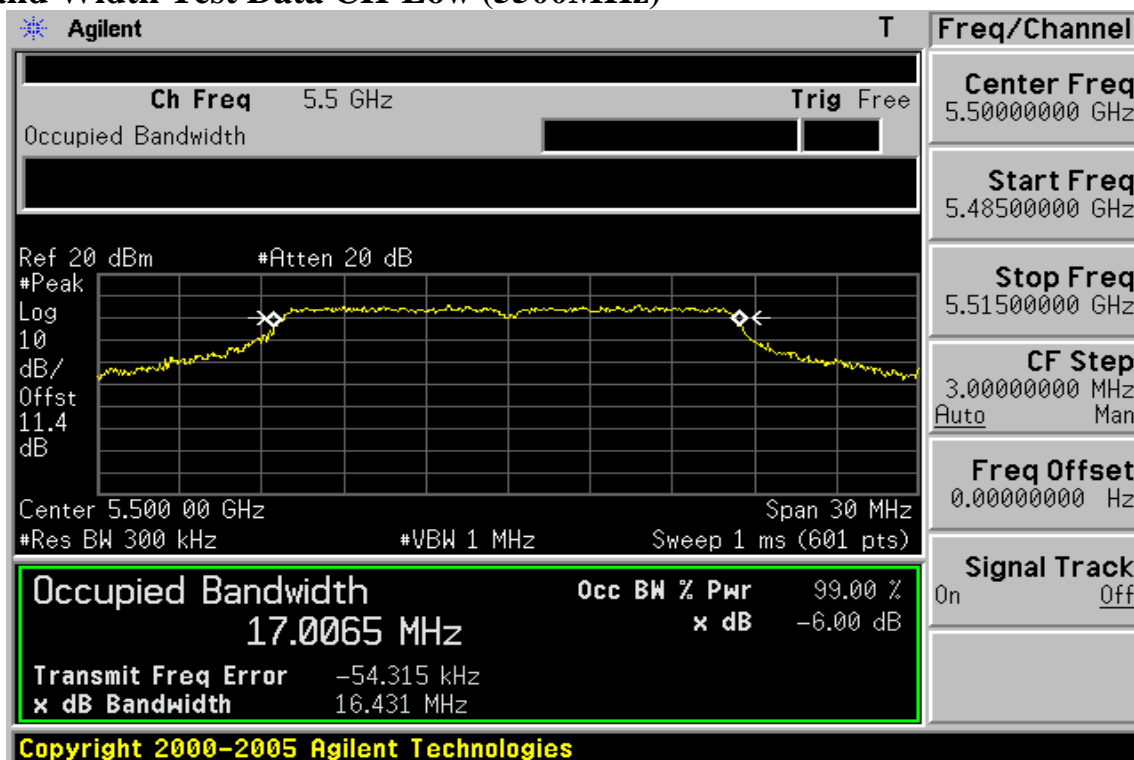
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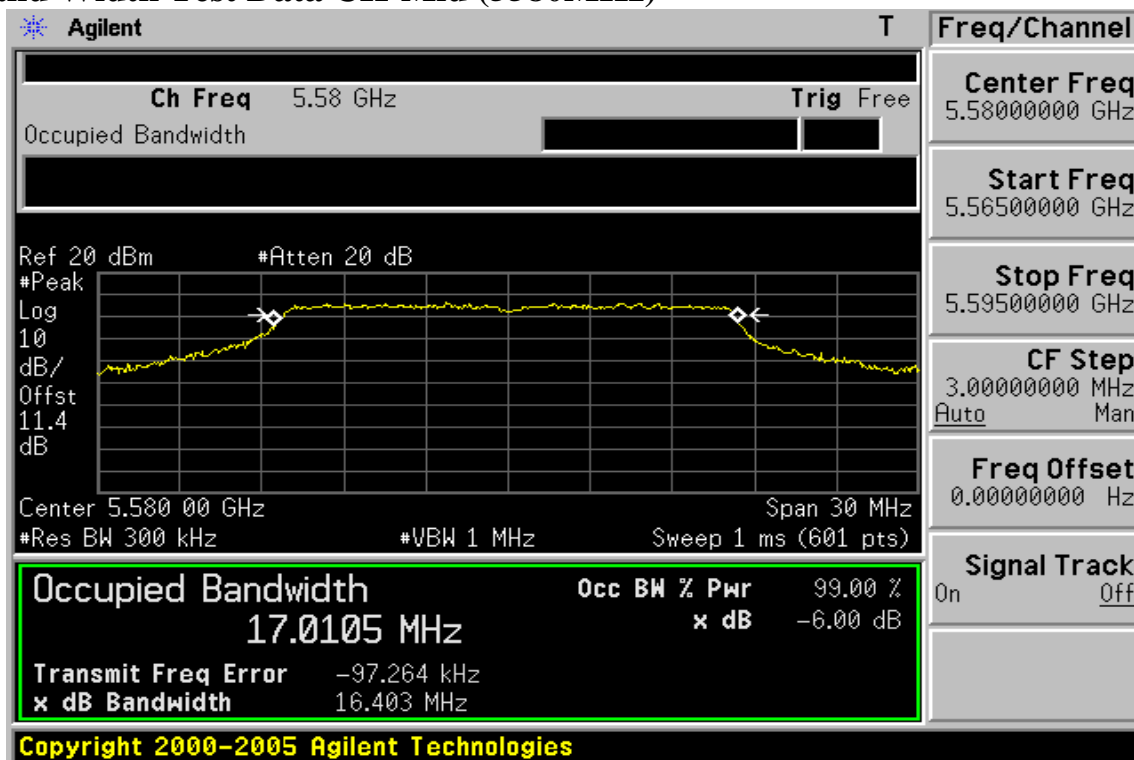
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## 802.11a, 5470~5725 MHz

### 99% Band Width Test Data CH-Low (5500MHz)



### 99% Band Width Test Data CH-Mid (5580MHz)

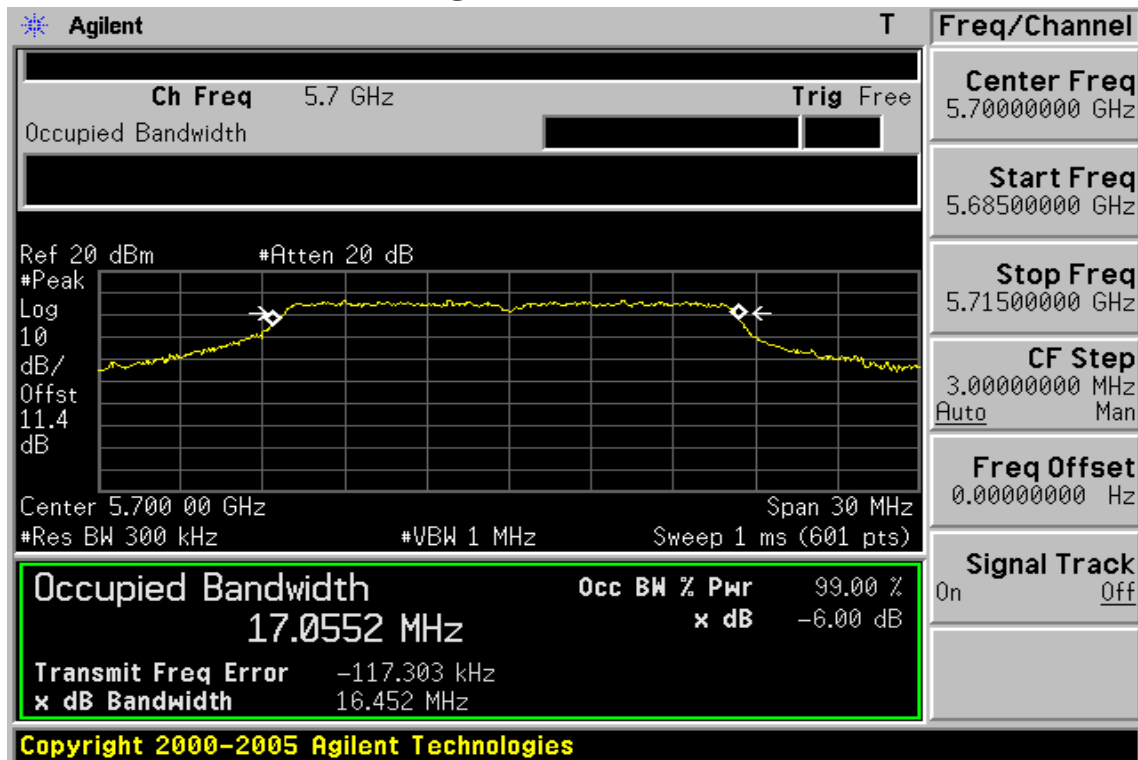


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## 99% Band Width Test Data CH-High (5700MHz)



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## 8. AVERAGE OUTPUT POWER MEASUREMENT

### 8.1 Standard Applicable

According to §15.407(a)

1. For the band 5.15-5.25 GHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 50mW (17dBm) or  $4\text{dBm} + 10\log B$ .
2. For the band 5.25-5.35 GHz and 5.47-5.725GHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 250mW (24dBm) or  $11\text{dBm} + 10\log B$ .
3. For the band 5.725-5.825 GHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 1W (30dBm) or  $17\text{dBm} + 10\log B$ .

According to RSS-210 A9.2

1. For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200mW or  $10 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10dBm in any 1.0 MHz band.
2. For the bands 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250mW or  $11 + 10 \log_{10} B$ , dBm, whichever power is less. The power spectral density shall not exceed 11dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz. In addition, devices with maximum e.i.r.p. greater than 500mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W. In addition to the above requirements, devices operating in the band 5250-5350 MHz with maximum e.i.r.p. greater than 200mW shall comply with the following e.i.r.p. elevation mask where  $\theta$  is the angle above the local horizontal plane (of the earth) as shown below:

- (i) -13 dB(W/MHz) for  $0^\circ \leq \theta < 8^\circ$
- (ii)  $-13 - 0.716 (\theta - 8)$  dB(W/MHz) for  $8^\circ \leq \theta < 40^\circ$
- (iii)  $-35.9 - 1.22 (\theta - 40)$  dB(W/MHz) for  $40^\circ \leq \theta \leq 45^\circ$
- (iv) -42 dB(W/MHz) for  $\theta > 45^\circ$

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3. For the band 5725-5825 MHz, the maximum conducted output power shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever power is less. The power spectral density shall not exceed 17dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 4.0 W or  $23 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz. Fixed point-to-point systems for this band are permitted to have an e.i.r.p. greater than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain antennas, but not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4W e.i.r.p. However, remote stations of point-to-multipoint systems shall be permitted to operate at greater than 4W e.i.r.p, under the same conditions as for point-to-point systems where B is the 26dB emission bandwidth in MHz.

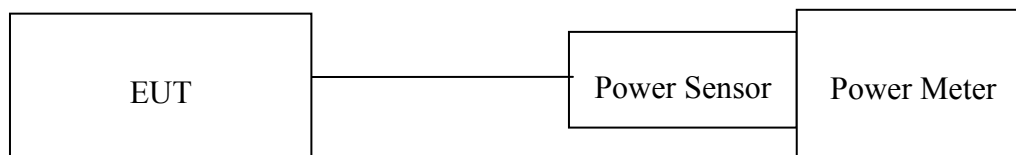
## 8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
3. Set the offset  $10 \cdot \log(1/x)$  ( $x=0.98$ ), 0.09 approximately
4. Record the max. reading in average
5. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

## 8.3 Measurement Equipment Used:

Refer to section 7.3 for details.

## 8.4 Test Set-up:



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## 8.5 Measurement Result

### 802.11a

Cable loss = 0		Average Power Output									
CH	Frequency (MHz)	Data Rate								Required Limit	Required Limit
		6	9	12	18	24	36	48	54	FCC	IC
36	5180	14.94	14.91	14.89	14.86	14.84	14.81	14.79	14.77	50mWatt or 4+10log(B) = 17.65dBm	N/A
44	5220	<b>15.06</b>	15.02	14.98	14.95	14.91	14.88	14.84	14.81	50mWatt or 4+10log(B) = 17.56dBm	N/A
48	5240	14.99	14.97	14.96	14.94	14.93	14.91	14.90	14.89	50mWatt or 4+10log(B) = 17.50dBm	N/A
52	5260	<b>15.27</b>	15.23	15.19	15.15	15.11	15.07	15.03	15.00	250mWatt or 11+10log(B) = 24.60dBm	250mWatt or 11+10log(B) = 23.32dBm
60	5300	14.86	14.81	14.76	14.71	14.66	14.61	14.56	14.51	250mWatt or 11+10log(B) = 24.44dBm	250mWatt or 11+10log(B) = 23.31dBm
64	5320	14.57	14.55	14.54	14.53	14.52	14.51	14.50	14.49	250mWatt or 11+10log(B) = 24.61dBm	250mWatt or 11+10log(B) = 23.31dBm
100	5500	14.19	14.17	14.16	14.15	14.14	14.13	14.12	14.11	250mWatt or 11+10log(B) = 24.44dBm	250mWatt or 11+10log(B) = 23.31dBm
116	5580	14.91	14.89	14.87	14.85	14.83	14.81	14.79	14.77	250mWatt or 11+10log(B) = 24.57dBm	250mWatt or 11+10log(B) = 23.31dBm
140	5700	<b>15.08</b>	15.06	15.05	15.04	15.02	15.01	15.00	14.99	250mWatt or 11+10log(B) = 24.70dBm	250mWatt or 11+10log(B) = 23.32dBm

Where, 50mW = 16.99dBm, and 250mW = 23.98dBm

Note: Offset 11.4dB

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### 802.11a

Cable loss = 0		Average Power Output (EIRP)								
CH	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
36	5180	18.86	18.83	18.81	18.78	18.76	18.73	18.71	18.69	200mWatt or $10+10\log(B) = 22.31\text{dBm}$
44	5220	<b>18.98</b>	18.94	18.90	18.87	18.83	18.80	18.76	18.73	200mWatt or $10+10\log(B) = 22.31\text{dBm}$
48	5240	18.91	18.89	18.88	18.86	18.85	18.83	18.82	18.81	200mWatt or $10+10\log(B) = 22.31\text{dBm}$
52	5260	<b>19.19</b>	19.15	19.11	19.07	19.03	18.99	18.95	18.92	1.0Watt or $17+10\log(B) = 29.32\text{dBm}$
60	5300	18.78	18.73	18.68	18.63	18.58	18.53	18.48	18.43	1.0Watt or $17+10\log(B) = 29.31\text{dBm}$
64	5320	18.49	18.47	18.46	18.45	18.44	18.43	18.42	18.41	1.0Watt or $17+10\log(B) = 29.31\text{dBm}$
100	5500	19.16	19.14	19.13	19.12	19.11	19.10	19.09	19.08	1.0Watt or $17+10\log(B) = 29.31\text{dBm}$
116	5580	19.88	19.86	19.84	19.82	19.80	19.78	19.76	19.74	1.0Watt or $17+10\log(B) = 29.31\text{dBm}$
140	5700	<b>20.05</b>	20.03	20.02	20.01	19.99	19.98	19.97	19.96	1.0Watt or $17+10\log(B) = 29.32\text{dBm}$

Where, 200mW = 23.dBm, and 250mW = 23.98dBm

Note: Offset 11.4dB

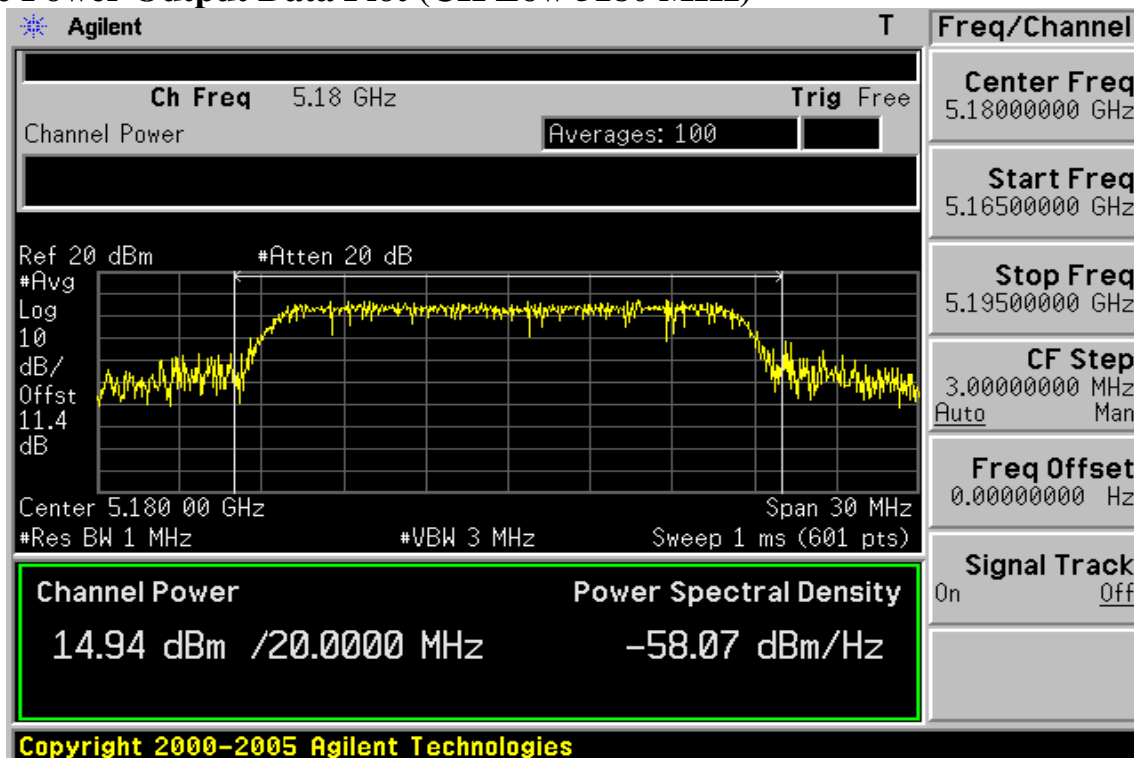
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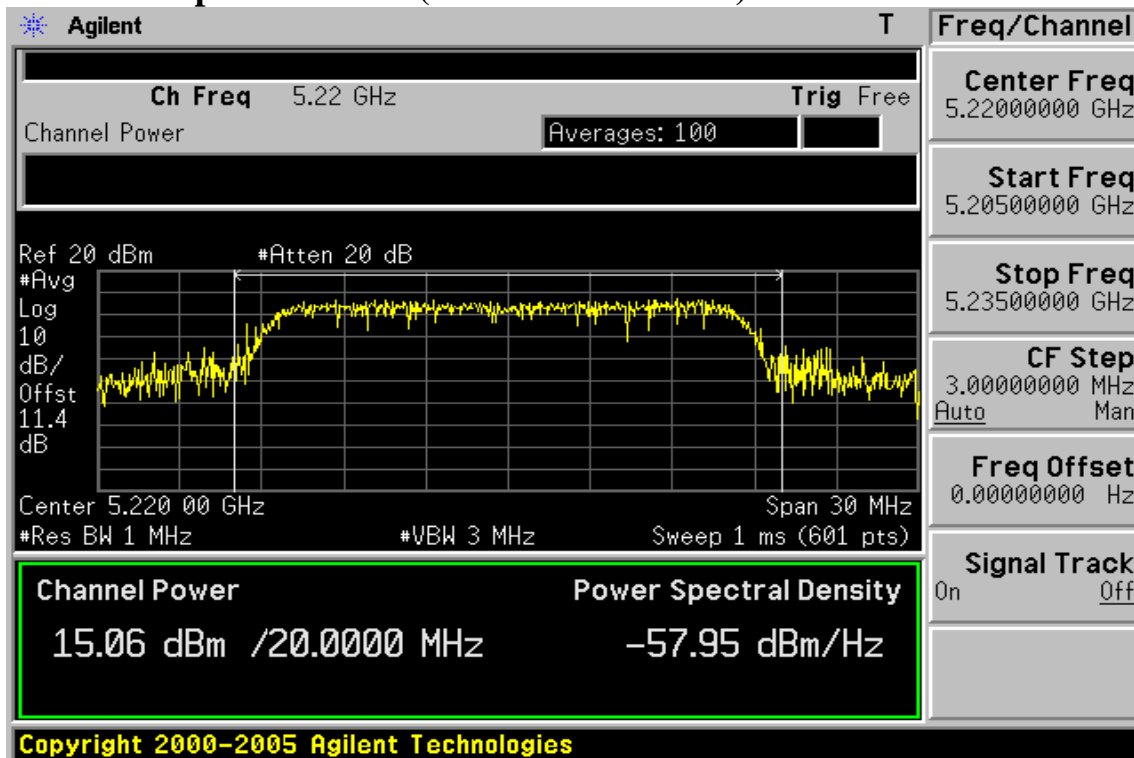
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## 802.11a, 5150~5250 MHz

### Average Power Output Data Plot (CH Low 5180 MHz)



### Average Power Output Data Plot (CH Mid 5220 MHz)

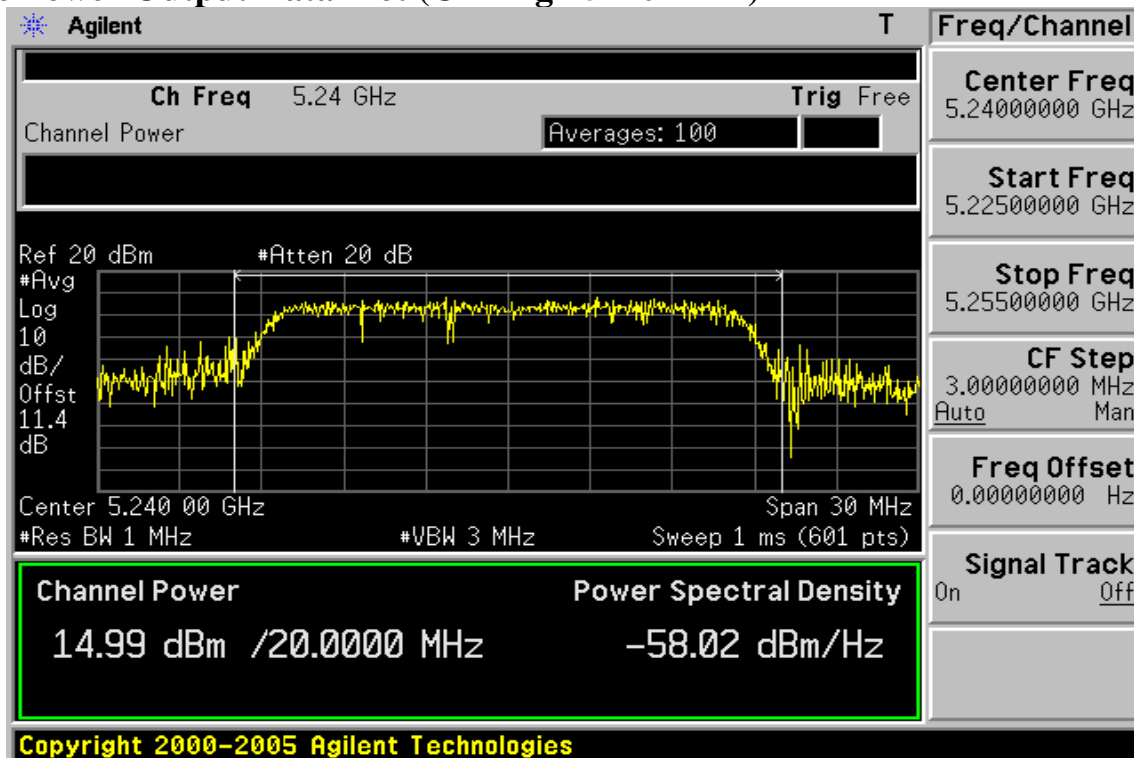


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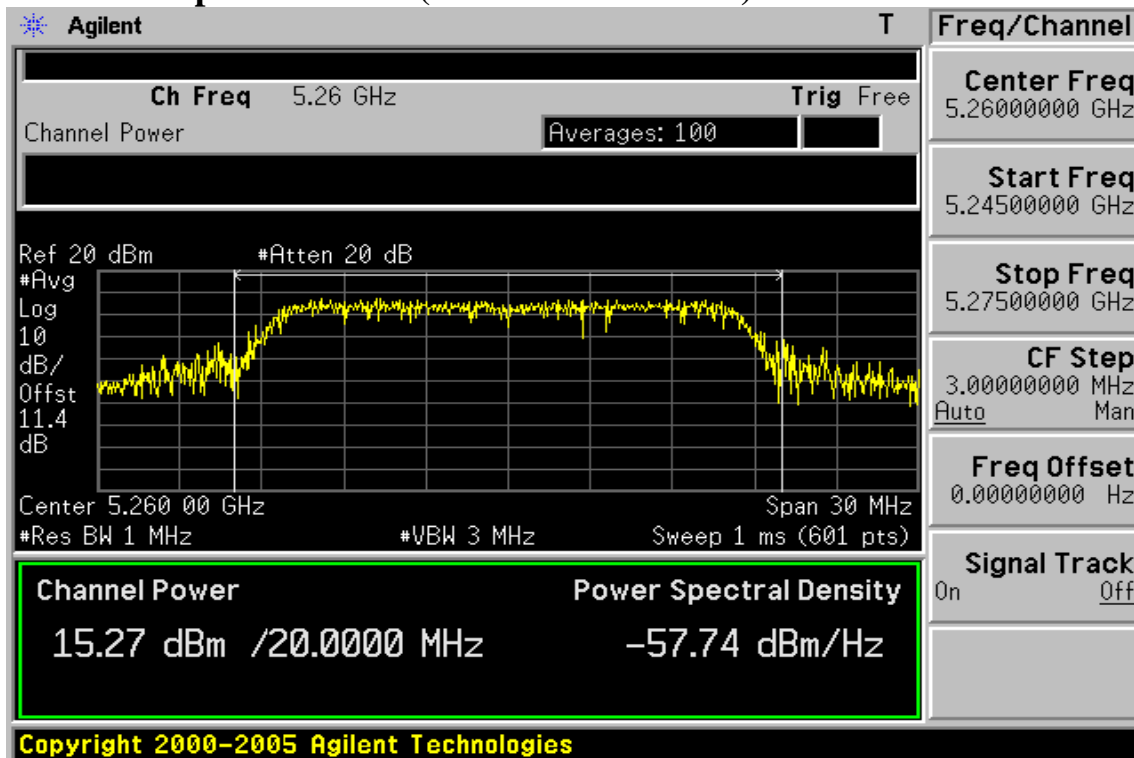
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## Average Power Output Data Plot (CH High 5240 MHz)



## 802.11a, 5250~5350 MHz

## Average Power Output Data Plot (CH Low 5260 MHz)

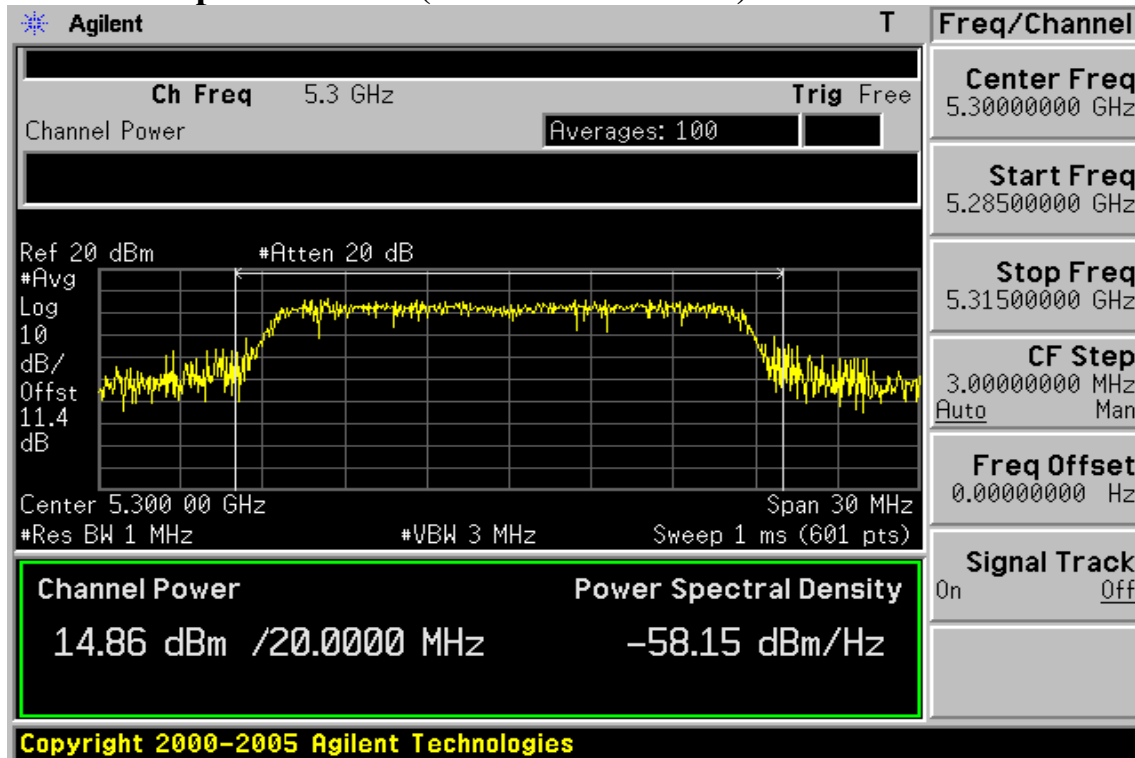


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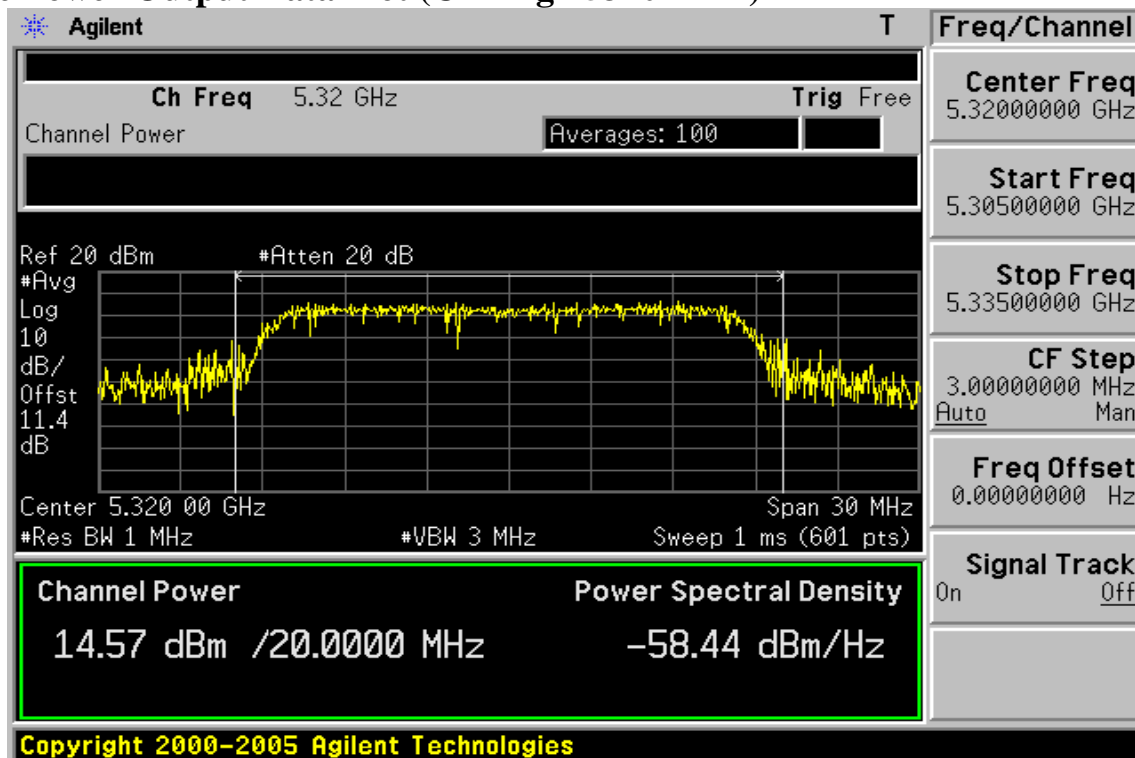
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## Average Power Output Data Plot (CH Mid 5300 MHz)



## Average Power Output Data Plot (CH High 5320 MHz)



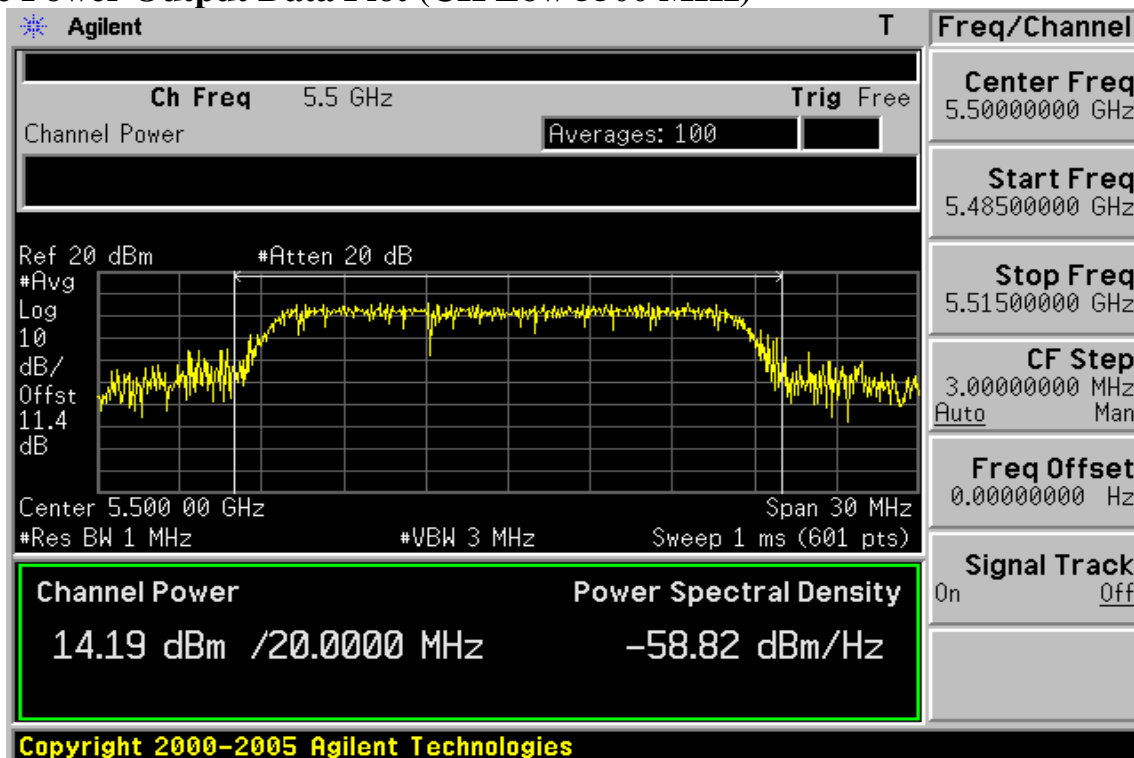
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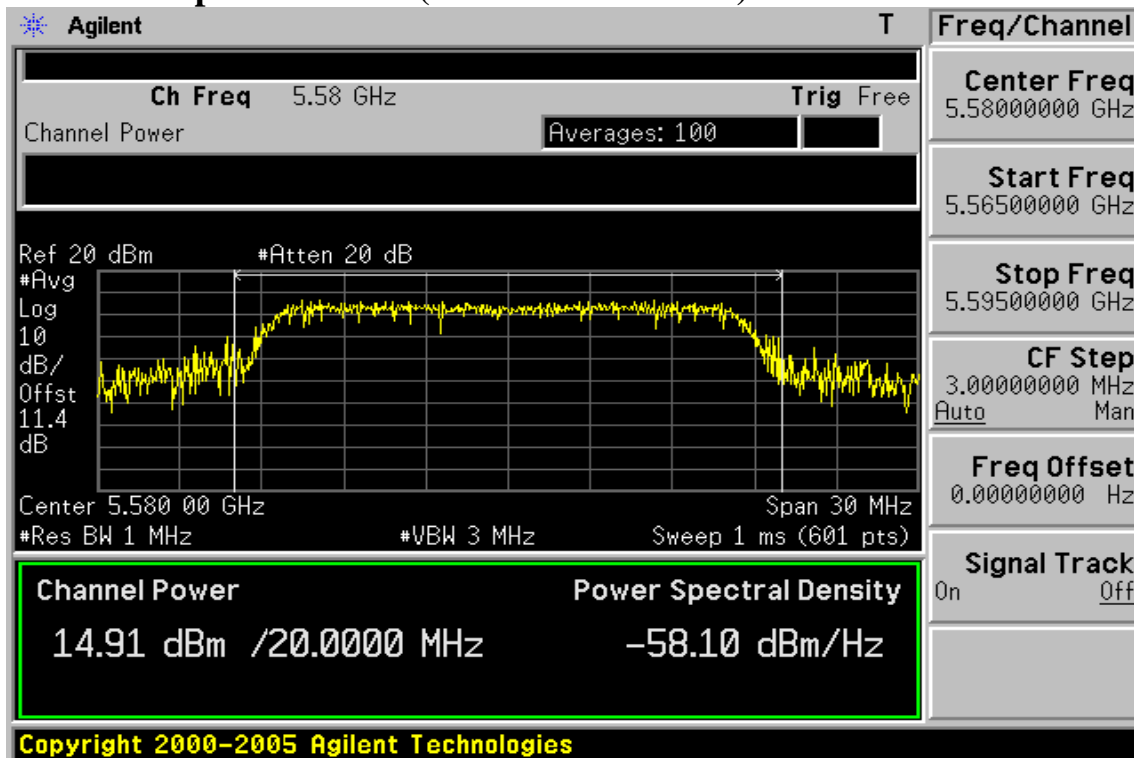
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## 802.11a, 5470~5725 MHz

### Average Power Output Data Plot (CH Low 5500 MHz)



### Average Power Output Data Plot (CH Mid 5580 MHz)



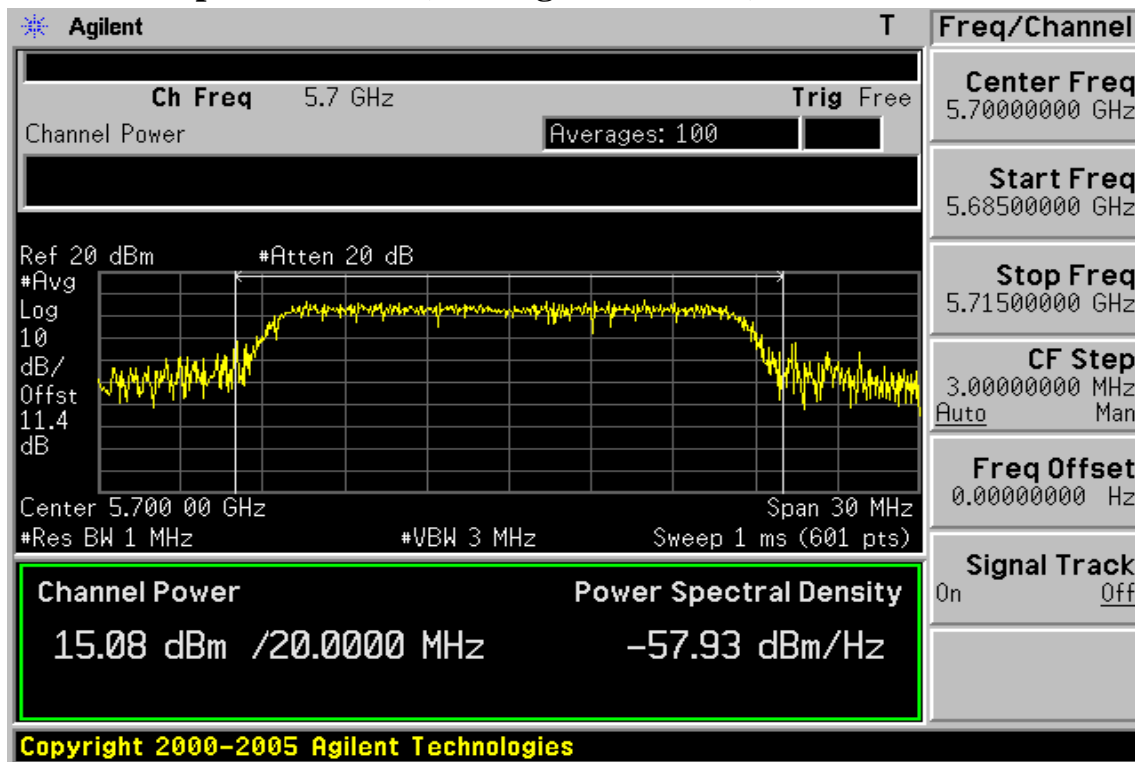
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## Average Power Output Data Plot (CH High 5700 MHz)



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## 9. PEAK POWER SPECTRAL DENSITY

### 9.1 Standard Applicable

According to §15.407(a)

1. For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band.
2. For the band 5.25-5.35 GHz and 5.47-5.725GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band.
3. For the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band.

Where B is the -26dBc emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to RSS-210 A9.2

1. For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or  $10 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.
2. For the bands 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250 mW or  $11 + 10 \log_{10} B$ , dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz. In addition, devices with maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W. In addition to the above requirements, devices operating in the band 5250-5350 MHz with maximum e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. elevation mask where  $\theta$  is the angle above the local horizontal plane (of the earth) as shown below:

- (i) -13 dB(W/MHz) for  $0^\circ \leq \theta < 8^\circ$
- (ii)  $-13 - 0.716 (\theta - 8)$  dB(W/MHz) for  $8^\circ \leq \theta < 40^\circ$
- (iii)  $-35.9 - 1.22 (\theta - 40)$  dB(W/MHz) for  $40^\circ \leq \theta \leq 45^\circ$
- (iv) -42dB (W/MHz) for  $\theta > 45^\circ$

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3. For the band 5725-5825 MHz, the maximum conducted output power shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever power is less. The power spectral density shall not exceed 17 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 4.0 W or  $23 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz. Fixed point-to-point systems for this band are permitted to have an e.i.r.p. greater than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain antennas, but not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4 W e.i.r.p. However, remote stations of point-to-multipoint systems shall be permitted to operate at greater than 4 W e.i.r.p, under the same conditions as for point-to-point systems. B is the 99% emission bandwidth in MHz.

## 9.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
3. Set RBW=1MHz, VBW=3MHz, Span=50MHz/80MHz (Base Mode), where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging.
4. Use the cursor on spectrum to peak search the highest level of trace.
5. Record the max. Reading.
6. For MIMO mode, add the appropriate offset
7. Repeat above procedures until all frequency measured were complete.

## 9.3 Measurement Equipment Used:

Refer to section 7.3 for details.

*Remark: as per KDB 662291, MIMO mode is accomplished by the addition of  $10 \log(N)$ , where  $N=2$  as the simultaneous emission of PSD*

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## 9.4 Measurement Result

802.11a, 5150~5250 MHz

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5180	-5.99	4.00	-9.99
5220	-6.37	4.00	-10.37
5240	-5.49	4.00	-9.49

802.11a, 5250~5350 MHz

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5260	-4.56	11.00	-15.56
5300	-5.14	11.00	-16.14
5320	-5.58	11.00	-16.58

802.11a, 5470~5725 MHz

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
5500	-5.21	11.00	-16.21
5580	-4.38	11.00	-15.38
5700	-4.95	11.00	-15.95

*Note: Offset 11.4dB*

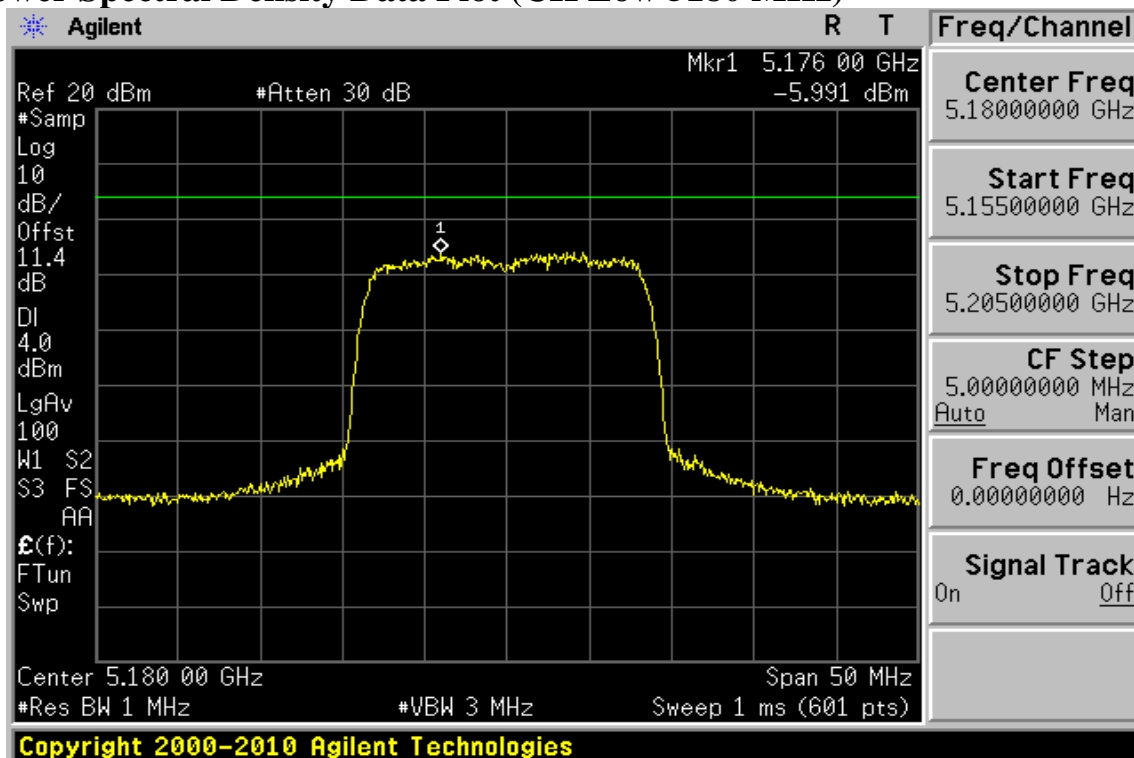
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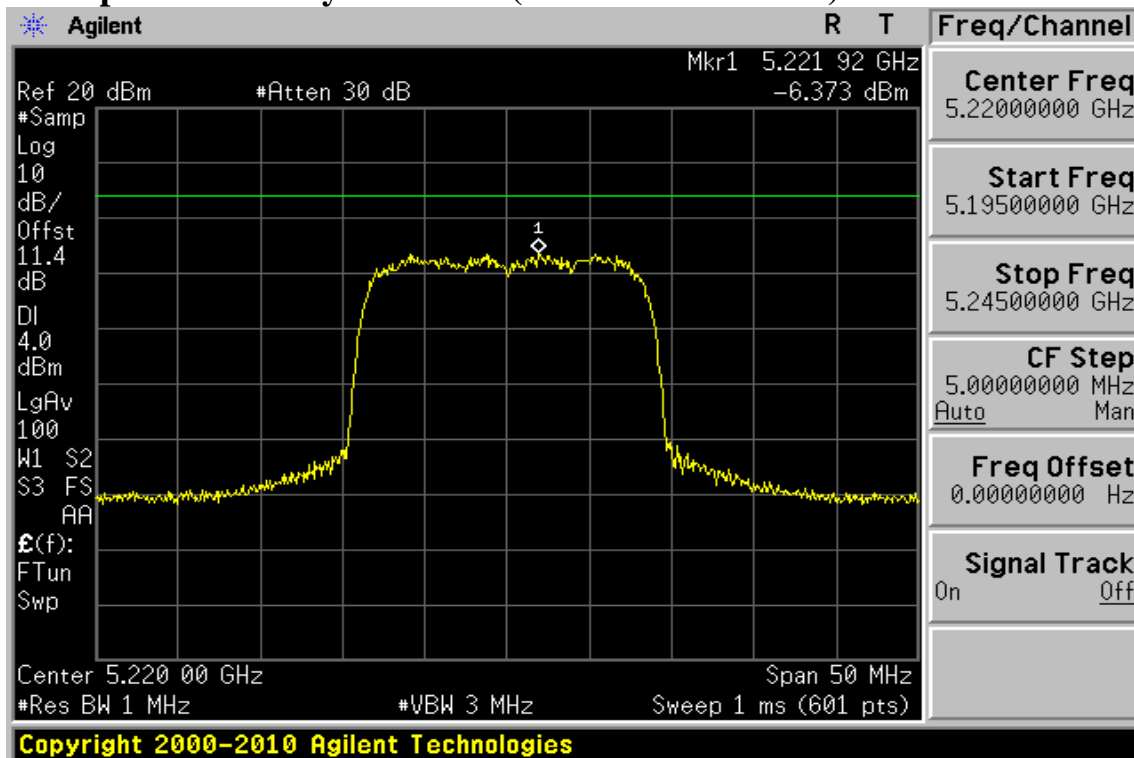
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## 802.11a, 5150~5250 MHz

### Peak Power Spectral Density Data Plot (CH Low 5180 MHz)



### Peak Power Spectral Density Data Plot (CH Mid 5220 MHz)

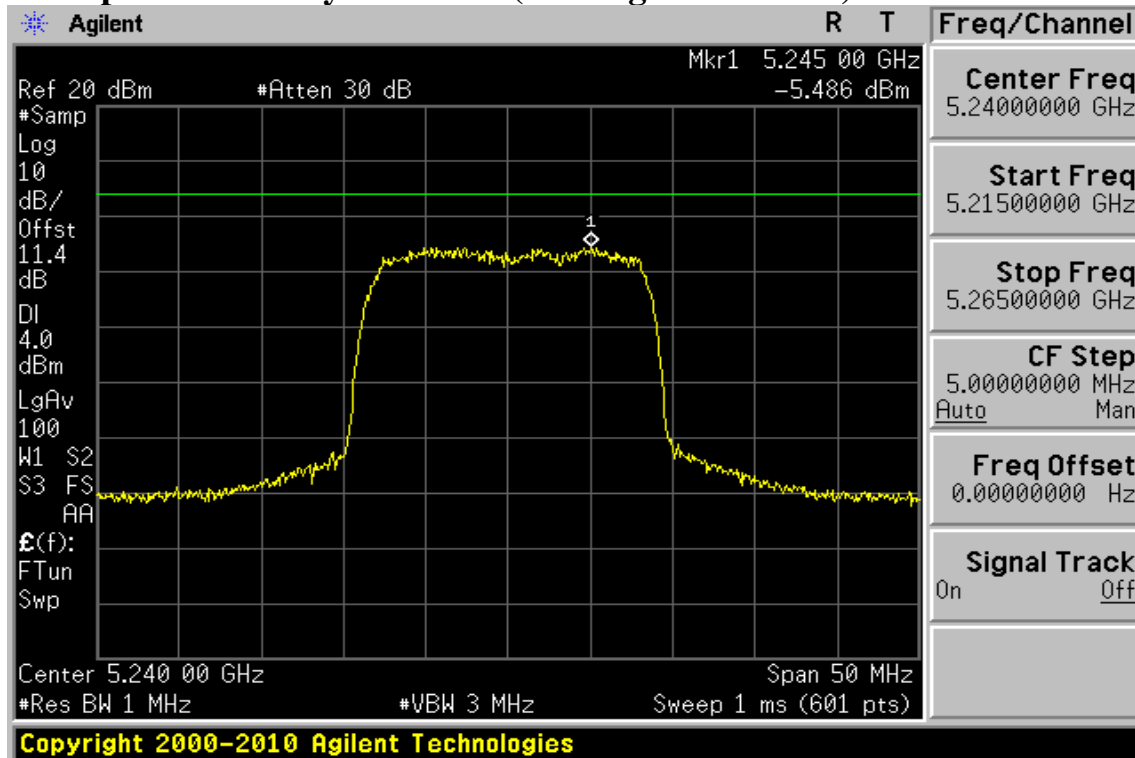


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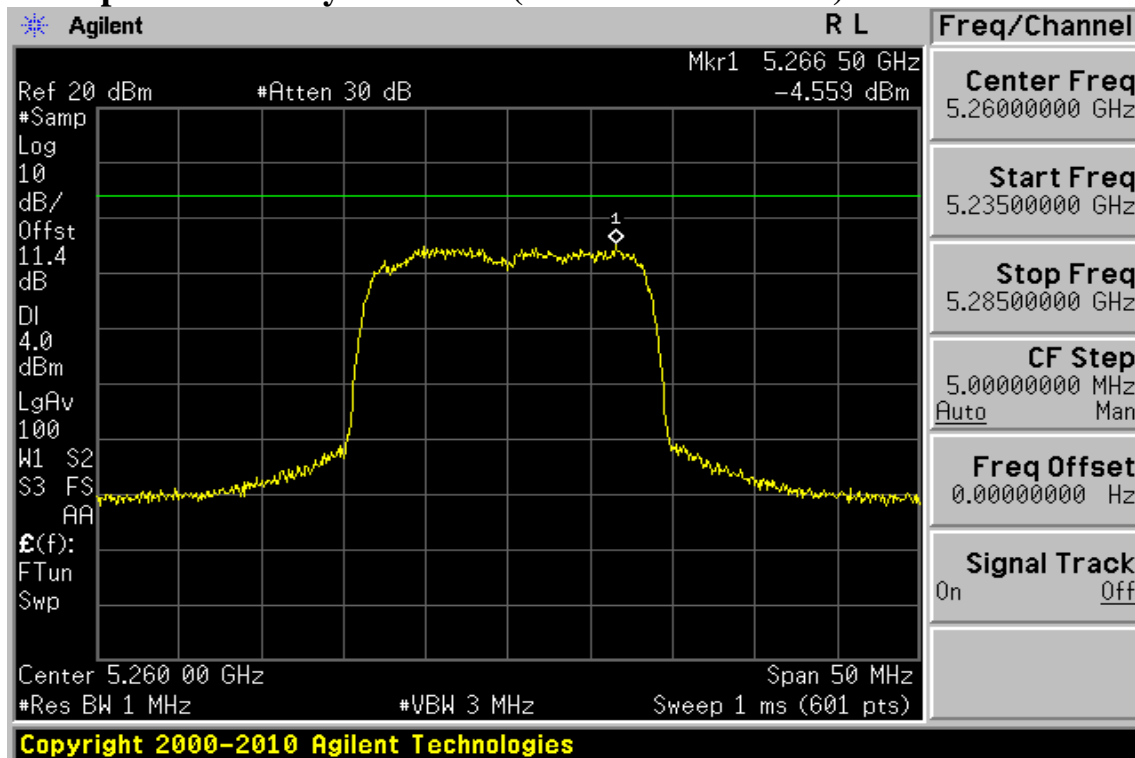
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## Peak Power Spectral Density Data Plot (CH High 5240 MHz)



## 802.11a, 5250~5350 MHz

## Peak Power Spectral Density Data Plot (CH Low 5260 MHz)

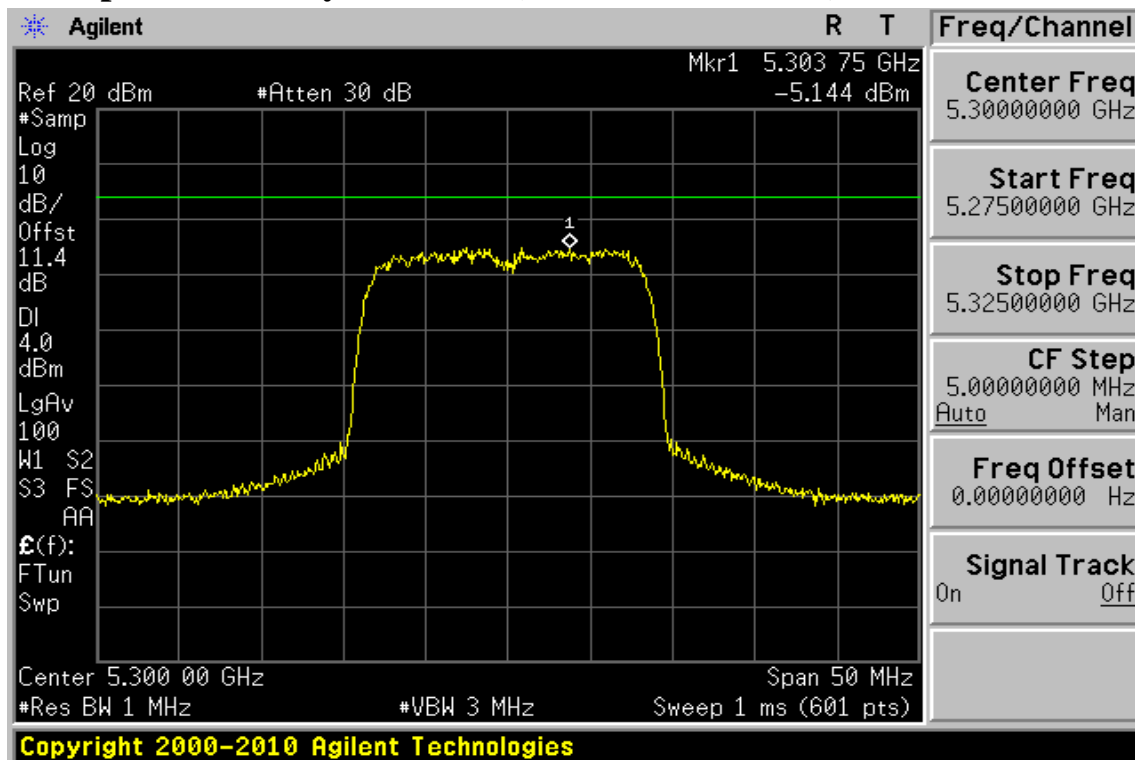


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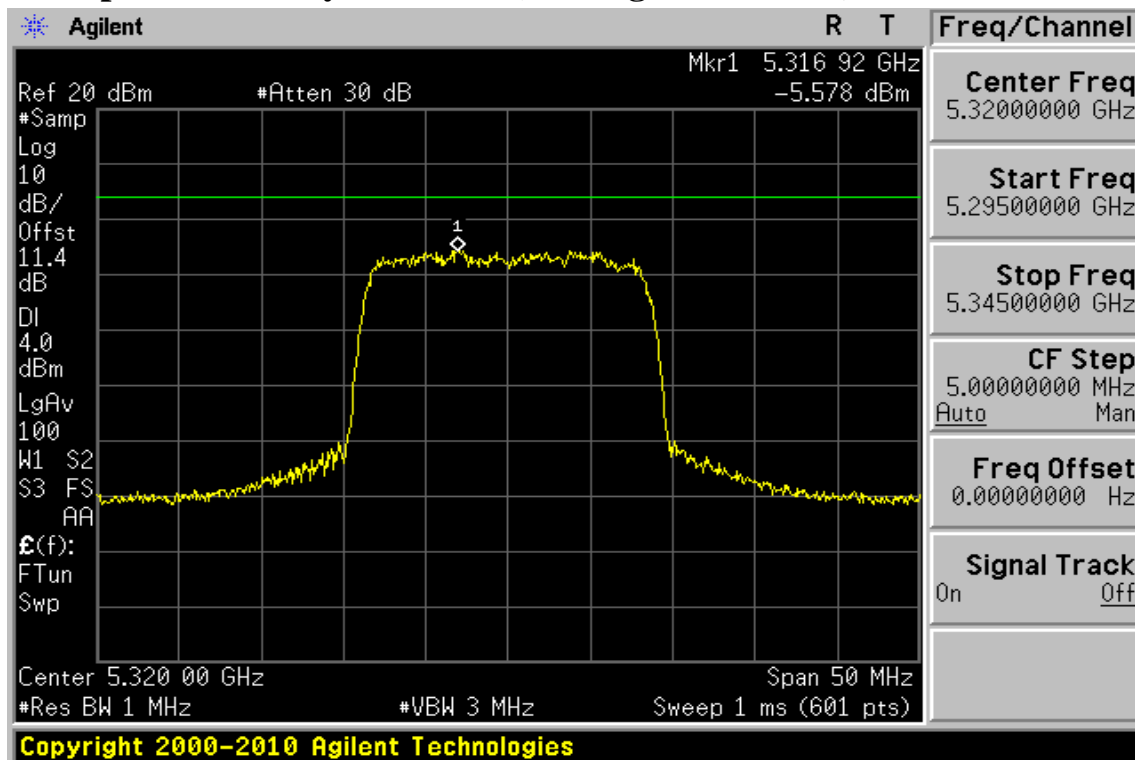
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## Peak Power Spectral Density Data Plot (CH Mid 5300 MHz)



## Peak Power Spectral Density Data Plot (CH High 5320 MHz)



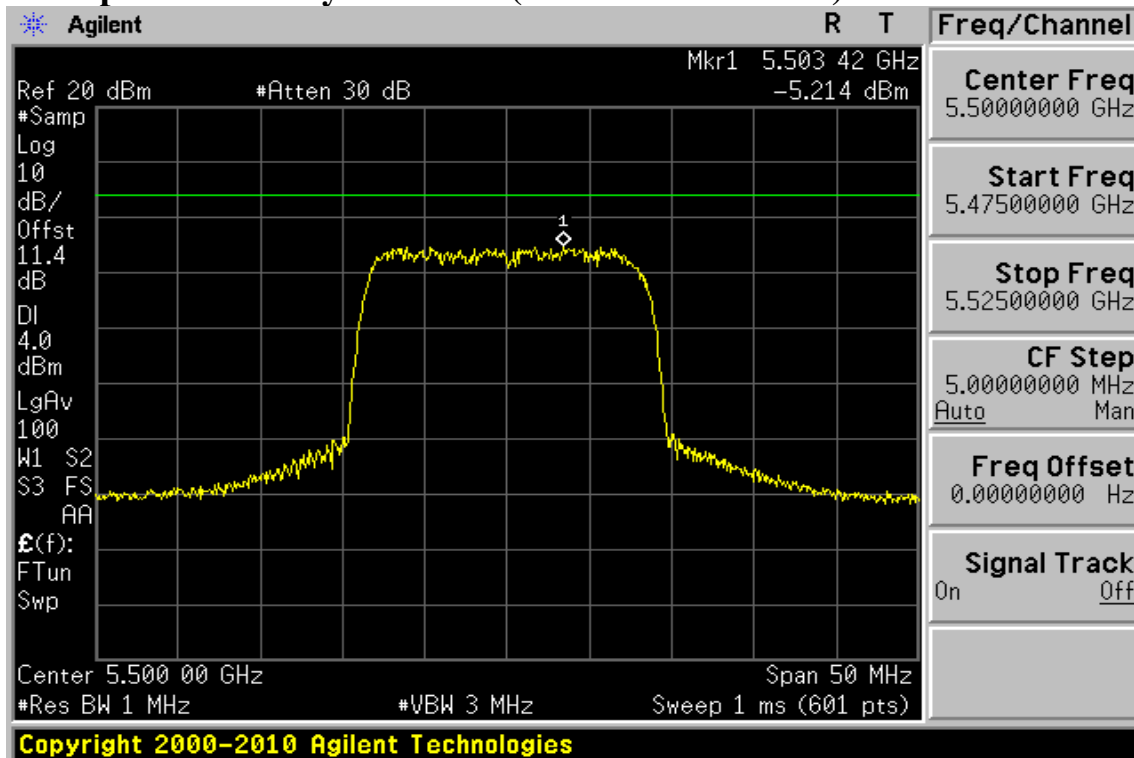
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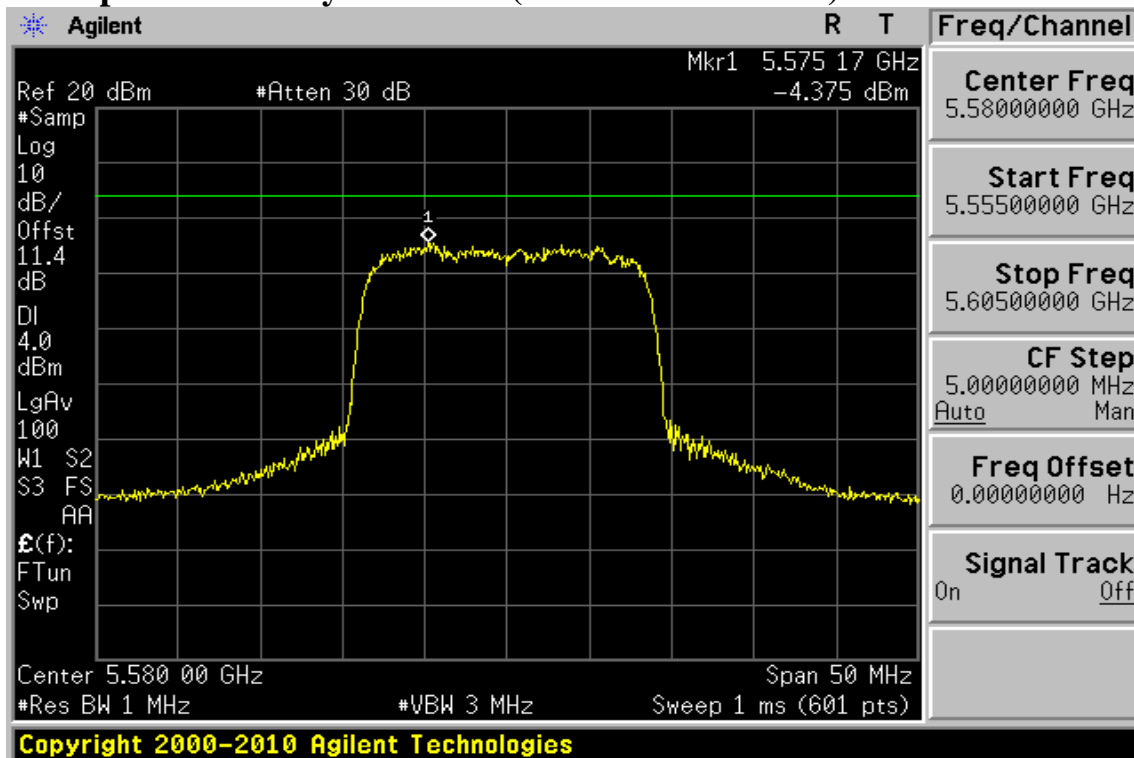
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## 802.11a, 5470~5725 MHz

### Peak Power Spectral Density Data Plot (CH Low 5500 MHz)



### Peak Power Spectral Density Data Plot (CH Mid 5580 MHz)

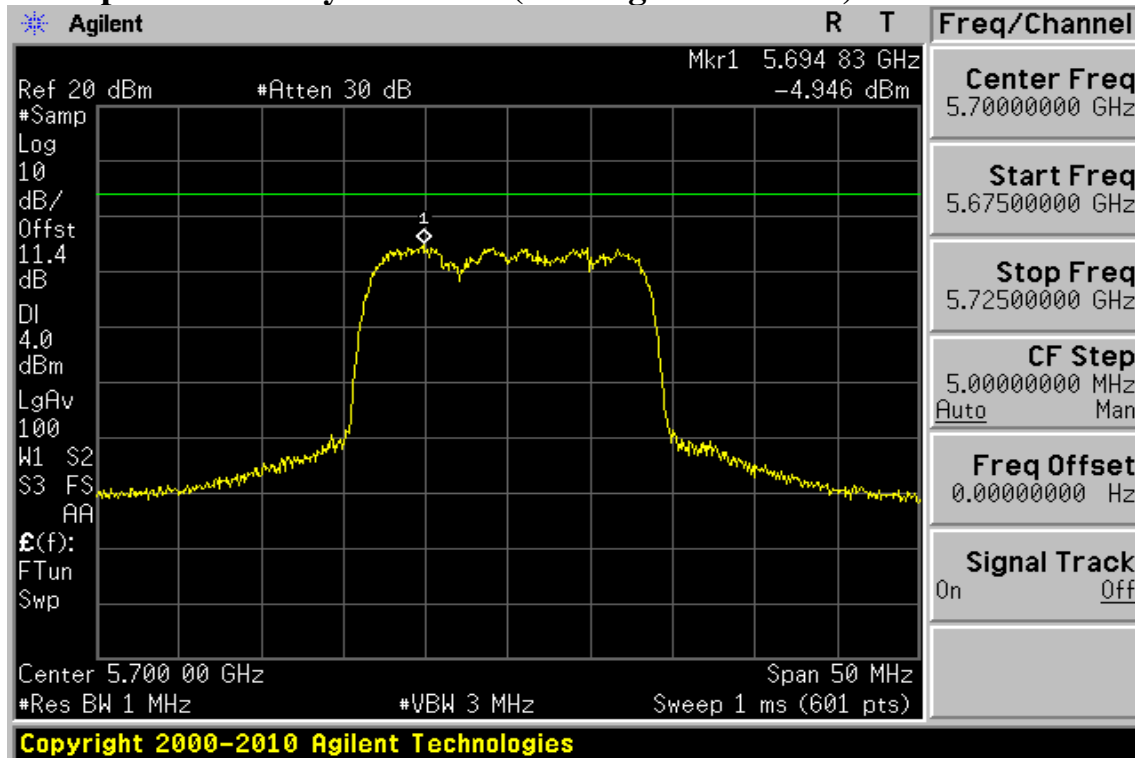


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## Peak Power Spectral Density Data Plot (CH High 5700 MHz)



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## 10. PEAK EXCURSION MEASUREMENT

### 10.1 Standard Applicable

15.407(a)(6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

### 10.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
3. Trace A, Set RBW=1MHz, VBW = 3MHz, Span = 26dBc, Max. hold.
4. Trace B, Set RBW=1MHz, VBW = 30KHz, Span = 26dBc, Max. hold..
5. For MIMO mode, set offset =  $10 * \log(N)$  on Trace B
6. Delta Mark trace A center frequency and trace B center frequency.
7. Repeat above procedures until all frequency measured were complete.

### 10.3 Measurement Equipment Used:

Refer to section 7.3 for details.

*Remark: as per KDB 662291, MIMO mode is accomplished by the addition of  $10 \log(N)$ , where  $N = 2$  as the simultaneous emission of Peak Excursion.*

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## 10.4 Test Results:

802.11a, 5150~5250 MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	7.46	13.00	-5.54
Mid	5220	6.95	13.00	-6.05
High	5240	6.57	13.00	-6.43

802.11a, 5250~5350 MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	6.96	13.00	-6.04
Mid	5300	6.94	13.00	-6.06
High	5320	7.41	13.00	-5.59

802.11a, 5470~5725 MHz

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	6.98	13.00	-6.02
Mid	5580	6.90	13.00	-6.10
High	5700	6.13	13.00	-6.87

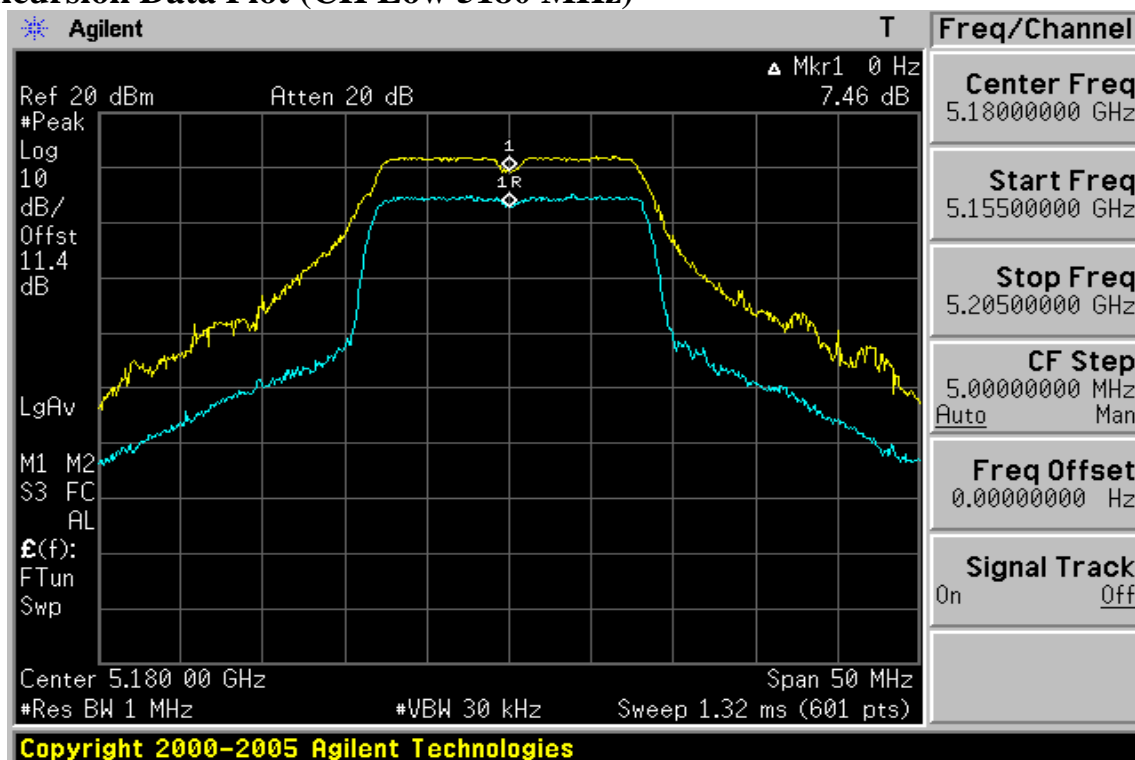
Note: Offset 11.4dB

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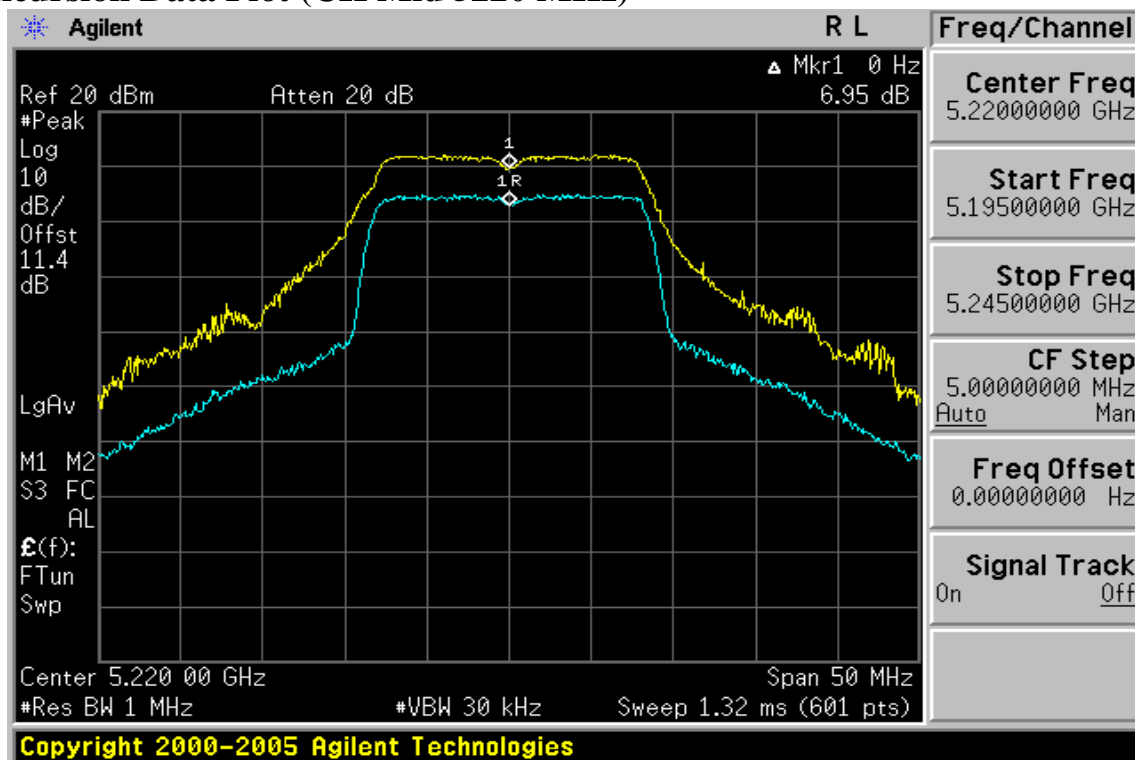
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## 802.11a, 5150~5250 MHz Peak Excursion Data Plot (CH Low 5180 MHz)



## Peak Excursion Data Plot (CH Mid 5220 MHz)

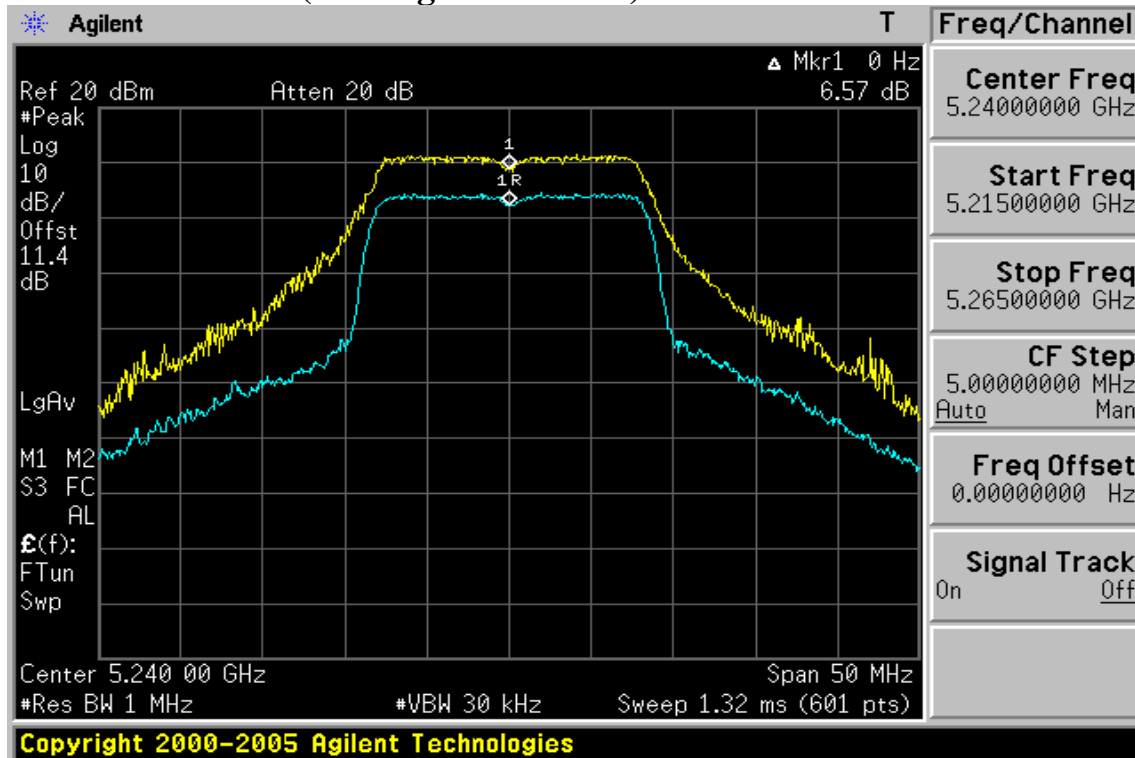


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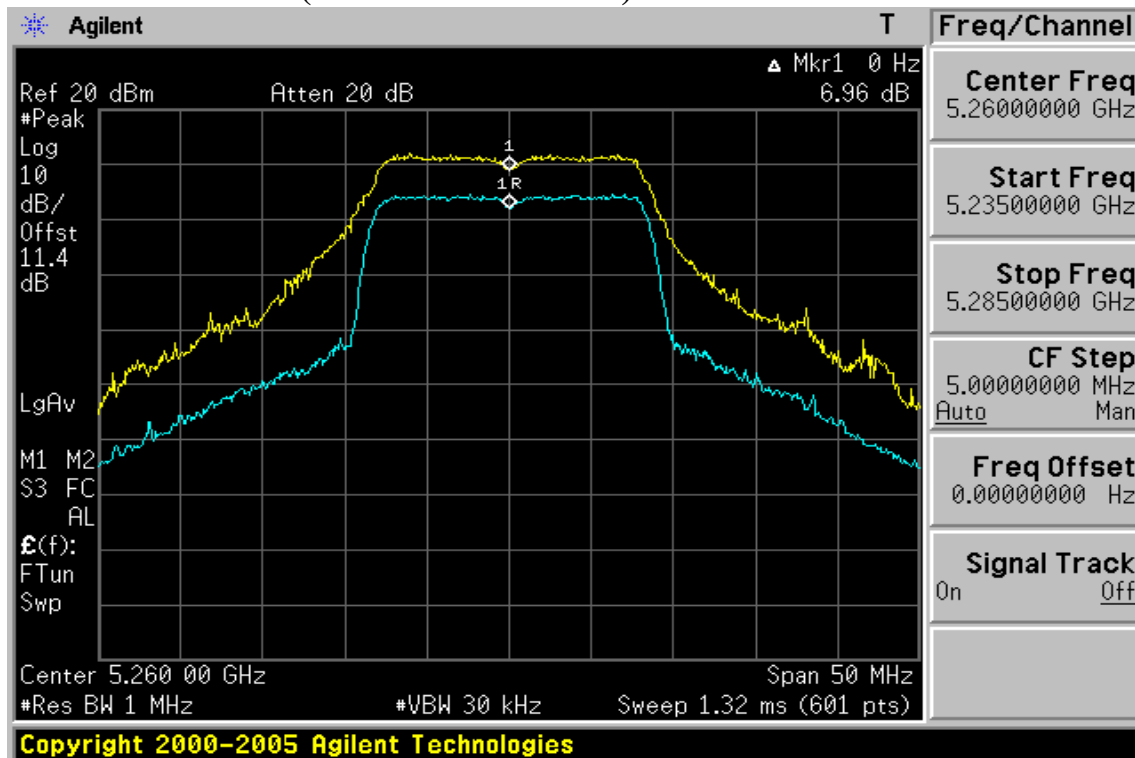
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## Peak Excursion Data Plot (CH High 5240 MHz)



## 802.11a, 5250~5350 MHz

## Peak Excursion Data Plot (CH Low 5260 MHz)

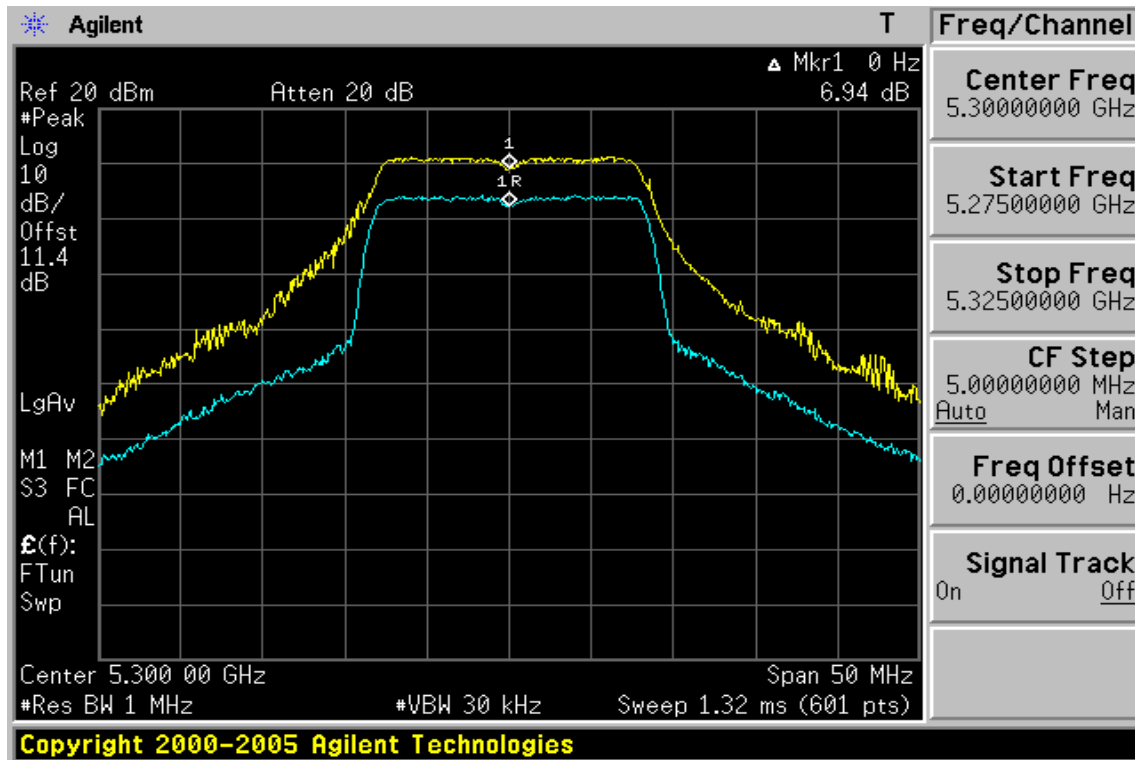


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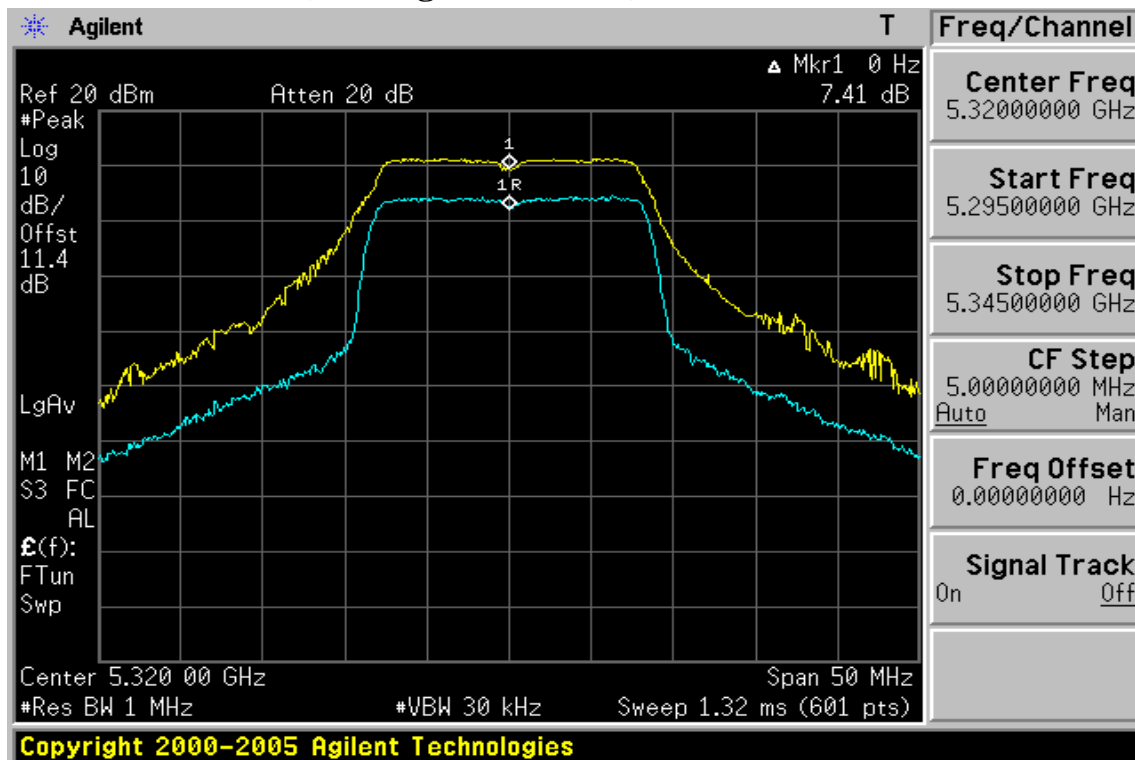
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## Peak Excursion Data Plot (CH Mid 5300 MHz)



## Peak Excursion Data Plot (CH High 5320 MHz)



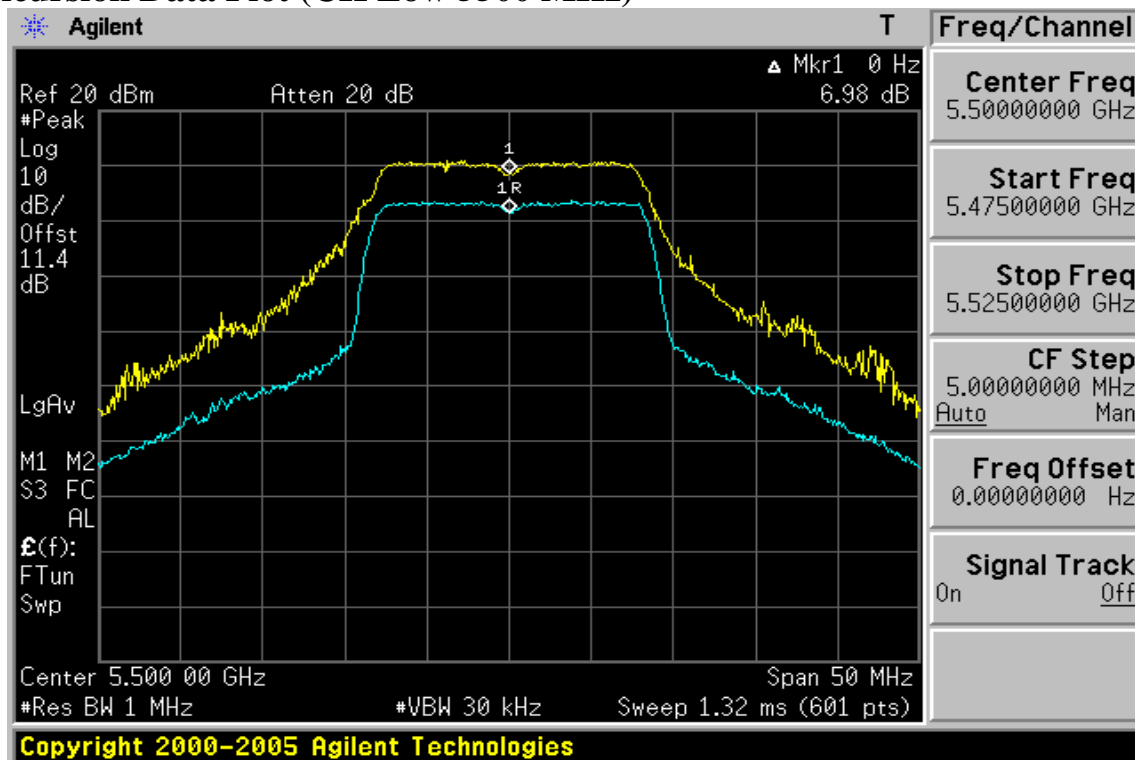
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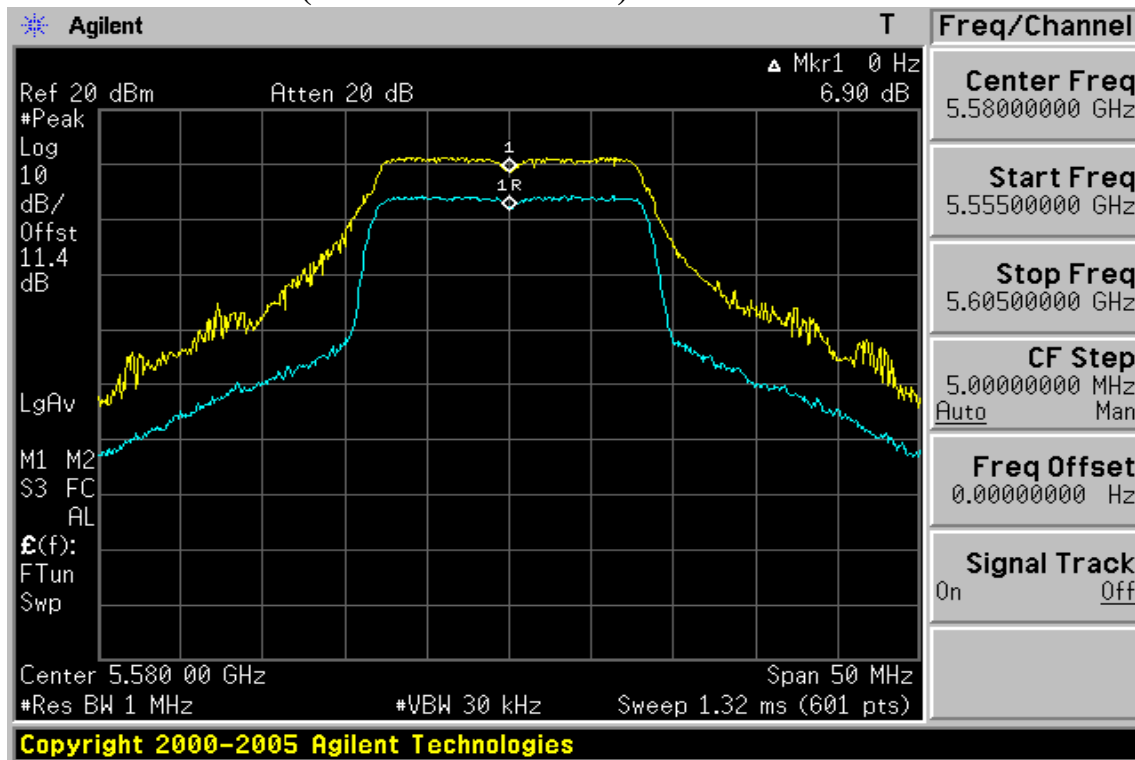
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## 802.11a, 5470~5725 MHz

### Peak Excursion Data Plot (CH Low 5500 MHz)



### Peak Excursion Data Plot (CH Mid 5580 MHz)

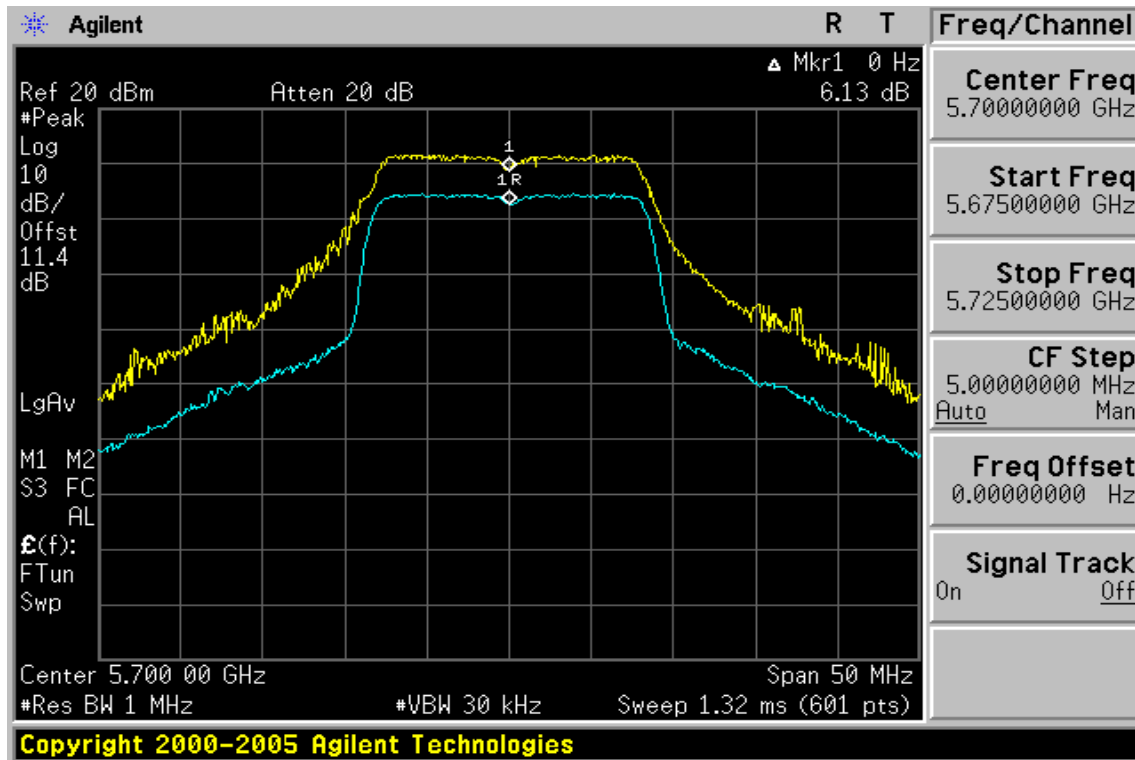


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## Peak Excursion Data Plot (CH High 5700 MHz)



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## 11. UNDESIRABLE EMISSION - CONDUCTED MEASUREMENT

### 11.1 Standard Applicable

According to §15.407(b),

(b) Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (2) 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 -27 dBm/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.
- (3) 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 -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.
- (5) The above emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.
- (7) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

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According to RSS-210 A9.2

1. For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p.
2. For transmitters operating in the band 5250-5350 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p. Devices operating in the band 5250-5350 MHz that generate emissions in the band 5150-5250 MHz shall not exceed an out-of-band emission limit of -27dBm/MHz e.i.r.p. in the band 5150-5250 MHz in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the band 5150-5250 MHz and shall be labeled “for indoor use only”.
3. For transmitters operating in the band 5470-5725 MHz, all emissions outside that band shall not exceed -27dBm/MHz e.i.r.p.
4. For transmitters operating in the band 5725-5825 MHz, all emissions within the frequency range from the band edges to 10 MHz above or below the band edges shall not exceed -17dBm/MHz e.i.r.p. For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27dBm/MHz.

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## 11.2 Measurement Procedure

### Radiated Emission:

1. Measure the proper duty cycle to determine what approach is going to be used
2. Place the EUT on the table and set it in transmitting mode.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
4. Set Spectrum RBW=1MHz, VBW = 1MHz for peak measurement and 10Hz for average measurement.
5. Set Spectrum at lower/upper band edge and the restricted band adjacent to the lower/upper edge of the authorized band, with the transmitter set to the lowest/highest channel.
6. Set Spectrum over the 30MHz to 40GHz range with the transmitter set to the lowest, middle, and highest channels.

### Conducted Emission:

1. Measure the proper duty cycle to determine what approach is going to be used
2. To connect Antenna Port of EUT to Spectrum.
3. Set RBW = 100K & VBW = 100K on Spectrum.
4. Sweep the frequency to determine spurious emission as seen on spectrum from span of 30 to 3G, 3G to 6G, 6G to 13G, 13G to 18G, 18G to 26.5G and 26.5G to 40GHz
5. Via Software, combine 6 spans of frequency range into one plot

RF measurements of the transmitter output employing measurement of conducted method were made at the band edges and the adjacent restricted bands.

Also, conducted RF measurements of the transmitter output over the 30 MHz to 40 GHz band were made in order to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

## 11.3 Measurement Equipment Used:

Refer to section 7.3 for details.

## 11.4 Measurement Result:

Refer to next page for plots.

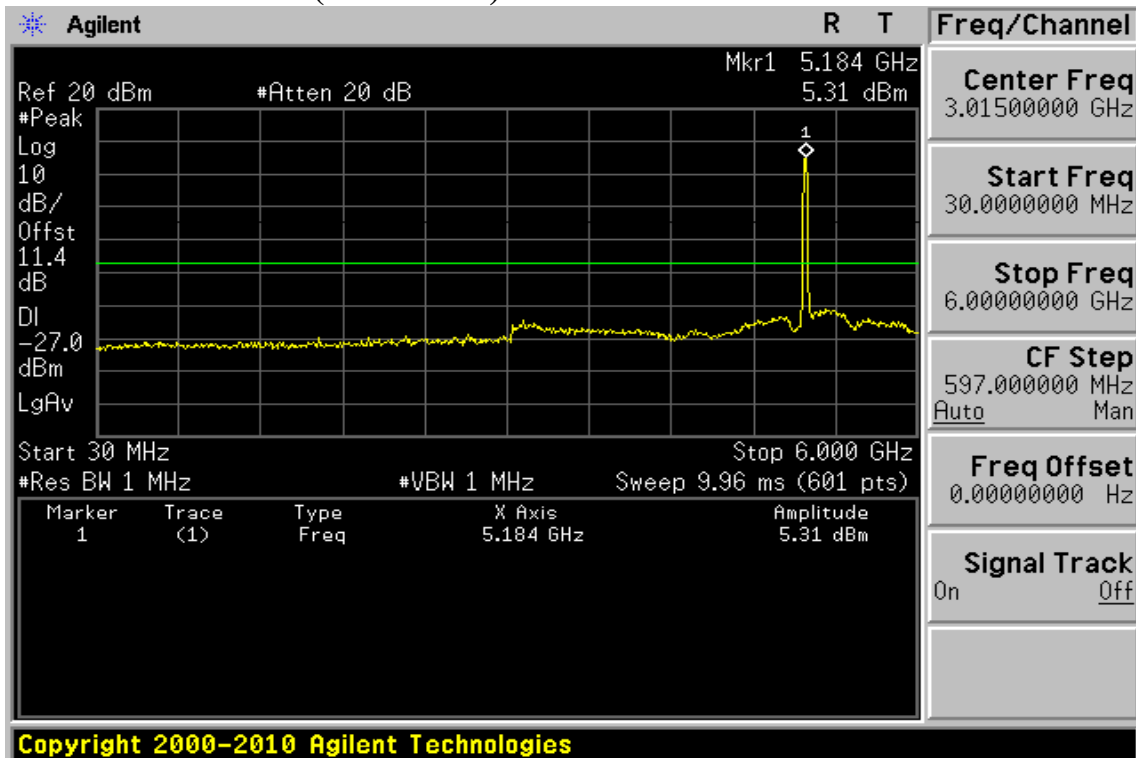
*Remark: as per KDB 662291, MIMO mode is accomplished by the addition of  $10 \log(N)$ , where  $N=2$  as the simultaneous emission of spurious emission, and bandedge for conducted compliance test items.*

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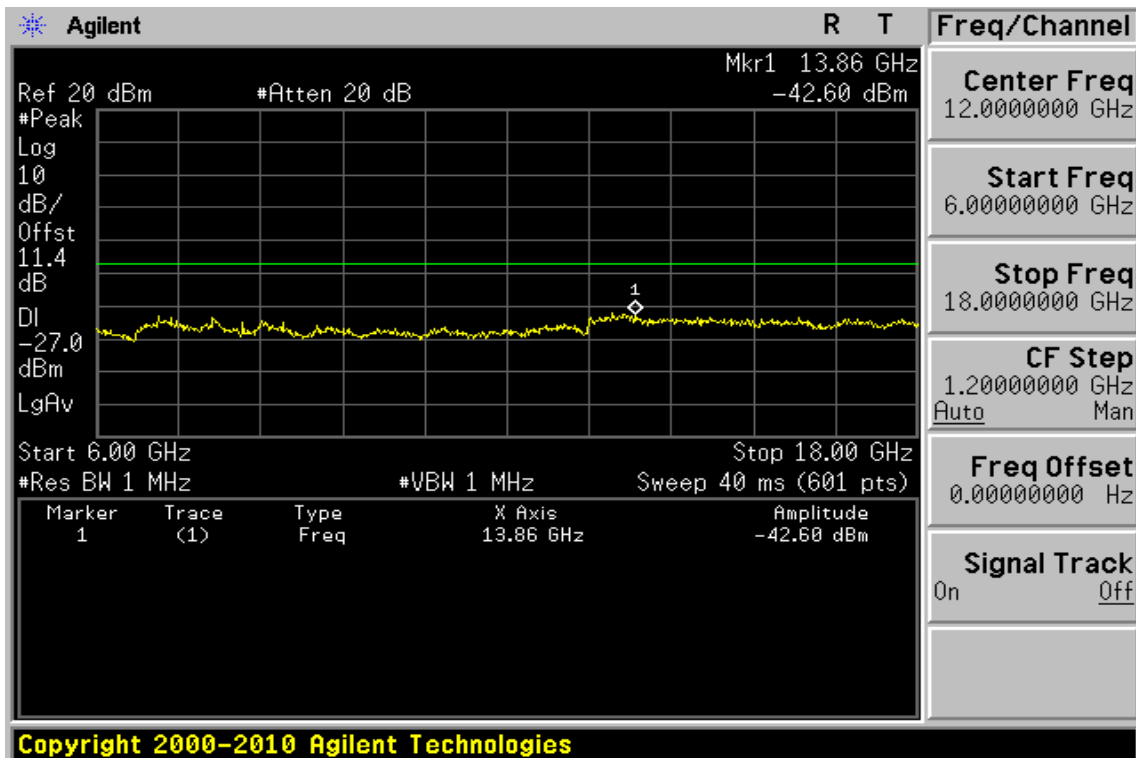
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## 802.11a, 5150~5250 MHz Ch Low 30MHz – 6GHz (5180 MHz)



## Ch Low 6GHz – 18GHz

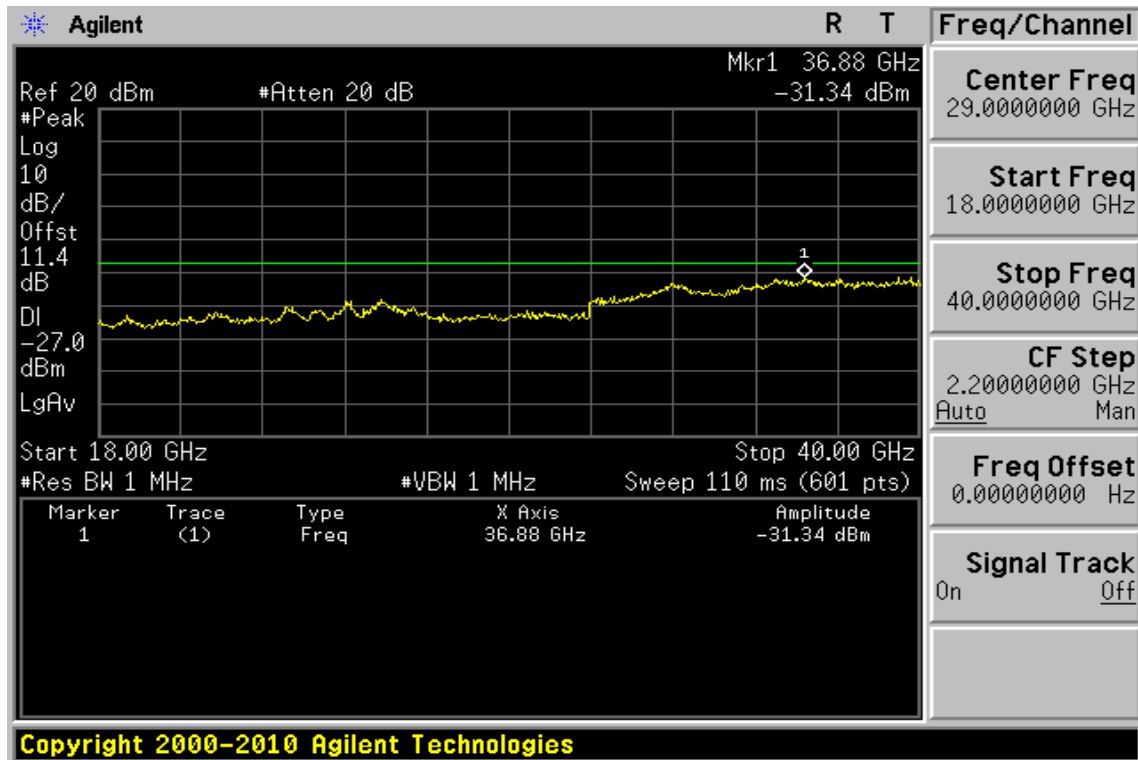


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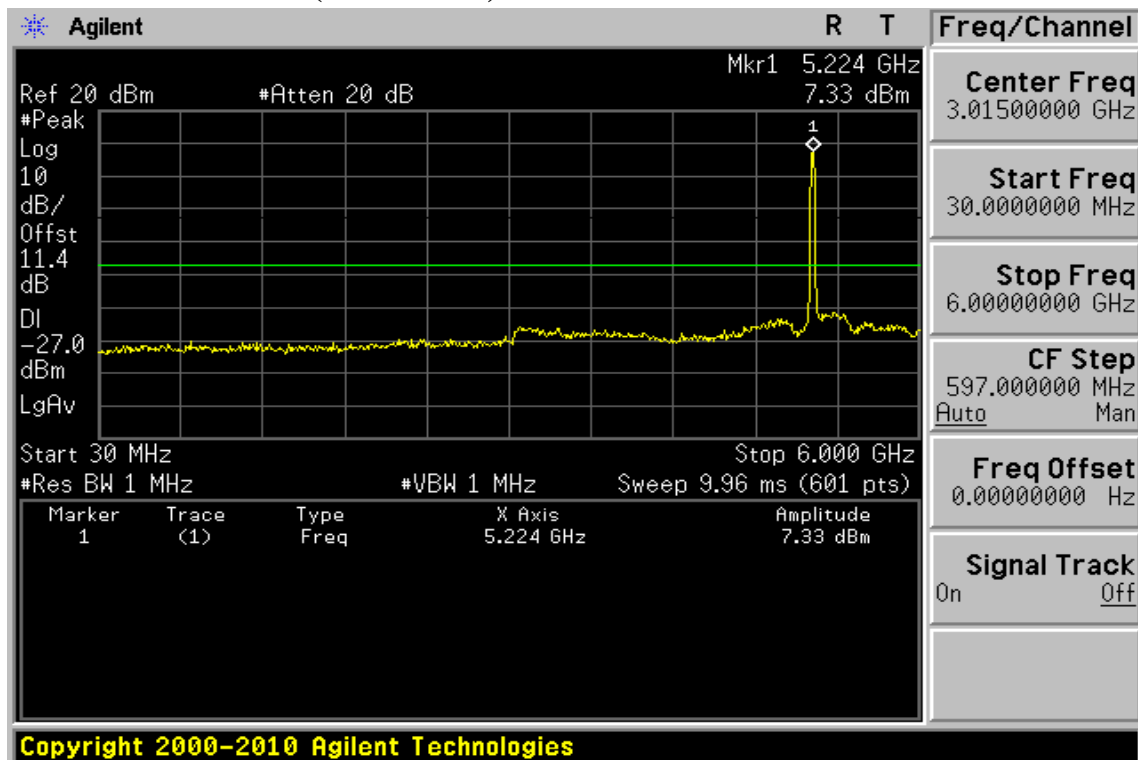
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## Ch Low 18GHz – 40GHz



## Ch Mid 30MHz – 6GHz (5220 MHz)

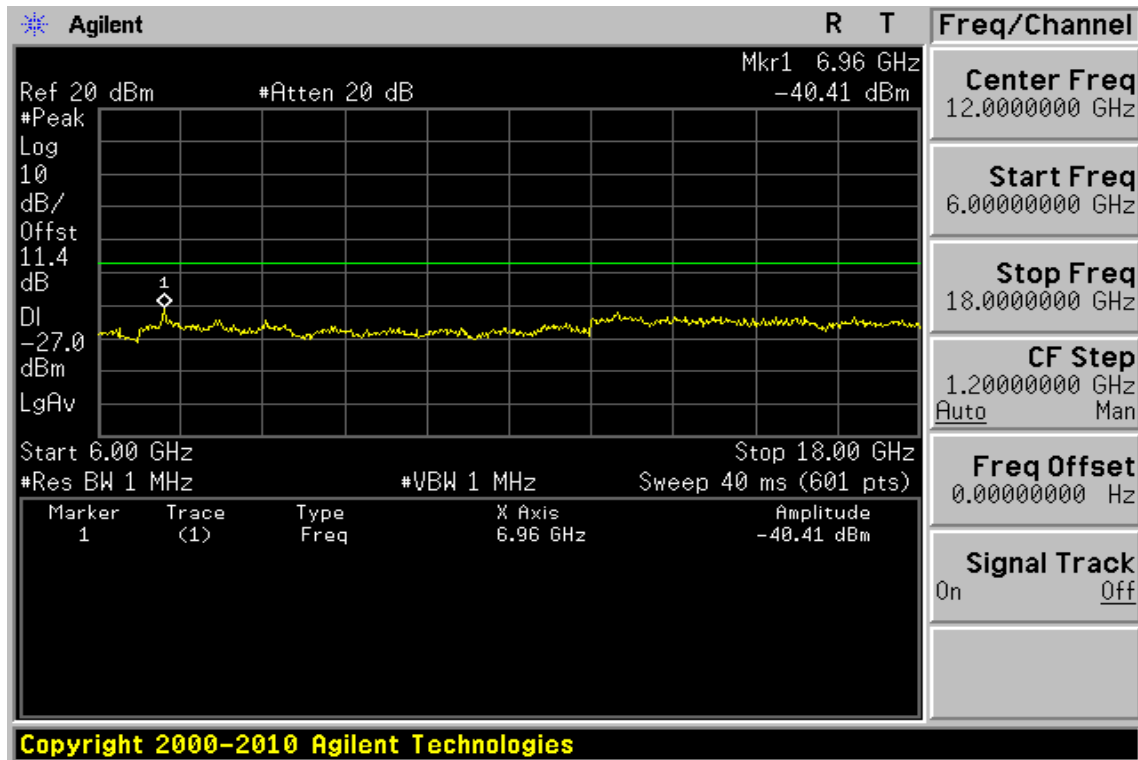


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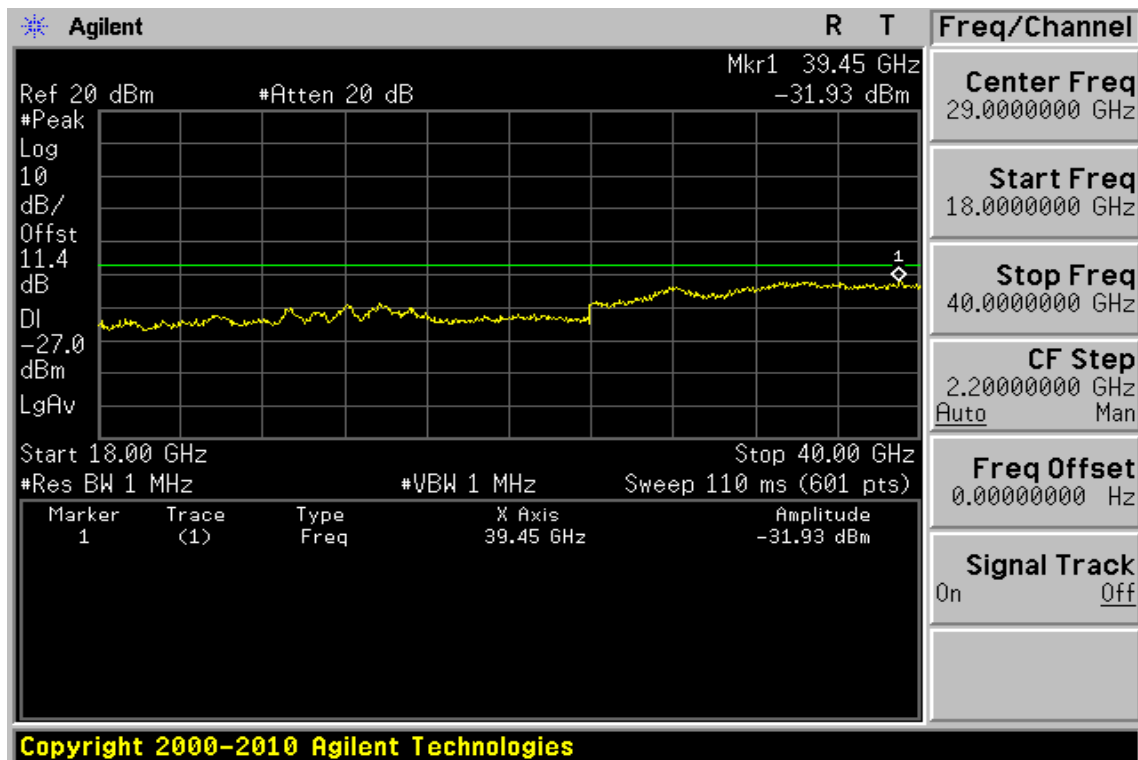
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## Ch Mid 6GHz – 18GHz



## Ch Mid 18GHz – 40GHz

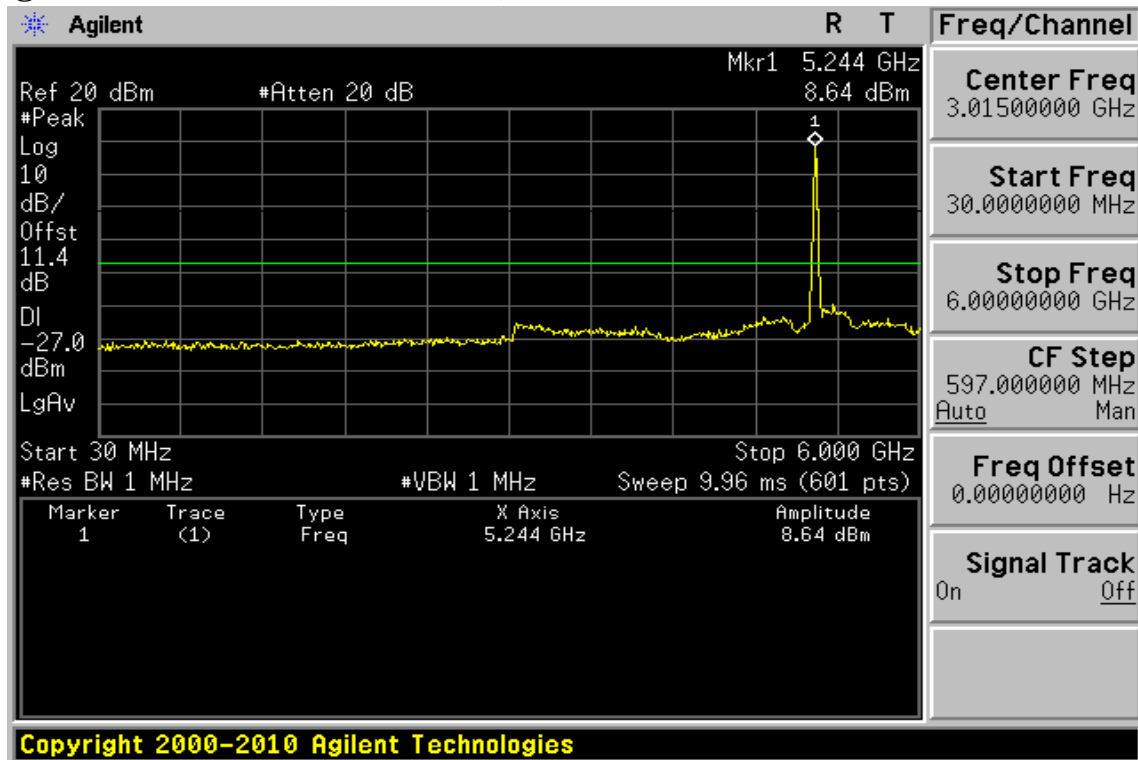


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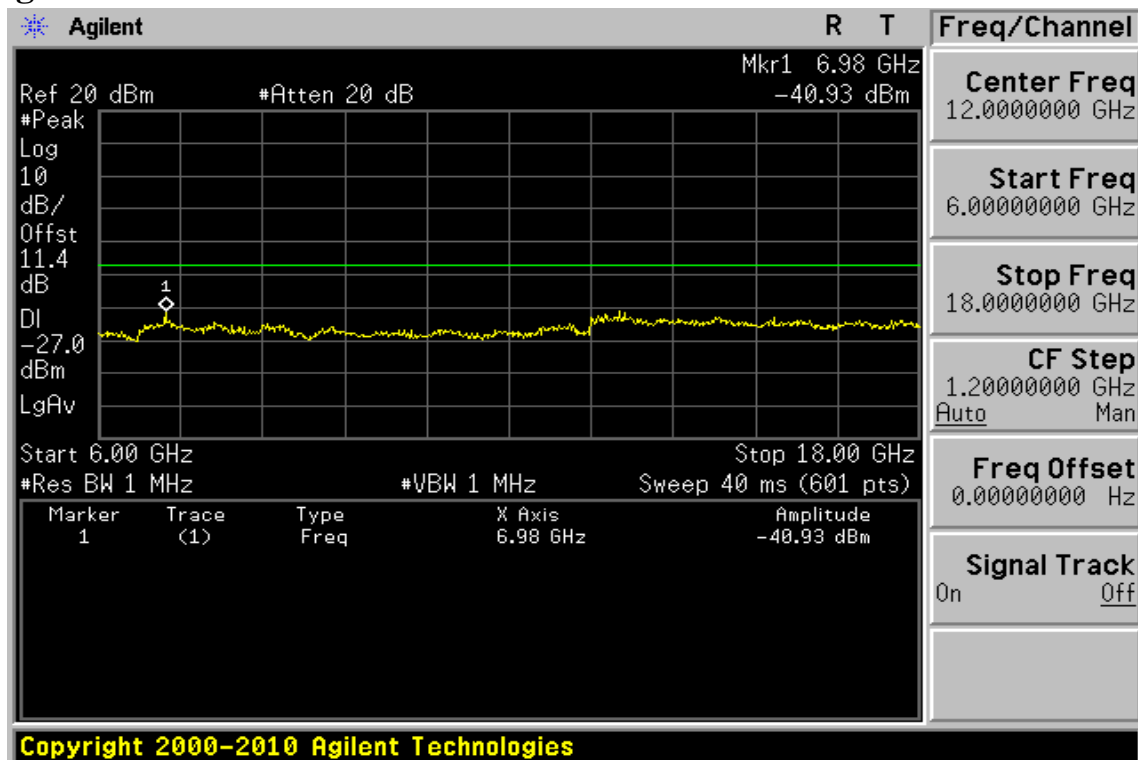
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## Ch High 30MHz – 6GHz (5240 MHz)



## Ch High 6GHz – 18GHz

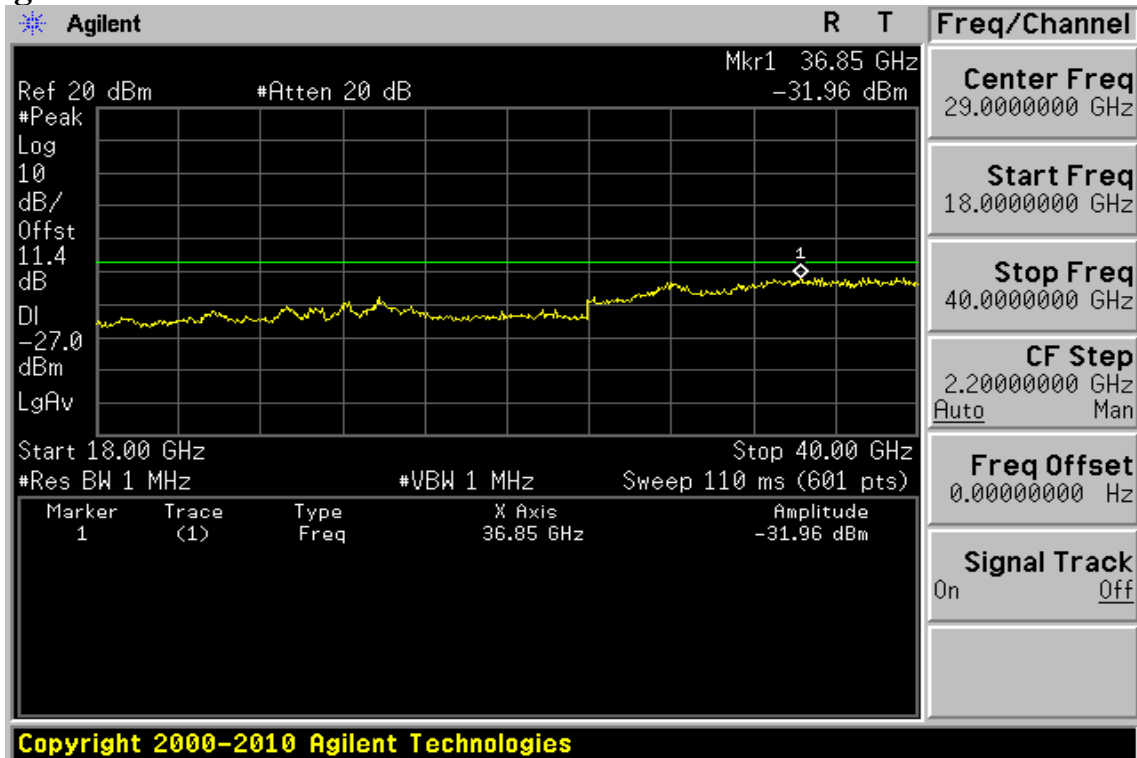


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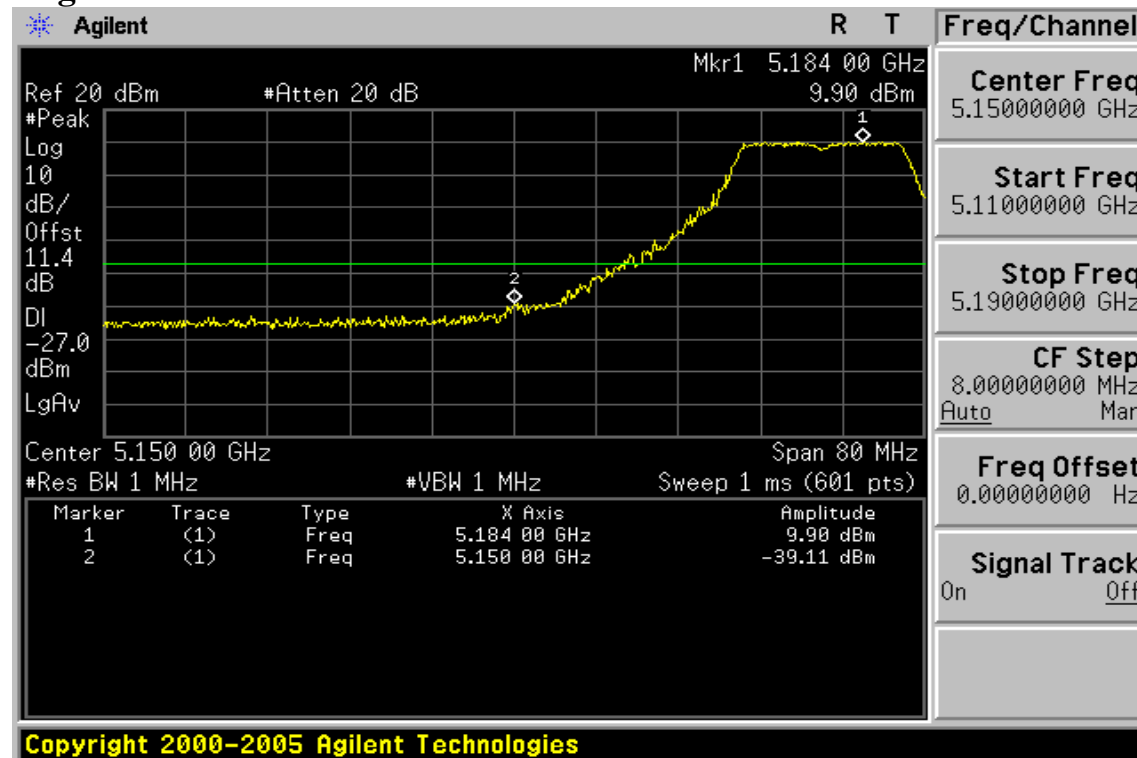
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## Ch High 18GHz – 40GHz



## 802.11a, 5150~5250 MHz

### Band Edges Test Data CH 5180

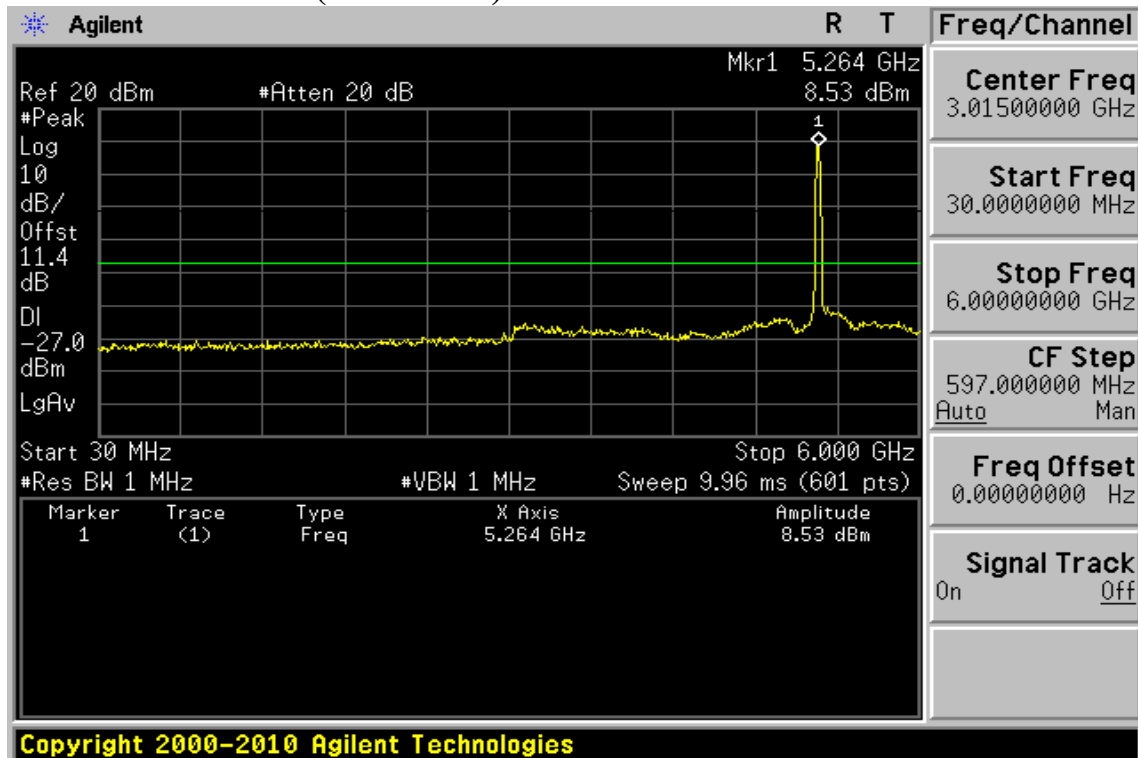


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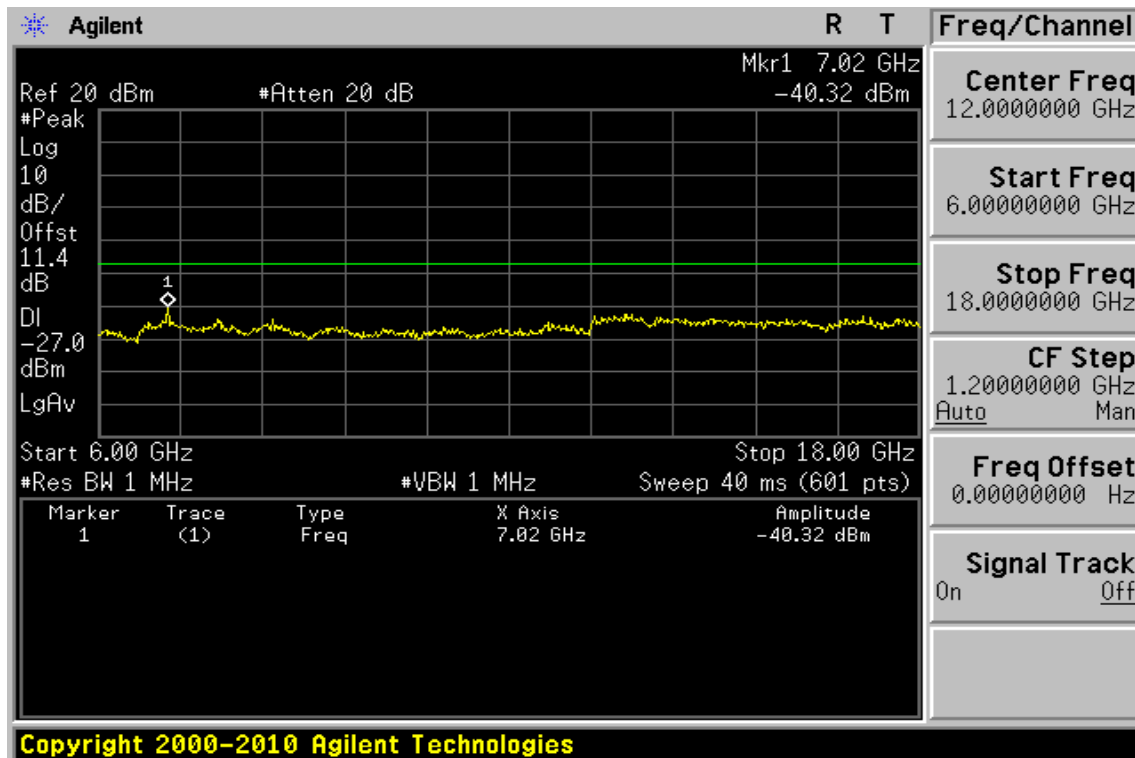
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## 802.11a, 5250~5350 MHz Ch Low 30MHz – 6GHz (5260 MHz)



## Ch Low 6GHz – 18GHz



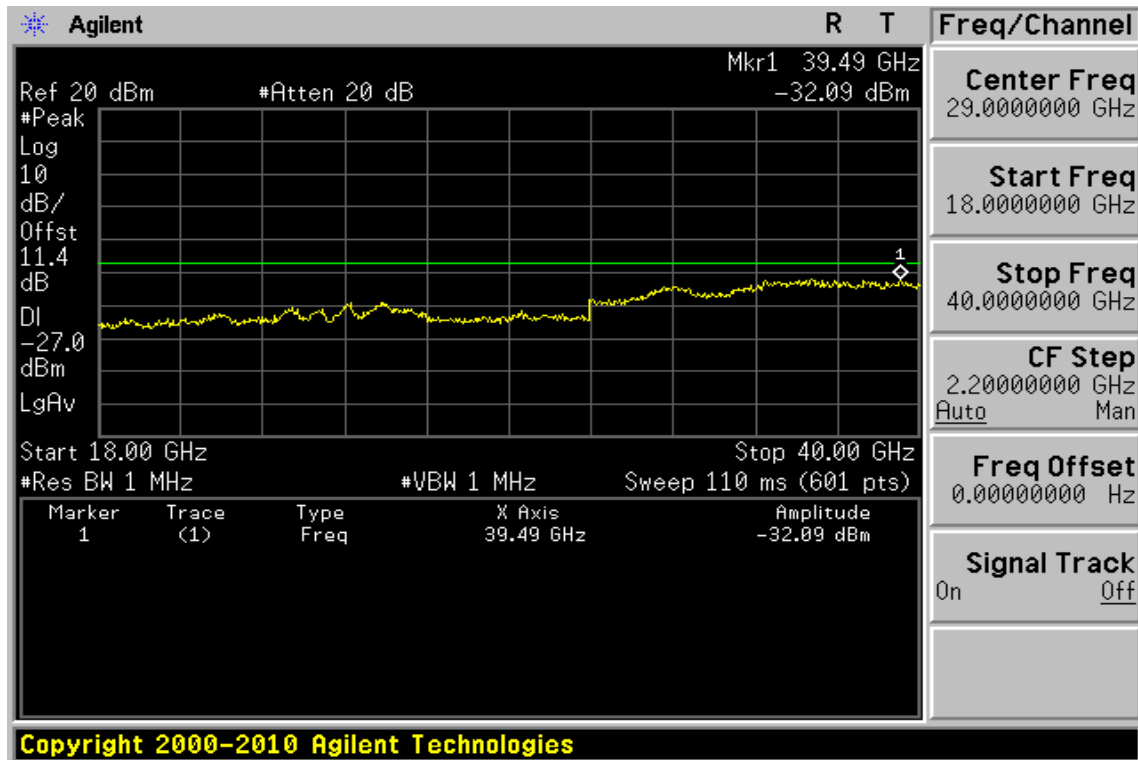
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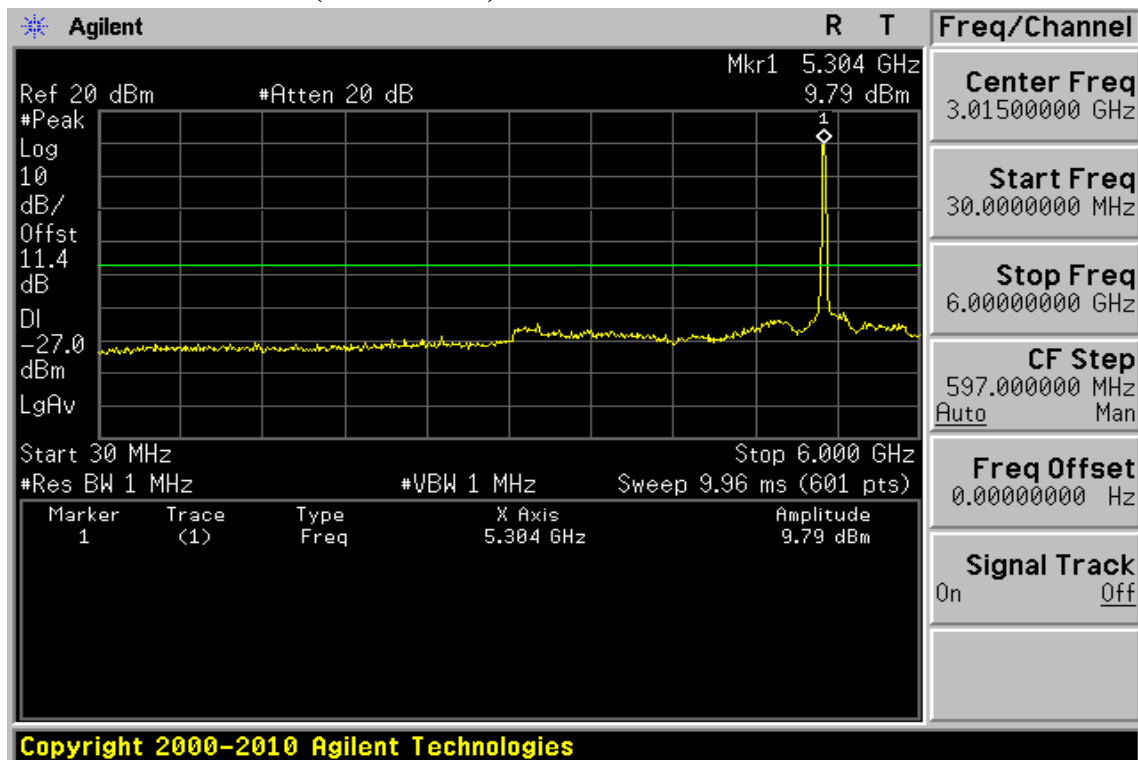
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## Ch Low 18GHz – 40GHz



## Ch Mid 30MHz – 6GHz (5300 MHz)

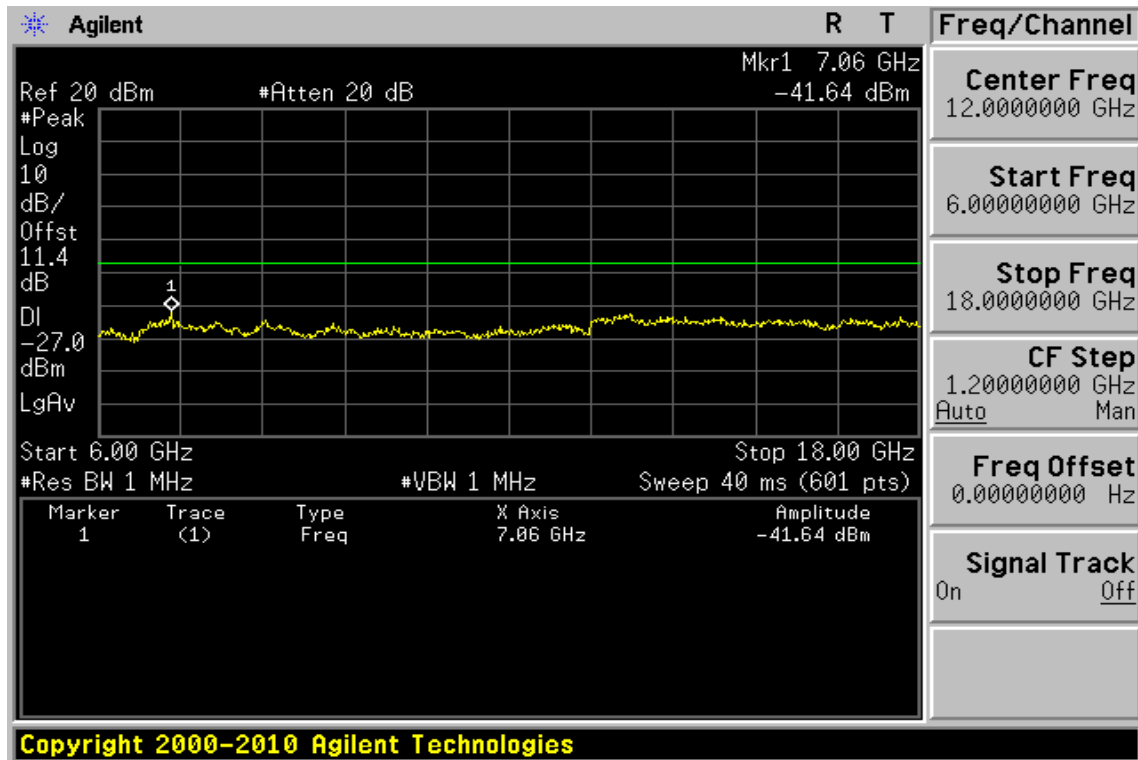


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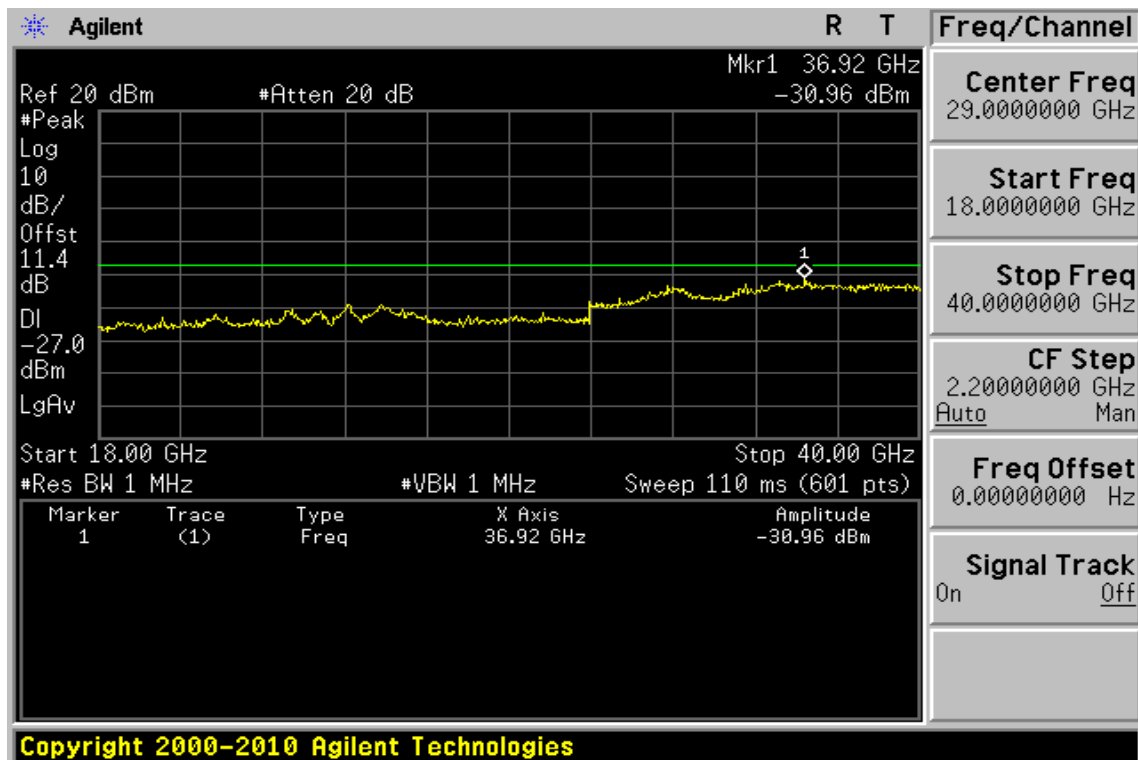
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## Ch Mid 6GHz – 18GHz



## Ch Mid 18GHz – 40GHz

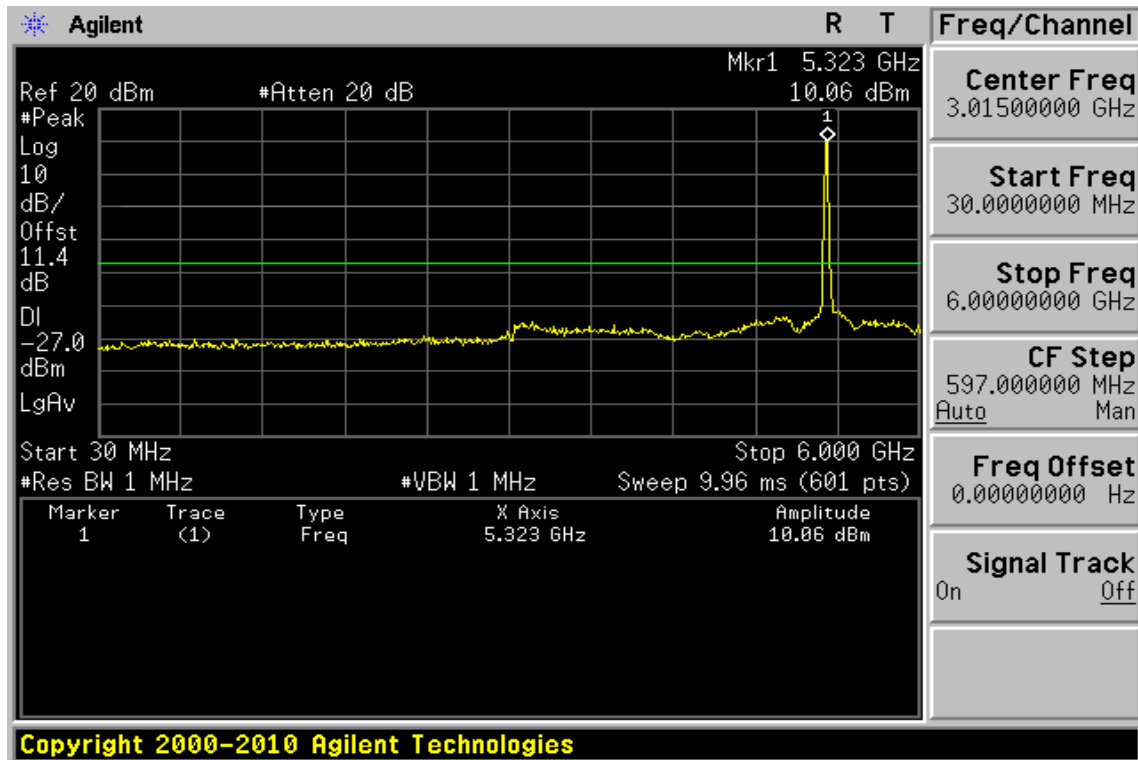


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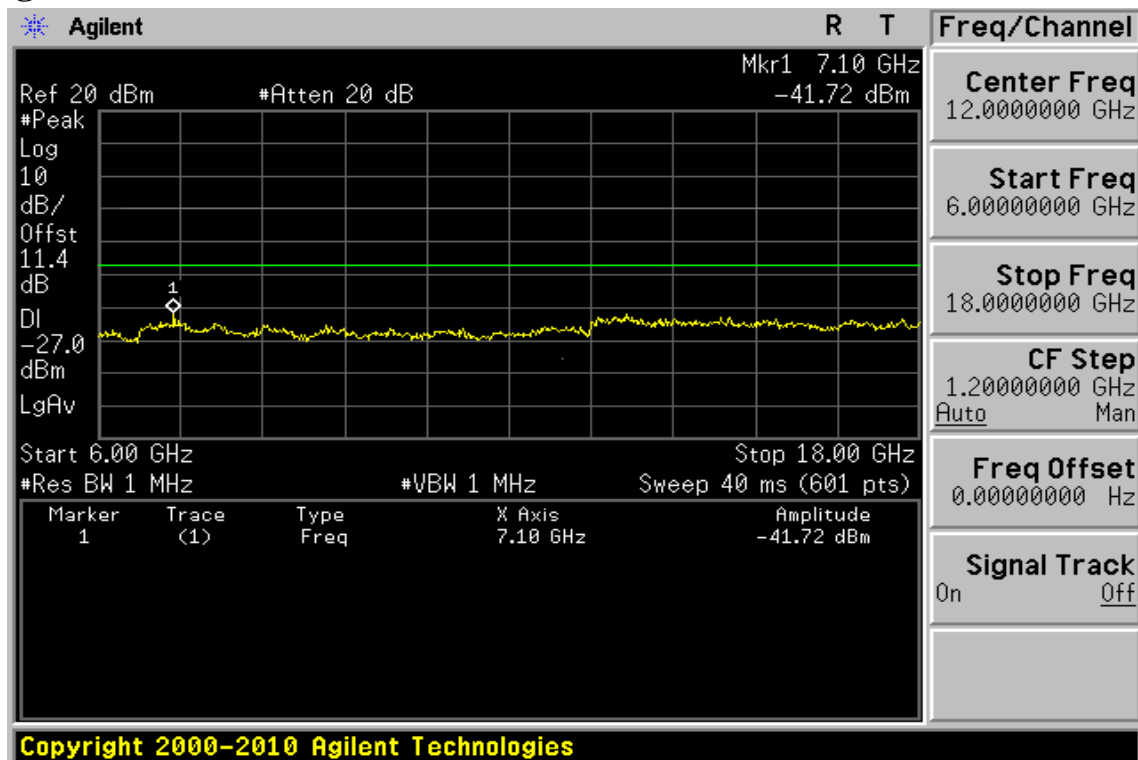
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## Ch High 30MHz – 6GHz (5320 MHz)



## Ch High 6GHz – 18GHz

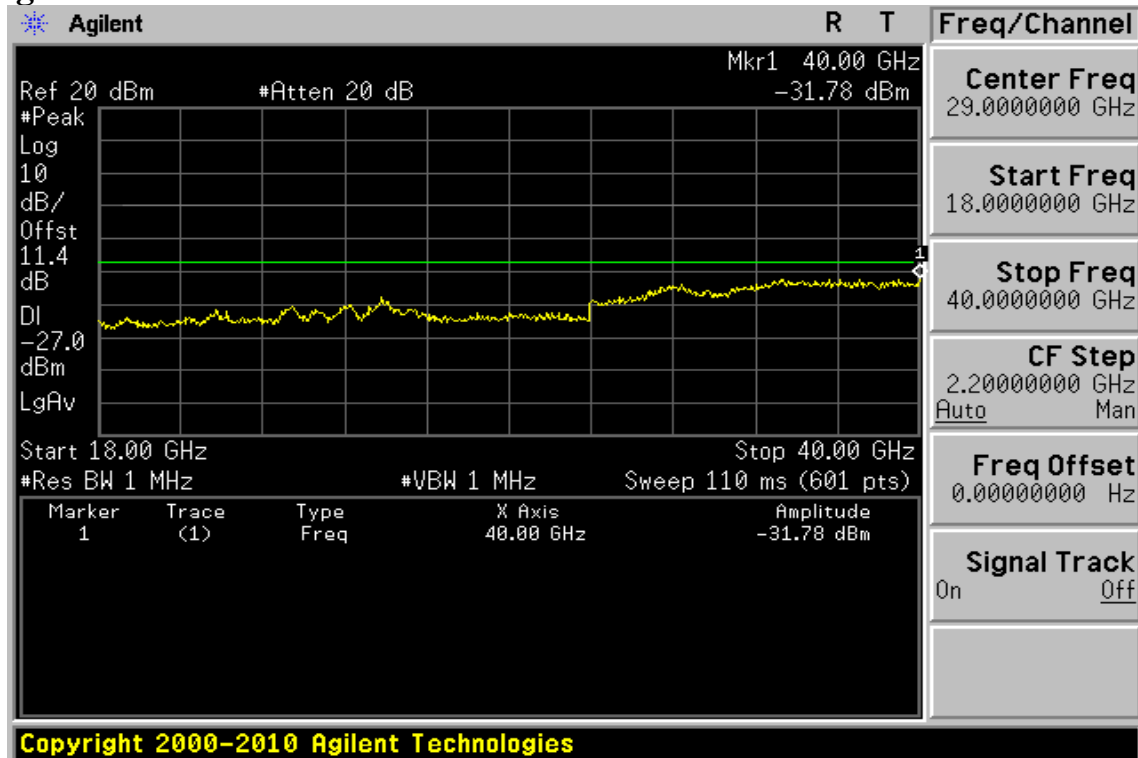


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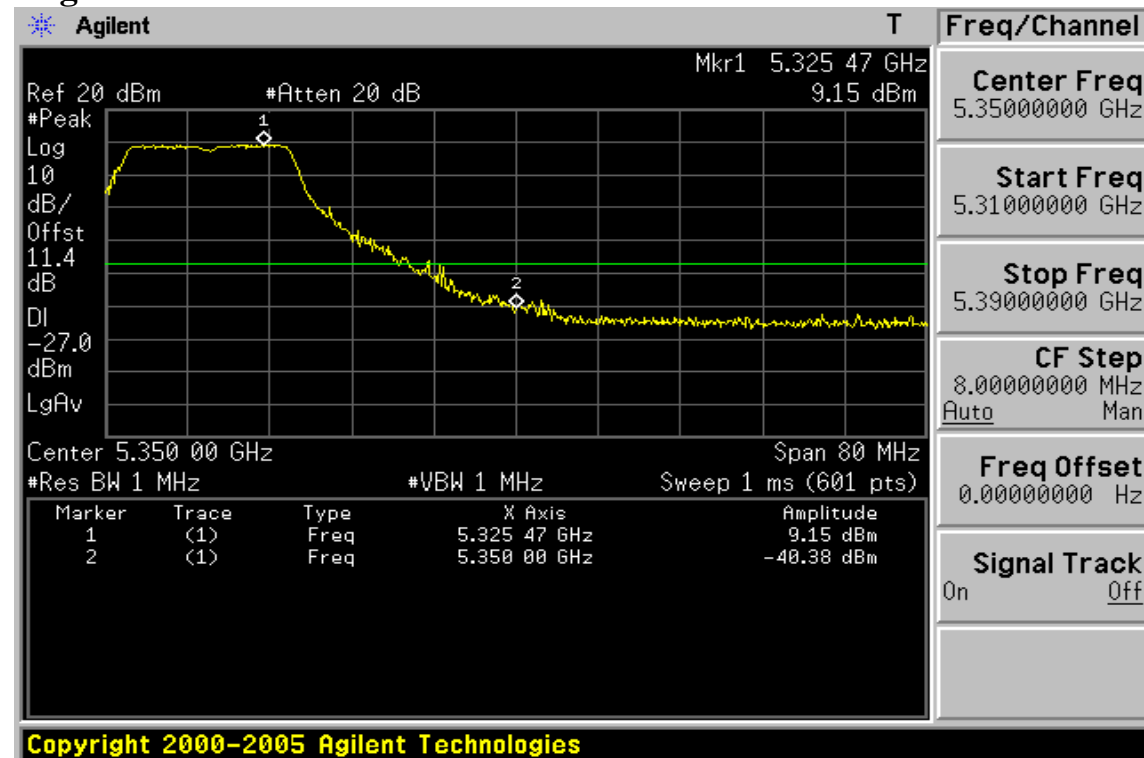
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## Ch High 18GHz – 40GHz



## 802.11a, 5250~5350 MHz

### Band Edges Test Data CH 5320

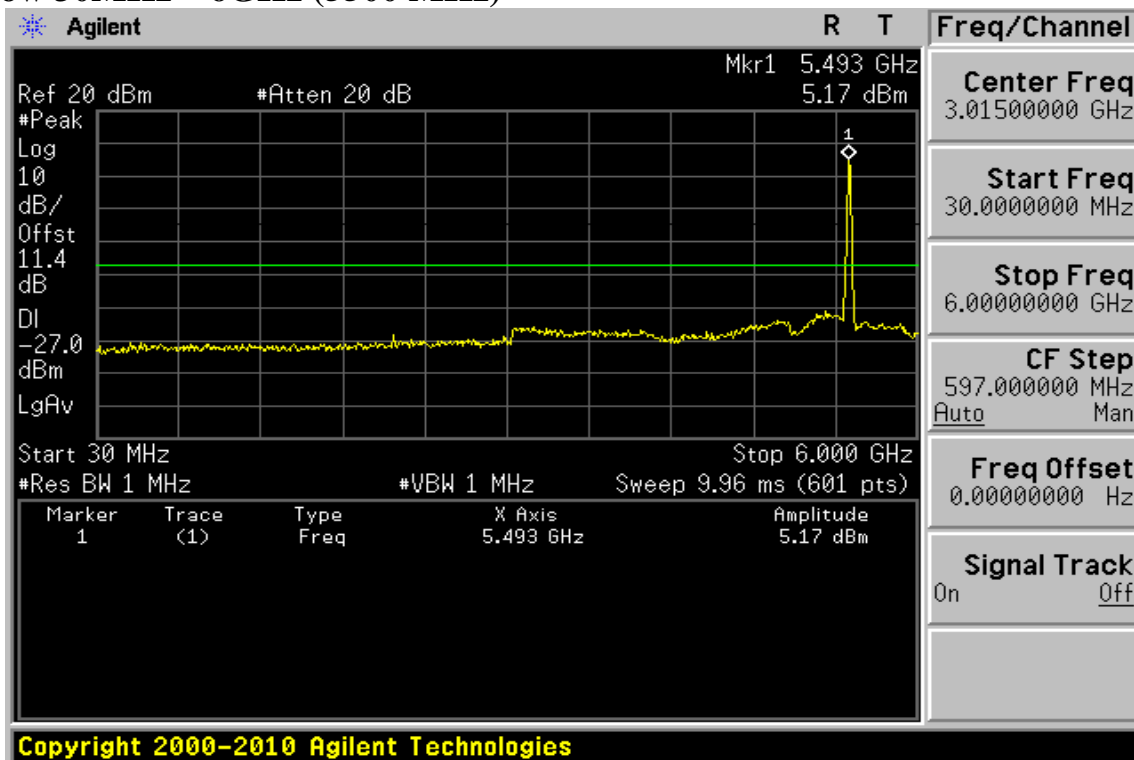


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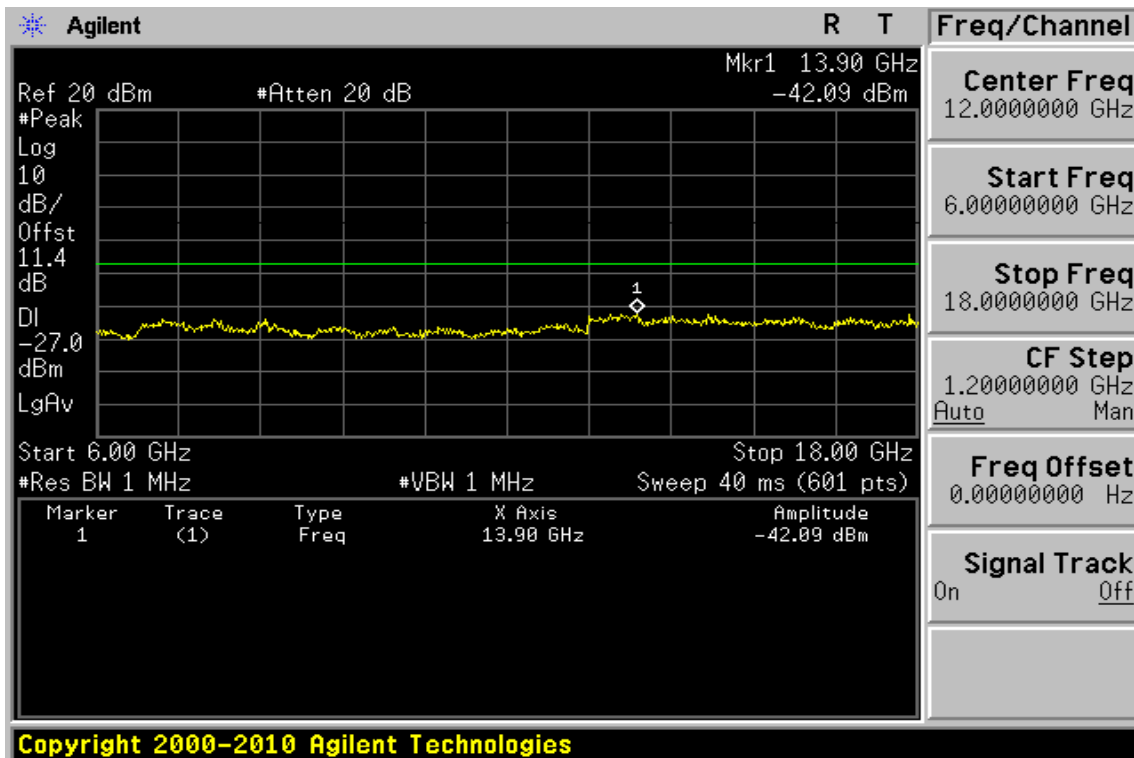
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## 802.11a, 5470~5725 MHz Ch Low 30MHz – 6GHz (5500 MHz)



## Ch Low 6GHz – 18GHz

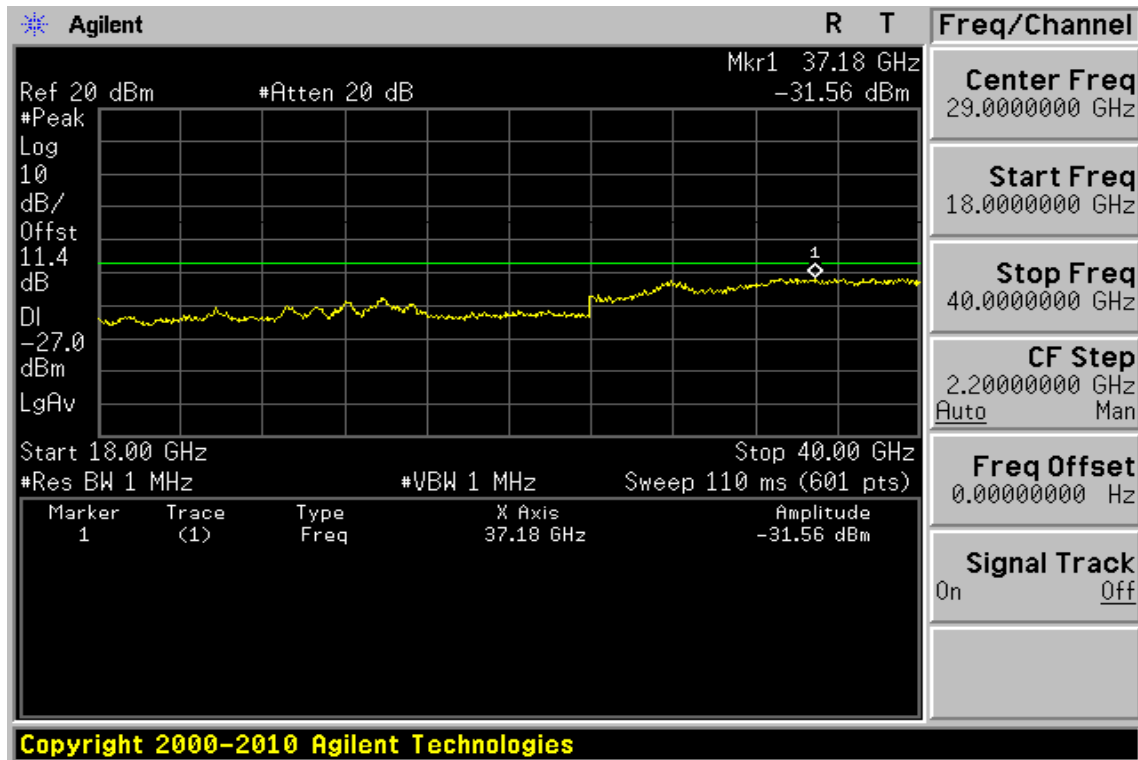


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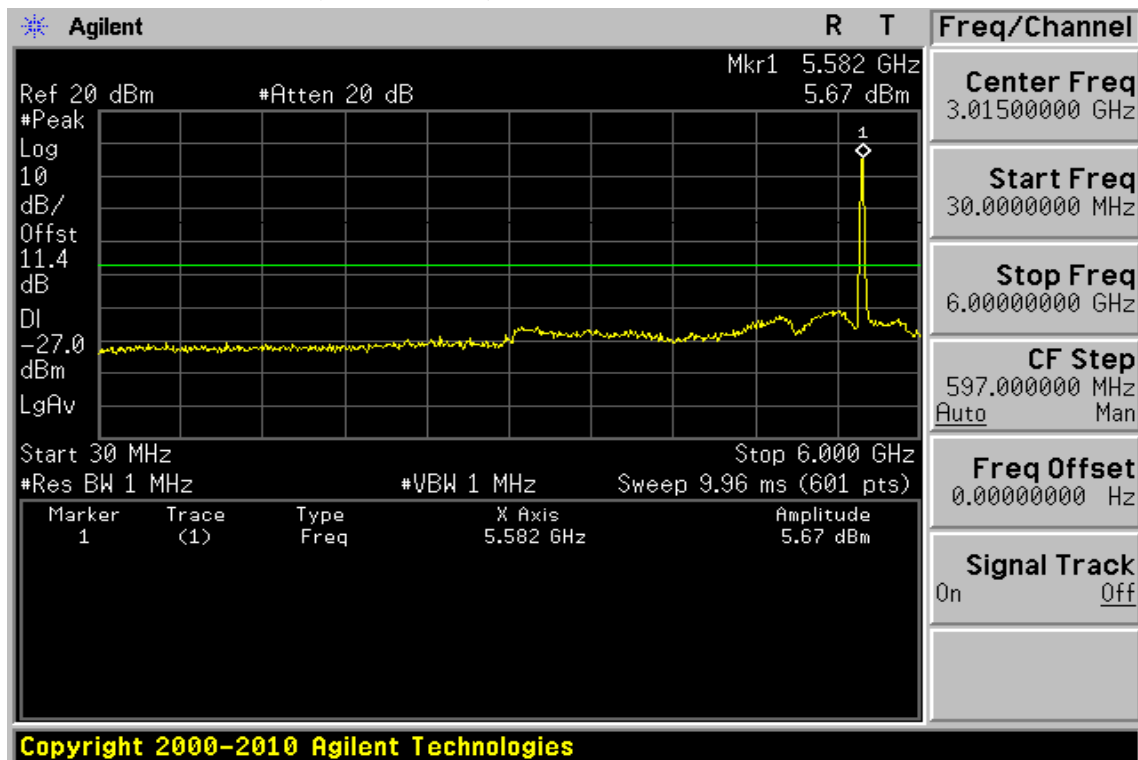
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## Ch Low 18GHz – 40GHz



## Ch Mid 30MHz – 6GHz (5580 MHz)

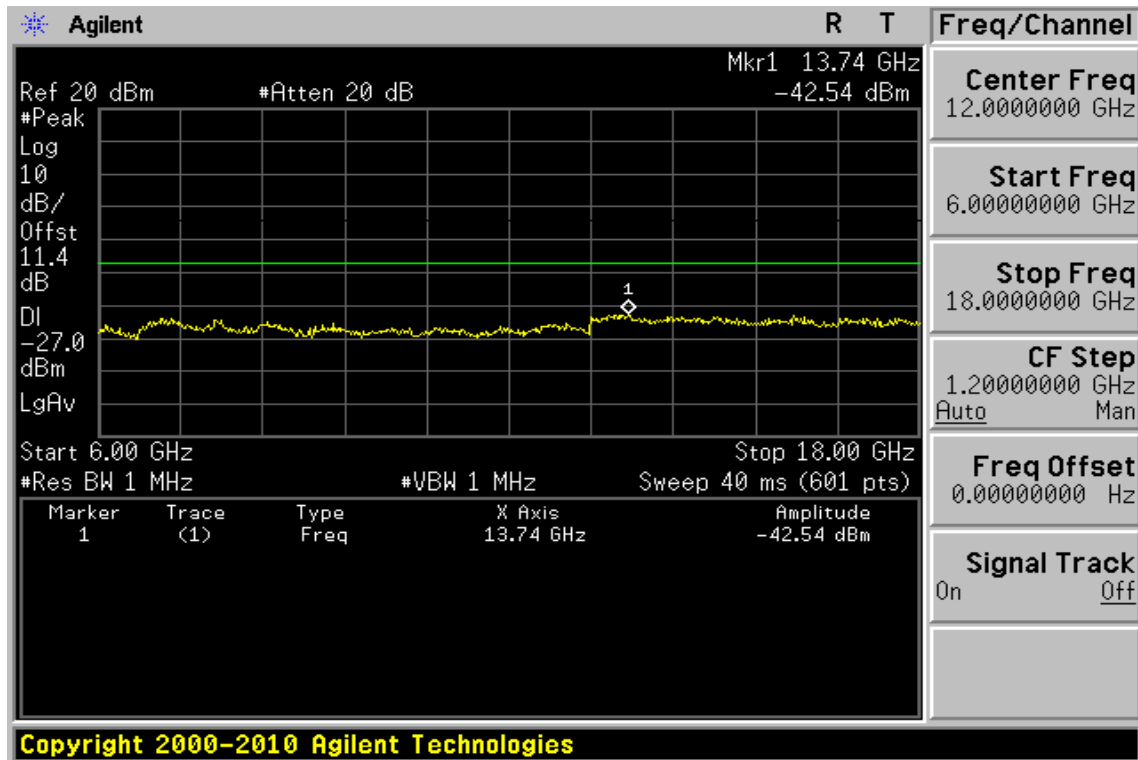


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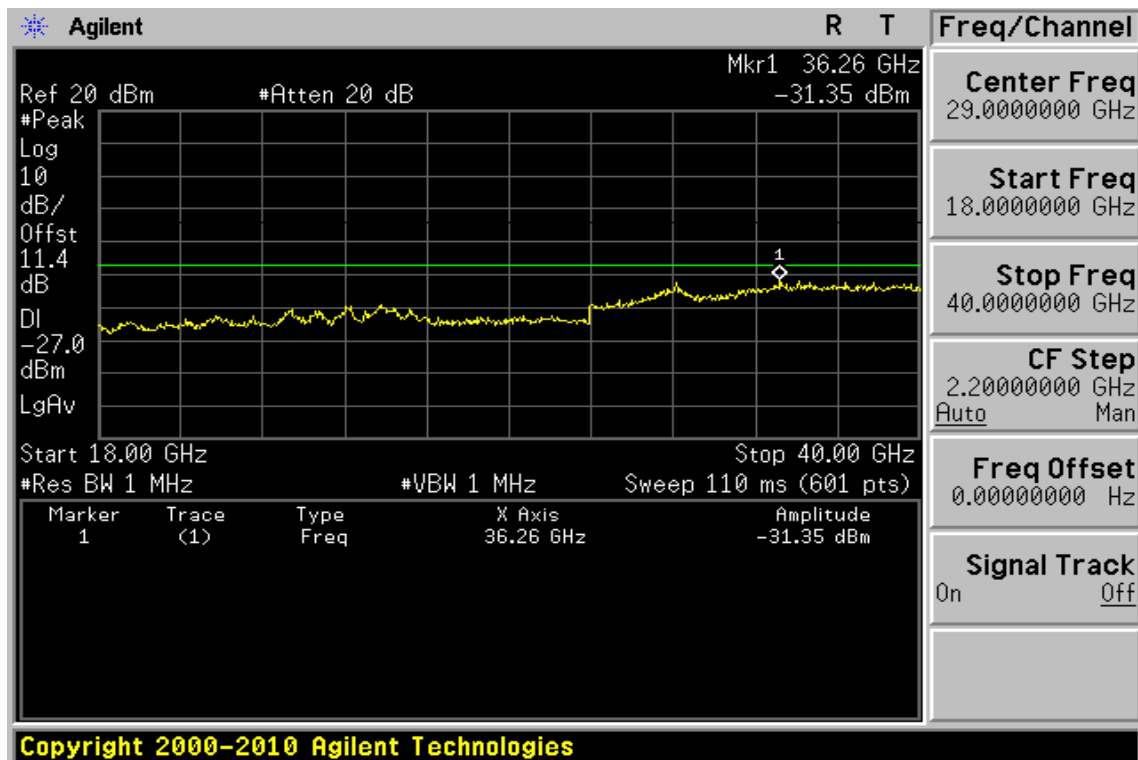
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## Ch Mid 6GHz – 18GHz



## Ch Mid 18GHz – 40GHz

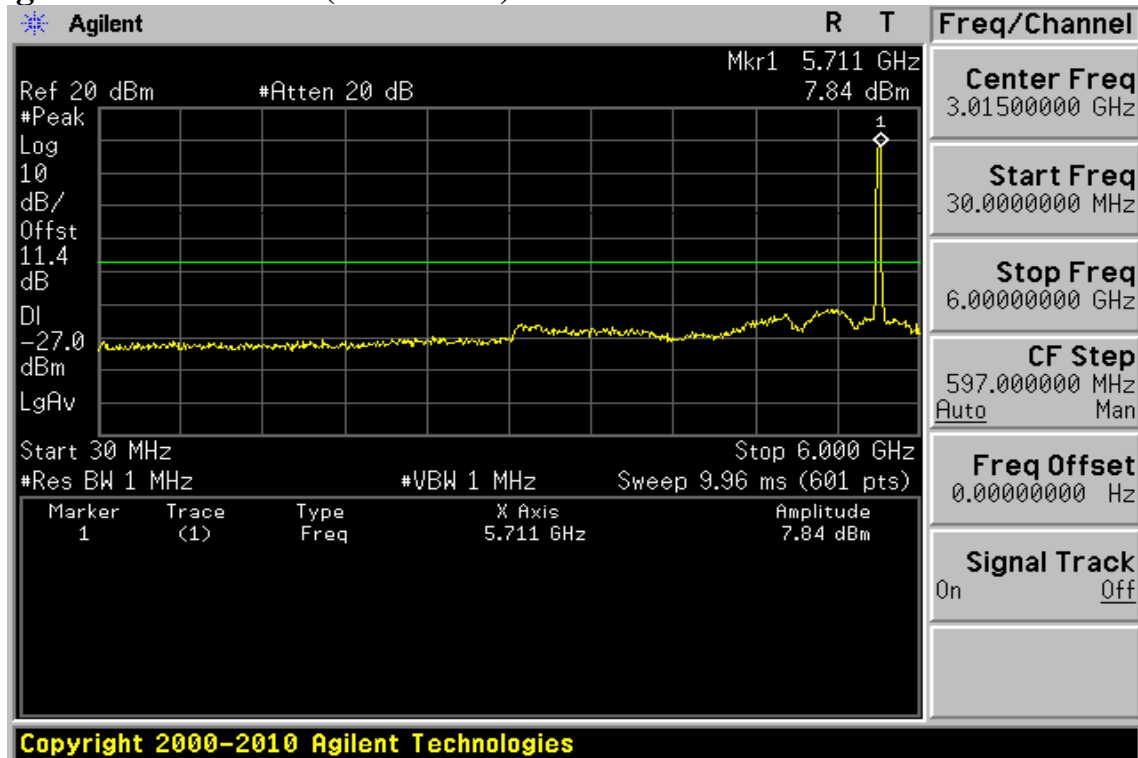


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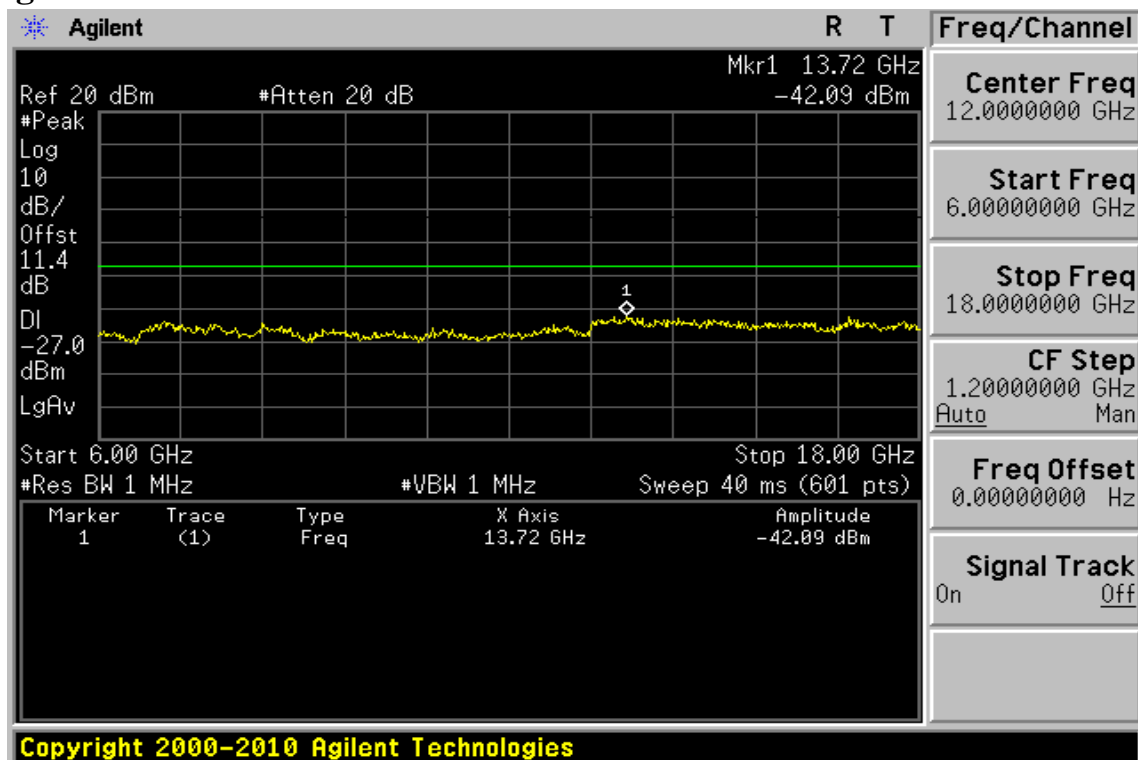
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## Ch High 30MHz – 6GHz (5700 MHz)



## Ch High 6GHz – 18GHz



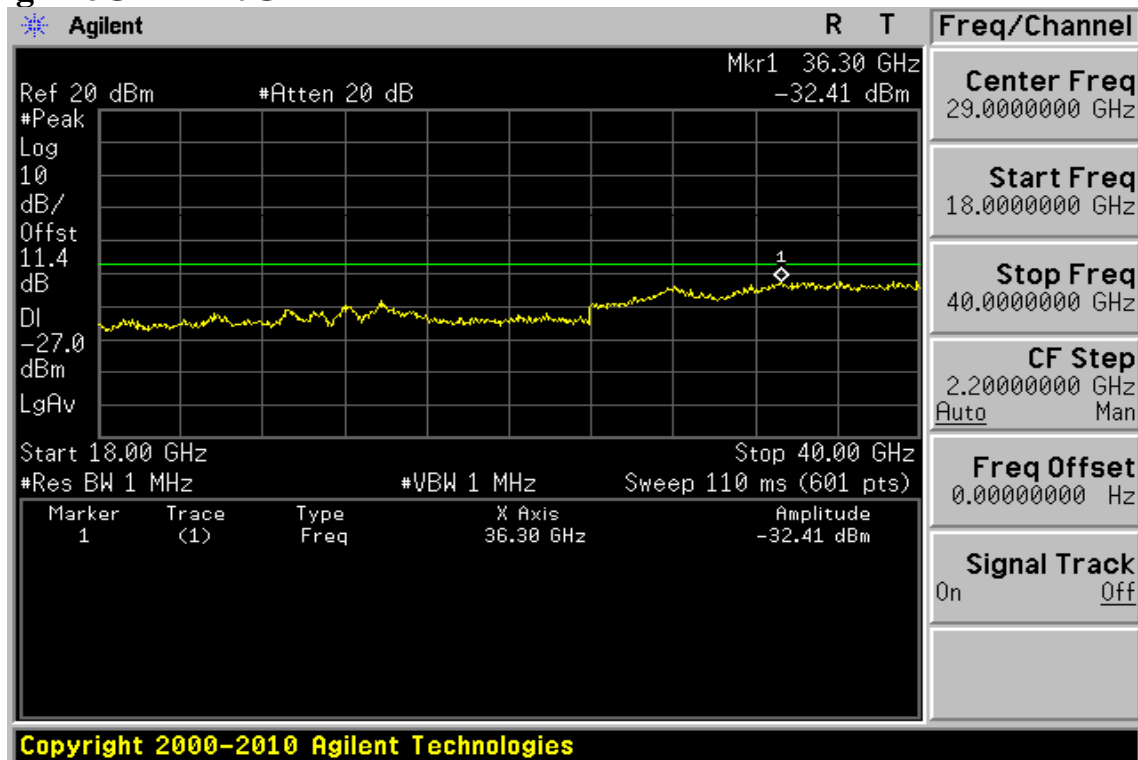
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## Ch High 18GHz – 40GHz



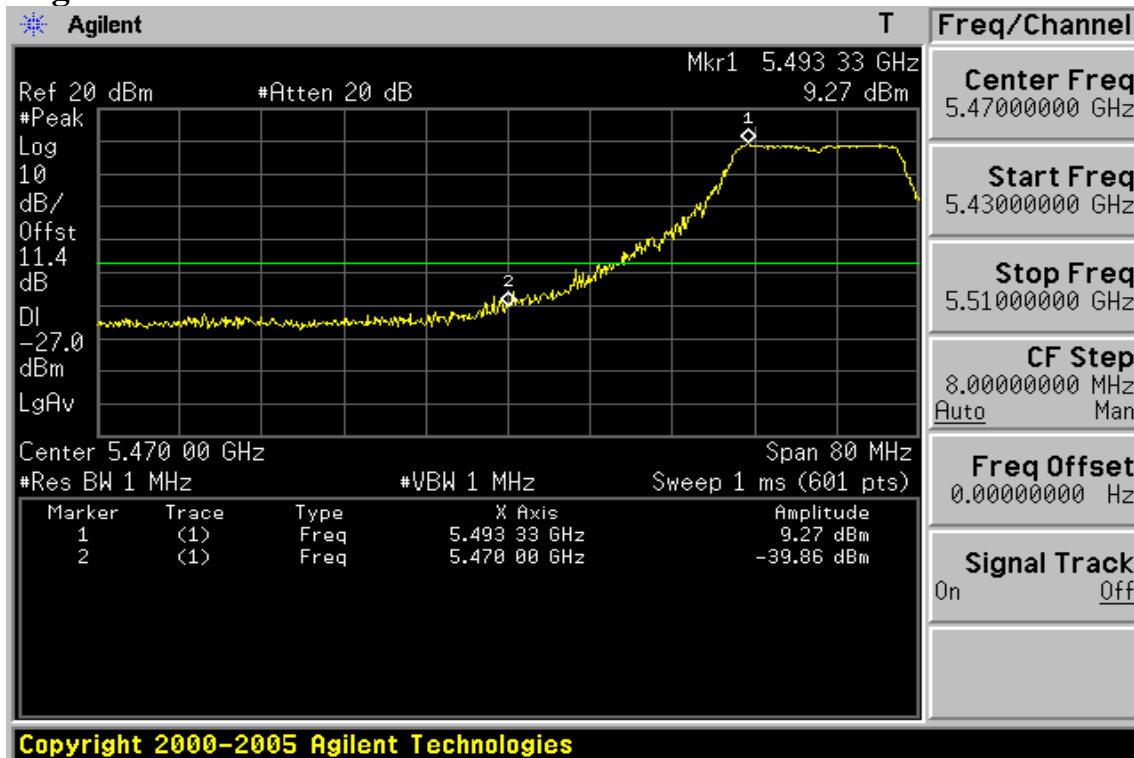
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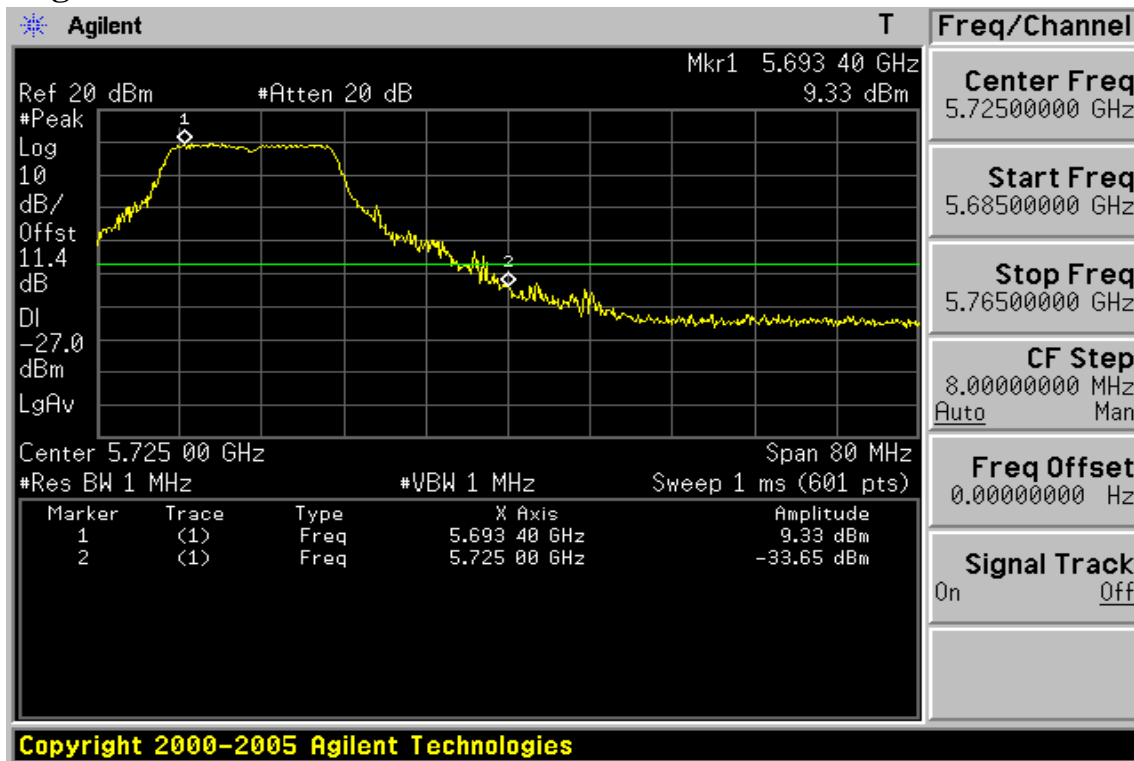
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## 802.11a, 5470~5725 MHz

### Band Edges Test Data CH 5500



### Band Edges Test Data CH 5700



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## 12. UNDESIRABLE EMISSION - RADICTED MEASUREMENT

### 12.1 Standard Applicable

According to §15.407(b),

(b) Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.
- (2) 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 -27dBm/MHz in the 5.15-5.25 GHz band.
- (3) 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.
- (4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27dBm/MHz.
- (5) The above emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) For MIMO operation, appropriate offset ( $10 \log(N)$ ) on the spectrum is adjusted on “per chain basis to result MIMO measurement.
- (7) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.
- (8) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
- (9) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

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## §15.205- RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

1. Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

2. Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

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## §15.209- RADIATED EMISSION LIMITS: GENERAL REQUIREMENTS

### FCC PART 15.209

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

According to RSS-210 A9.2

1. For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p.
2. For transmitters operating in the band 5250-5350 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p. Devices operating in the band 5250-5350 MHz that generate emissions in the band 5150-5250 MHz shall not exceed an out-of-band emission limit of -27dBm/MHz e.i.r.p. in the band 5150-5250 MHz in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the band 5150-5250 MHz and shall be labeled “for indoor use only”.
3. For transmitters operating in the band 5470-5725 MHz, all emissions outside that band shall not exceed -27dBm/MHz e.i.r.p.
4. For transmitters operating in the band 5725-5825 MHz, all emissions within the frequency range from the band edges to 10 MHz above or below the band edges shall not exceed -17dBm/MHz e.i.r.p. For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27dBm/MHz.

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## 12.2 EUT Setup

1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-1992.
2. The EUT was put in the front of the test table. The host PC system was placed on the center of the back edge on the test table. The peripherals like modem, monitor printer, K/B, and mouse were placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the monitor, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when necessary.
6. The host PC system was connected with 120Vac/60Hz power source.

## 12.3 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measured were complete.

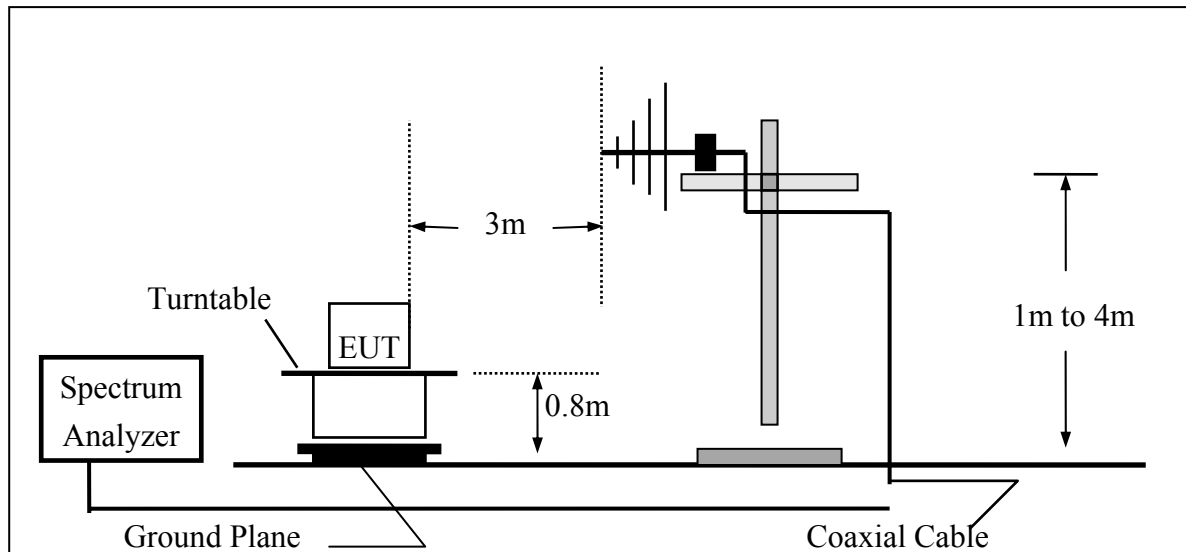
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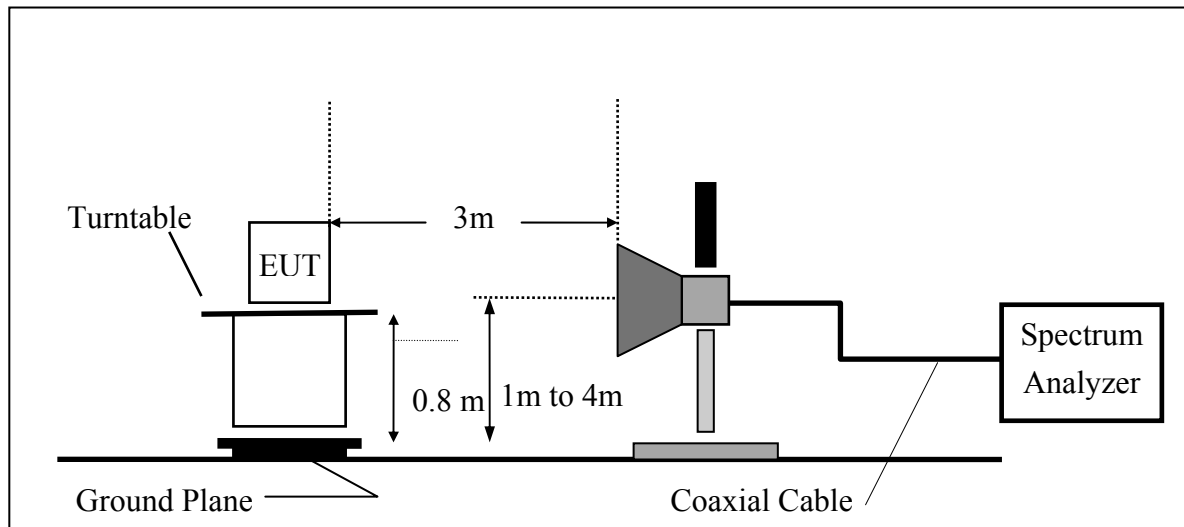
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## 12.4 Test SET-UP (Block Diagram of Configuration)

### (A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



### (B) Radiated Emission Test Set-Up Frequency Over 1 GHz



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## 12.5 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESC17	100759	05/20/2011	05/19/2013
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	02/15/2011	02/14/2013
Spectrum Analyzer	R&S	FSV-30	101398	10/18/2011	10/17/2013
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/10/2012	01/09/2014
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2011	05/18/2013
Horn Antenna	Schwarzbeck	BBHA9170	185	07/11/2011	07/10/2013
RF amplifier	Miteq	AMF-6F-2600 400-40-8P	971576	12/28/2011	12/27/2012
Pre-Amplifier	Agilent	8447D	2944A07676	01/04/2012	01/03/2013
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/04/2012	01/03/2013
5150-5350 Band Reject Filter	Micro-Tronics	BRM50703	1	01/04/2012	01/03/2013
5470-5725 Band Reject Filter	Micro-Tronics	BRM50704	1	01/04/2012	01/03/2013
5725-5875 Band Reject Filter	Micro-Tronics	BRM50705	1	01/04/2012	01/03/2013
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	02/28/2012	02/27/2013
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	02/28/2012	02/27/2013
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2012	02/27/2013
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_Rx	9	01/04/2012	01/03/2013
3m Site NSA	SGS	966 chamber	N/A	07/15/2012	07/14/2013

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## 12.6 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

## 12.7 Measurement Result

Refer to attach tabular data sheets.

### NOTE:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

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**Radiated Spurious Emission Measurement Result 802.11a, 5150~5250 MHz (Internal Antenna)**

Operation Band	:802.11a	Test Date	:2012-11-02
Fundamental Frequency	:5180 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
34.85	S	Peak	46.76	-14.14	32.62	40.00	-7.38
70.74	S	Peak	48.86	-16.55	32.31	40.00	-7.69
276.38	S	Peak	41.01	-13.16	27.85	46.00	-18.15
632.37	S	Peak	31.54	-6.90	24.64	46.00	-21.36
763.32	S	Peak	31.33	-4.74	26.59	46.00	-19.41
962.17	S	Peak	29.61	-2.05	27.56	54.00	-26.44
10360.00	H	Average	18.87	15.14	34.01	54.00	-19.99
10360.00	H	Peak	23.56	15.14	38.70	74.00	-35.30
15540.00	H	---					
20720.00	H	---					
25900.00	H	---					
31080.00	H	---					
36260.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5180 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
139.61	S	Peak	39.81	-13.13	26.68	43.50	-16.82
184.23	S	Peak	48.28	-15.00	33.28	43.50	-10.22
273.47	S	Peak	47.95	-13.25	34.70	46.00	-11.30
577.08	S	Peak	39.10	-8.05	31.05	46.00	-14.95
796.30	S	Peak	35.09	-4.24	30.85	46.00	-15.15
962.17	S	Peak	31.70	-2.05	29.65	54.00	-24.35
10360.00	H	Average	18.53	15.17	33.70	54.00	-20.30
10360.00	H	Peak	23.95	15.17	39.12	74.00	-34.88
15540.00	H	---					
20720.00	H	---					
25900.00	H	---					
31080.00	H	---					
36260.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5220 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	48.49	-13.85	34.64	40.00	-5.36
72.68	S	Peak	49.62	-16.83	32.79	40.00	-7.21
273.47	S	Peak	43.36	-13.25	30.11	46.00	-15.89
432.55	S	Peak	34.05	-10.37	23.68	46.00	-22.32
577.08	S	Peak	37.41	-8.05	29.36	46.00	-16.64
966.05	S	Peak	32.81	-2.03	30.78	54.00	-23.22
10440.00	H	Average	21.28	14.92	36.20	54.00	-17.80
10440.00	H	Peak	22.94	14.92	37.86	74.00	-36.14
15660.00	H	---					
20880.00	H	---					
26100.00	H	---					
31320.00	H	---					
36540.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5220 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
134.76	S	Peak	39.11	-13.50	25.61	43.50	-17.89
182.29	S	Peak	48.64	-14.78	33.86	43.50	-9.64
272.50	S	Peak	47.29	-13.28	34.01	46.00	-11.99
577.08	S	Peak	38.65	-8.05	30.60	46.00	-15.40
766.23	S	Peak	36.18	-4.69	31.49	46.00	-14.51
962.17	S	Peak	31.59	-2.05	29.54	54.00	-24.46
10440.00	H	Peak	26.86	15.00	41.86	74.00	-32.14
15660.00	H	---					
20880.00	H	---					
26100.00	H	---					
31320.00	H	---					
36540.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5240 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	47.66	-13.85	33.81	40.00	-6.19
152.22	S	Peak	44.74	-12.32	32.42	43.50	-11.08
191.99	S	Peak	47.26	-15.76	31.50	43.50	-12.00
366.59	S	Peak	37.99	-11.48	26.51	46.00	-19.49
577.08	S	Peak	37.13	-8.05	29.08	46.00	-16.92
996.12	S	Peak	31.22	-1.87	29.35	54.00	-24.65
10480.00	H	Average	21.54	14.83	36.37	54.00	-17.63
10480.00	H	Peak	25.10	14.83	39.93	74.00	-34.07
15720.00	H	---					
20960.00	H	---					
26200.00	H	---					
31440.00	H	---					
36680.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5240 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
185.20	S	Peak	48.04	-15.10	32.94	43.50	-10.56
273.47	S	Peak	47.34	-13.25	34.09	46.00	-11.91
364.65	S	Peak	42.85	-11.50	31.35	46.00	-14.65
633.34	S	Peak	35.40	-6.89	28.51	46.00	-17.49
763.32	S	Peak	35.26	-4.74	30.52	46.00	-15.48
966.05	S	Peak	31.68	-2.03	29.65	54.00	-24.35
10480.00	H	Average	21.12	14.92	36.04	54.00	-17.96
10480.00	H	Peak	27.76	14.92	42.68	74.00	-31.32
15720.00	H	---					
20960.00	H	---					
26200.00	H	---					
31440.00	H	---					
36680.00	H	---					

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Operation Band	:082.11a	Test Date	:2012-10-27
Fundamental Frequency	:5260 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	47.54	-13.85	33.69	40.00	-6.31
153.19	S	Peak	44.81	-12.32	32.49	43.50	-11.01
270.56	S	Peak	43.73	-13.34	30.39	46.00	-15.61
366.59	S	Peak	38.37	-11.48	26.89	46.00	-19.11
799.21	S	Peak	34.44	-4.21	30.23	46.00	-15.77
995.15	S	Peak	30.84	-1.87	28.97	54.00	-25.03
10520.00	H	Average	23.94	14.69	38.63	54.00	-15.37
10520.00	H	Peak	27.07	14.69	41.76	74.00	-32.24
15780.00	H	---					
21040.00	H	---					
26300.00	H	---					
31560.00	H	---					
36820.00	H	---					

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Operation Band	:082.11a	Test Date	:2012-10-27
Fundamental Frequency	:5260 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
183.26	S	Peak	48.71	-14.89	33.82	43.50	-9.68
272.50	S	Peak	47.43	-13.28	34.15	46.00	-11.85
366.59	S	Peak	43.44	-11.48	31.96	46.00	-14.04
633.34	S	Peak	35.44	-6.89	28.55	46.00	-17.45
797.27	S	Peak	35.08	-4.24	30.84	46.00	-15.16
934.04	S	Peak	34.05	-2.25	31.80	46.00	-14.20
10520.00	H	Average	22.50	14.78	37.28	54.00	-16.72
10520.00	H	Peak	27.55	14.78	42.33	74.00	-31.67
15780.00	H	---					
21040.00	H	---					
26300.00	H	---					
31560.00	H	---					
36820.00	H	---					

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Operation Band	:082.11a	Test Date	:2012-10-27
Fundamental Frequency	:5300 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	48.16	-13.85	34.31	40.00	-5.69
72.68	S	Peak	49.62	-16.83	32.79	40.00	-7.21
151.25	S	Peak	44.71	-12.34	32.37	43.50	-11.13
271.53	S	Peak	44.22	-13.32	30.90	46.00	-15.10
672.14	S	Peak	35.02	-6.16	28.86	46.00	-17.14
995.15	S	Peak	31.65	-1.87	29.78	54.00	-24.22
10600.00	H	Average	24.49	15.33	39.82	54.00	-14.18
10600.00	H	Peak	30.43	15.33	45.76	74.00	-28.24
15900.00	H	---					
21200.00	H	---					
26500.00	H	---					
31800.00	H	---					
37100.00	H	---					

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Operation Band	:082.11a	Test Date	:2012-10-27
Fundamental Frequency	:5300 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
184.23	S	Peak	48.28	-15.00	33.28	43.50	-10.22
274.44	S	Peak	47.39	-13.21	34.18	46.00	-11.82
366.59	S	Peak	43.24	-11.48	31.76	46.00	-14.24
577.08	S	Peak	39.32	-8.05	31.27	46.00	-14.73
766.23	S	Peak	36.01	-4.69	31.32	46.00	-14.68
934.04	S	Peak	34.39	-2.25	32.14	46.00	-13.86
10600.00	H	Average	22.56	15.35	37.91	54.00	-16.09
10600.00	H	Peak	29.40	15.35	44.75	74.00	-29.25
15900.00	H	---					
21200.00	H	---					
26500.00	H	---					
31800.00	H	---					
37100.00	H	---					

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Operation Band	:082.11a	Test Date	:2012-10-27
Fundamental Frequency	:5320 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	47.75	-13.85	33.90	40.00	-6.10
72.68	S	Peak	49.35	-16.83	32.52	40.00	-7.48
152.22	S	Peak	45.40	-12.32	33.08	43.50	-10.42
271.53	S	Peak	43.90	-13.32	30.58	46.00	-15.42
577.08	S	Peak	37.49	-8.05	29.44	46.00	-16.56
966.05	S	Peak	31.12	-2.03	29.09	54.00	-24.91
10640.00	H	Average	23.52	15.72	39.24	54.00	-14.76
10640.00	H	Peak	27.57	15.72	43.29	74.00	-30.71
15960.00	H	---					
21280.00	H	---					
26600.00	H	---					
31920.00	H	---					
37240.00	H	---					

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Operation Band	:082.11a	Test Date	:2012-10-27
Fundamental Frequency	:5320 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
183.26	S	Peak	47.80	-14.89	32.91	43.50	-10.59
272.50	S	Peak	47.28	-13.28	34.00	46.00	-12.00
366.59	S	Peak	43.47	-11.48	31.99	46.00	-14.01
577.08	S	Peak	38.95	-8.05	30.90	46.00	-15.10
696.39	S	Peak	36.23	-5.79	30.44	46.00	-15.56
934.04	S	Peak	33.62	-2.25	31.37	46.00	-14.63
10640.00	H	Average	22.62	15.71	38.33	54.00	-15.67
10640.00	H	Peak	27.47	15.71	43.18	74.00	-30.82
15960.00	H	---					
21280.00	H	---					
26600.00	H	---					
31920.00	H	---					
37240.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5500 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	48.21	-13.85	34.36	40.00	-5.64
153.19	S	Peak	44.64	-12.32	32.32	43.50	-11.18
273.47	S	Peak	43.66	-13.25	30.41	46.00	-15.59
577.08	S	Peak	37.33	-8.05	29.28	46.00	-16.72
696.39	S	Peak	34.13	-5.79	28.34	46.00	-17.66
995.15	S	Peak	32.05	-1.87	30.18	54.00	-23.82
11000.00	H	Average	18.71	16.54	35.25	54.00	-18.75
11000.00	H	Peak	23.27	16.54	39.81	74.00	-34.19
16500.00	H	---					
22000.00	H	---					
27500.00	H	---					
33000.00	H	---					
38500.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5500 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
138.64	S	Peak	38.68	-13.20	25.48	43.50	-18.02
185.20	S	Peak	48.24	-15.10	33.14	43.50	-10.36
274.44	S	Peak	47.19	-13.21	33.98	46.00	-12.02
633.34	S	Peak	36.19	-6.89	29.30	46.00	-16.70
799.21	S	Peak	38.34	-4.21	34.13	46.00	-11.87
934.04	S	Peak	31.46	-2.25	29.21	46.00	-16.79
11000.00	H	Average	18.23	16.44	34.67	54.00	-19.33
11000.00	H	Peak	24.06	16.44	40.50	74.00	-33.50
16500.00	H	---					
22000.00	H	---					
27500.00	H	---					
33000.00	H	---					
38500.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5580 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	46.96	-13.85	33.11	40.00	-6.89
151.25	S	Peak	44.07	-12.34	31.73	43.50	-11.77
270.56	S	Peak	43.55	-13.34	30.21	46.00	-15.79
564.47	S	Peak	35.96	-8.28	27.68	46.00	-18.32
800.18	S	Peak	33.39	-4.19	29.20	46.00	-16.80
995.15	S	Peak	30.88	-1.87	29.01	54.00	-24.99
11160.00	H	Peak	20.04	16.93	36.97	74.00	-37.03
16740.00	H	---					
22320.00	H	---					
27900.00	H	---					
33480.00	H	---					
39060.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5580 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
183.26	S	Peak	48.99	-14.89	34.10	43.50	-9.40
272.50	S	Peak	47.14	-13.28	33.86	46.00	-12.14
552.83	S	Peak	36.84	-8.53	28.31	46.00	-17.69
633.34	S	Peak	37.18	-6.89	30.29	46.00	-15.71
796.30	S	Peak	35.00	-4.24	30.76	46.00	-15.24
934.04	S	Peak	34.00	-2.25	31.75	46.00	-14.25
11160.00	H	Peak	17.55	16.70	34.25	74.00	-39.75
16740.00	H	---					
22320.00	H	---					
27900.00	H	---					
33480.00	H	---					
39060.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5700 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB $\mu$ V/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dB $\mu$ V	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB
47.46	S	Peak	47.12	-13.85	33.27	40.00	-6.73
71.71	S	Peak	48.80	-16.69	32.11	40.00	-7.89
153.19	S	Peak	44.50	-12.32	32.18	43.50	-11.32
273.47	S	Peak	43.70	-13.25	30.45	46.00	-15.55
699.30	S	Peak	33.48	-5.76	27.72	46.00	-18.28
995.15	S	Peak	32.85	-1.87	30.98	54.00	-23.02
11400.00	H	Peak	20.93	17.30	38.23	74.00	-35.77
17100.00	H	---					
22800.00	H	---					
28500.00	H	---					
34200.00	H	---					
39900.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-27
Fundamental Frequency	:5700 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Aken
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
185.20	S	Peak	48.00	-15.10	32.90	43.50	-10.60
272.50	S	Peak	47.14	-13.28	33.86	46.00	-12.14
577.08	S	Peak	38.23	-8.05	30.18	46.00	-15.82
798.24	S	Peak	35.94	-4.22	31.72	46.00	-14.28
934.04	S	Peak	32.51	-2.25	30.26	46.00	-15.74
966.05	S	Peak	31.62	-2.03	29.59	54.00	-24.41
11400.00	H	Peak	19.67	17.06	36.73	74.00	-37.27
17100.00	H	---					
22800.00	H	---					
28500.00	H	---					
34200.00	H	---					
39900.00	H	---					

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# Radiated Spurious Emission Measurement Result 802.11a, 5150~5250 MHz (External Antenna)

Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5180 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
46.49	S	Peak	48.67	-13.80	34.87	40.00	-5.13
191.99	S	Peak	47.88	-15.76	32.12	43.50	-11.38
271.53	S	Peak	44.08	-13.32	30.76	46.00	-15.24
566.41	S	Peak	37.05	-8.25	28.80	46.00	-17.20
699.30	S	Peak	33.59	-5.76	27.83	46.00	-18.17
995.15	S	Peak	32.05	-1.87	30.18	54.00	-23.82
10360.00	H	Average	20.34	15.14	35.48	54.00	-18.52
10360.00	H	Peak	23.73	15.14	38.87	74.00	-35.13
15540.00	H	---					
20720.00	H	---					
25900.00	H	---					
31080.00	H	---					
36260.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5180 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
185.20	S	Peak	48.28	-15.10	33.18	43.50	-10.32
273.47	S	Peak	47.53	-13.25	34.28	46.00	-11.72
366.59	S	Peak	43.33	-11.48	31.85	46.00	-14.15
577.08	S	Peak	38.58	-8.05	30.53	46.00	-15.47
800.18	S	Peak	37.45	-4.19	33.26	46.00	-12.74
962.17	S	Peak	33.09	-2.05	31.04	54.00	-22.96
10360.00	H	Average	19.05	15.17	34.22	54.00	-19.78
10360.00	H	Peak	25.96	15.17	41.13	74.00	-32.87
15540.00	H	---					
20720.00	H	---					
25900.00	H	---					
31080.00	H	---					
36260.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5220 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	48.76	-13.85	34.91	40.00	-5.09
156.10	S	Peak	44.84	-12.30	32.54	43.50	-10.96
272.50	S	Peak	43.58	-13.28	30.30	46.00	-15.70
366.59	S	Peak	38.16	-11.48	26.68	46.00	-19.32
699.30	S	Peak	34.42	-5.76	28.66	46.00	-17.34
995.15	S	Peak	31.48	-1.87	29.61	54.00	-24.39
10440.00	H	Average	19.32	14.92	34.24	54.00	-19.76
10440.00	H	Peak	25.50	14.92	40.42	74.00	-33.58
15660.00	H	---					
20880.00	H	---					
26100.00	H	---					
31320.00	H	---					
36540.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5220 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
184.23	S	Peak	48.50	-15.00	33.50	43.50	-10.00
273.47	S	Peak	47.38	-13.25	34.13	46.00	-11.87
366.59	S	Peak	43.48	-11.48	32.00	46.00	-14.00
633.34	S	Peak	35.71	-6.89	28.82	46.00	-17.18
766.23	S	Peak	34.98	-4.69	30.29	46.00	-15.71
962.17	S	Peak	31.50	-2.05	29.45	54.00	-24.55
10440.00	H	Average	18.98	15.00	33.98	54.00	-20.02
10440.00	H	Peak	23.35	15.00	38.35	74.00	-35.65
15660.00	H	---					
20880.00	H	---					
26100.00	H	---					
31320.00	H	---					
36540.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5240 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	48.60	-13.85	34.75	40.00	-5.25
191.99	S	Peak	48.66	-15.76	32.90	43.50	-10.60
271.53	S	Peak	43.78	-13.32	30.46	46.00	-15.54
566.41	S	Peak	36.48	-8.25	28.23	46.00	-17.77
763.32	S	Peak	33.42	-4.74	28.68	46.00	-17.32
995.15	S	Peak	31.41	-1.87	29.54	54.00	-24.46
10480.00	H	Average	19.96	14.83	34.79	54.00	-19.21
10480.00	H	Peak	25.22	14.83	40.05	74.00	-33.95
15720.00	H	---					
20960.00	H	---					
26200.00	H	---					
31440.00	H	---					
36680.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5240 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
182.29	S	Peak	47.83	-14.78	33.05	43.50	-10.45
273.47	S	Peak	47.49	-13.25	34.24	46.00	-11.76
364.65	S	Peak	43.22	-11.50	31.72	46.00	-14.28
577.08	S	Peak	38.72	-8.05	30.67	46.00	-15.33
800.18	S	Peak	36.64	-4.19	32.45	46.00	-13.55
934.04	S	Peak	32.62	-2.25	30.37	46.00	-15.63
10480.00	H	Average	19.10	14.92	34.02	54.00	-19.98
10480.00	H	Peak	24.63	14.92	39.55	74.00	-34.45
15720.00	H	---					
20960.00	H	---					
26200.00	H	---					
31440.00	H	---					
36680.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5260 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	47.30	-13.85	33.45	40.00	-6.55
152.22	S	Peak	44.65	-12.32	32.33	43.50	-11.17
272.50	S	Peak	43.79	-13.28	30.51	46.00	-15.49
552.83	S	Peak	36.68	-8.53	28.15	46.00	-17.85
763.32	S	Peak	33.27	-4.74	28.53	46.00	-17.47
966.05	S	Peak	32.07	-2.03	30.04	54.00	-23.96
10520.00	H	Peak	22.96	14.69	37.65	74.00	-36.35
15780.00	H	---					
21040.00	H	---					
26300.00	H	---					
31560.00	H	---					
36820.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5260 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
182.29	S	Peak	48.32	-14.78	33.54	43.50	-9.96
273.47	S	Peak	47.00	-13.25	33.75	46.00	-12.25
364.65	S	Peak	43.67	-11.50	32.17	46.00	-13.83
633.34	S	Peak	35.95	-6.89	29.06	46.00	-16.94
763.32	S	Peak	35.10	-4.74	30.36	46.00	-15.64
966.05	S	Peak	32.06	-2.03	30.03	54.00	-23.97
10520.00	H	Peak	21.83	14.78	36.61	74.00	-37.39
15780.00	H	---					
21040.00	H	---					
26300.00	H	---					
31560.00	H	---					
36820.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5300 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
46.49	S	Peak	46.03	-13.80	32.23	40.00	-7.77
153.19	S	Peak	44.46	-12.32	32.14	43.50	-11.36
271.53	S	Peak	43.60	-13.32	30.28	46.00	-15.72
564.47	S	Peak	37.66	-8.28	29.38	46.00	-16.62
797.27	S	Peak	32.96	-4.24	28.72	46.00	-17.28
966.05	S	Peak	31.92	-2.03	29.89	54.00	-24.11
10600.00	H	Peak	21.32	15.33	36.65	74.00	-37.35
15900.00	H	---					
21200.00	H	---					
26500.00	H	---					
31800.00	H	---					
37100.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5300 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
182.29	S	Peak	48.58	-14.78	33.80	43.50	-9.70
272.50	S	Peak	46.81	-13.28	33.53	46.00	-12.47
365.62	S	Peak	40.69	-11.49	29.20	46.00	-16.80
699.30	S	Peak	35.08	-5.76	29.32	46.00	-16.68
799.21	S	Peak	37.03	-4.21	32.82	46.00	-13.18
934.04	S	Peak	33.05	-2.25	30.80	46.00	-15.20
10600.00	H	Peak	21.76	15.35	37.11	74.00	-36.89
15900.00	H	---					
21200.00	H	---					
26500.00	H	---					
31800.00	H	---					
37100.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5320 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	48.59	-13.85	34.74	40.00	-5.26
157.07	S	Peak	44.38	-12.29	32.09	43.50	-11.41
271.53	S	Peak	43.93	-13.32	30.61	46.00	-15.39
366.59	S	Peak	38.18	-11.48	26.70	46.00	-19.30
798.24	S	Peak	35.12	-4.22	30.90	46.00	-15.10
966.05	S	Peak	32.61	-2.03	30.58	54.00	-23.42
10640.00	H	Average	16.15	15.72	31.87	54.00	-22.13
10640.00	H	Peak	21.24	15.72	36.96	74.00	-37.04
15960.00	H	---					
21280.00	H	---					
26600.00	H	---					
31920.00	H	---					
37240.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5320 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB $\mu$ V/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB $\mu$ V	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB
182.29	S	Peak	48.05	-14.78	33.27	43.50	-10.23
273.47	S	Peak	47.39	-13.25	34.14	46.00	-11.86
366.59	S	Peak	43.07	-11.48	31.59	46.00	-14.41
630.43	S	Peak	37.70	-6.92	30.78	46.00	-15.22
897.18	S	Peak	32.64	-2.87	29.77	46.00	-16.23
962.17	S	Peak	31.70	-2.05	29.65	54.00	-24.35
10640.00	H	Average	15.88	15.71	31.59	54.00	-22.41
10640.00	H	Peak	21.50	15.71	37.21	74.00	-36.79
15960.00	H	---					
21280.00	H	---					
26600.00	H	---					
31920.00	H	---					
37240.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5500 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB $\mu$ V/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dB $\mu$ V	dB	dB $\mu$ V/m	dB $\mu$ V/m	dB
47.46	S	Peak	47.05	-13.85	33.20	40.00	-6.80
153.19	S	Peak	44.64	-12.32	32.32	43.50	-11.18
270.56	S	Peak	43.23	-13.34	29.89	46.00	-16.11
564.47	S	Peak	36.24	-8.28	27.96	46.00	-18.04
766.23	S	Peak	32.70	-4.69	28.01	46.00	-17.99
995.15	S	Peak	30.99	-1.87	29.12	54.00	-24.88
11000.00	H	Peak	18.72	16.54	35.26	74.00	-38.74
16500.00	H	---					
22000.00	H	---					
27500.00	H	---					
33000.00	H	---					
38500.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5500 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX LOW	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
184.23	S	Peak	48.38	-15.00	33.38	43.50	-10.12
274.44	S	Peak	46.98	-13.21	33.77	46.00	-12.23
366.59	S	Peak	42.86	-11.48	31.38	46.00	-14.62
630.43	S	Peak	36.83	-6.92	29.91	46.00	-16.09
763.32	S	Peak	35.98	-4.74	31.24	46.00	-14.76
962.17	S	Peak	30.86	-2.05	28.81	54.00	-25.19
11000.00	H	Peak	18.28	16.44	34.72	74.00	-39.28
16500.00	H	---					
22000.00	H	---					
27500.00	H	---					
33000.00	H	---					
38500.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5580 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	46.96	-13.85	33.11	40.00	-6.89
191.99	S	Peak	47.67	-15.76	31.91	43.50	-11.59
273.47	S	Peak	42.53	-13.25	29.28	46.00	-16.72
366.59	S	Peak	38.04	-11.48	26.56	46.00	-19.44
577.08	S	Peak	37.36	-8.05	29.31	46.00	-16.69
966.05	S	Peak	31.44	-2.03	29.41	54.00	-24.59
11160.00	H	Peak	18.16	16.93	35.09	74.00	-38.91
16740.00	H	---					
22320.00	H	---					
27900.00	H	---					
33480.00	H	---					
39060.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5580 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX MID	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
183.26	S	Peak	47.68	-14.89	32.79	43.50	-10.71
274.44	S	Peak	46.68	-13.21	33.47	46.00	-12.53
366.59	S	Peak	43.01	-11.48	31.53	46.00	-14.47
577.08	S	Peak	38.88	-8.05	30.83	46.00	-15.17
897.18	S	Peak	33.19	-2.87	30.32	46.00	-15.68
962.17	S	Peak	31.73	-2.05	29.68	54.00	-24.32
11160.00	H	Peak	17.80	16.70	34.50	74.00	-39.50
16740.00	H	---					
22320.00	H	---					
27900.00	H	---					
33480.00	H	---					
39060.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5700 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	46.95	-13.85	33.10	40.00	-6.90
153.19	S	Peak	44.37	-12.32	32.05	43.50	-11.45
271.53	S	Peak	42.86	-13.32	29.54	46.00	-16.46
366.59	S	Peak	38.39	-11.48	26.91	46.00	-19.09
577.08	S	Peak	37.64	-8.05	29.59	46.00	-16.41
995.15	S	Peak	32.31	-1.87	30.44	54.00	-23.56
11400.00	H	Peak	18.51	17.30	35.81	74.00	-38.19
17100.00	H	---					
22800.00	H	---					
28500.00	H	---					
34200.00	H	---					
39900.00	H	---					

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Operation Band	:802.11a	Test Date	:2012-10-26
Fundamental Frequency	:5700 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX HIGH	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
184.23	S	Peak	48.99	-15.00	33.99	43.50	-9.51
273.47	S	Peak	46.67	-13.25	33.42	46.00	-12.58
366.59	S	Peak	43.49	-11.48	32.01	46.00	-13.99
577.08	S	Peak	38.68	-8.05	30.63	46.00	-15.37
763.32	S	Peak	35.06	-4.74	30.32	46.00	-15.68
962.17	S	Peak	30.56	-2.05	28.51	54.00	-25.49
11400.00	H	Peak	18.44	17.06	35.50	74.00	-38.50
17100.00	H	---					
22800.00	H	---					
28500.00	H	---					
34200.00	H	---					
39900.00	H	---					

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**Radiated Emission (Internal Antenna):**

Operation Band	:802.11a	Test Date	:2012-11-09
Fundamental Frequency	:5180 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Average	42.67	7.37	50.04	54.00	-3.96
5150.00	E	Peak	54.66	7.37	62.03	74.00	-11.97

Operation Band	:802.11a	Test Date	:2012-11-09
Fundamental Frequency	:5180 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Average	39.96	7.47	47.43	54.00	-6.57
5150.00	E	Peak	51.07	7.47	58.54	74.00	-15.46

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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Operation Band	:802.11a	Test Date	:2012-11-09
Fundamental Frequency	:5320 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Average	42.65	8.02	50.67	54.00	-3.33
5350.00	E	Peak	56.75	8.02	64.77	74.00	-9.23

Operation Band	:802.11a	Test Date	:2012-11-09
Fundamental Frequency	:5320 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Average	40.45	8.32	48.77	54.00	-5.23
5350.00	E	Peak	53.33	8.32	61.65	74.00	-12.35

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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### Radiated Emission (External Antenna):

Operation Band	:802.11a	Test Date	:2012-11-04
Fundamental Frequency	:5150 MHz	Temp./Humi.	:23.9deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Average	42.05	7.37	49.42	54.00	-4.58
5150.00	E	Peak	52.41	7.37	59.78	74.00	-14.22

Operation Band	:802.11a	Test Date	:2012-11-04
Fundamental Frequency	:5150 MHz	Temp./Humi.	:23.9deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5150.00	E	Average	39.34	7.47	46.81	54.00	-7.19
5150.00	E	Peak	52.03	7.47	59.50	74.00	-14.50

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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Operation Band	:802.11a	Test Date	:2012-11-04
Fundamental Frequency	:5350 MHz	Temp./Humi.	:23.9deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Average	42.62	8.02	50.64	54.00	-3.36
5350.00	E	Peak	52.39	8.02	60.41	74.00	-13.59

Operation Band	:802.11a	Test Date	:2012-11-04
Fundamental Frequency	:5350 MHz	Temp./Humi.	:23.9deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5350.00	E	Average	39.98	8.32	48.30	54.00	-5.70
5350.00	E	Peak	50.32	8.32	58.64	74.00	-15.36

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

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### Radiated Emission (Internal Antenna):

Operation Band	:802.11a	Test Date	:2012-11-09
Fundamental Frequency	:5500 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5460.00	E	Average	42.34	7.77	50.11	54.00	-3.89
5460.00	E	Peak	53.71	7.77	61.48	74.00	-12.52

Operation Band	:802.11a	Test Date	:2012-11-09
Fundamental Frequency	:5500 MHz	Temp./Humi.	:25.1deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5460.00	E	Average	40.23	8.07	48.30	54.00	-5.70
5460.00	E	Peak	52.60	8.07	60.67	74.00	-13.33

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

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### Radiated Emission (External Antenna):

Operation Band	:802.11a	Test Date	:2012-11-06
Fundamental Frequency	:5500 MHz	Temp./Humi.	:23.9deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5460.00	E	Average	41.64	7.77	49.41	54.00	-4.59
5460.00	E	Peak	51.85	7.77	59.62	74.00	-14.38

Operation Band	:802.11a	Test Date	:2012-11-04
Fundamental Frequency	:5500 MHz	Temp./Humi.	:23.9deg_C/64RH
Operation Mode	:TX BANDEDGE	Engineer	:Allen
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
5460.00	E	Average	39.96	8.07	48.03	54.00	-5.97
5460.00	E	Peak	50.40	8.07	58.47	74.00	-15.53

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---” : denotes Noise Floor.

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## 13. TRANSMISSION IN THE ABSENCE OF DATA

### 13.1 Standard Applicable

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

According to RSS-210 A9.4(4)

The device shall automatically discontinue transmission in case of absence of information to transmit, or operational failure. A description on how this is done shall accompany the application for equipment certification. Note that this is not intended to prohibit transmission of control or signalling information or the use of repetitive codes where required by the technology.

### 13.2 Result:

No non-compliance noted:

Refer to the theory of operation.

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## 14. FREQUENCY STABILITY

### 14.1 Standard Applicable

According to §15.407 (g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

According to A9.5

(5) The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.

### 14.2 Result:

No non-compliance noted:

±20ppm ppm was defined in product specification.

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## 15. ANTENNA REQUIREMENT

### 15.1 Standard Applicable

According to §15.203, Antenna requirement.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

### 15.2 Antenna Connected Construction

The directional gains of antenna used for transmitting are 3.92dBi (5.2GHz) and 4.97dBi (5.5GHz), and the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

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## 16. TPC and DFS MEASUREMENT

### 16.1 TPC: Standard Applicable

According to §15.407(h)(1), Transmit power control (TPC). 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.

According to RSS 210 A9.2 (3), The maximum conducted output power shall not exceed 250mW or  $11 + 10 \log_{10} B$ , dBm, whichever power is less. The power spectral density shall not exceed 11dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz. Note that devices with a maximum e.i.r.p. greater than 500mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

**16.1.1. Result:** N/A, The output power is less than 500mW.

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## 16.2 DFS: Standard Applicable

According to §15.407(h)(2), Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection.

According to RSS 210 A9.3), Note: For the band 5600-5650 MHz, no operation is permitted. Until further notice, devices subject to this annex shall not be capable of transmitting in the band 5600-5650 MHz. This restriction is for the protection of Environment Canada weather radars operating in this band.

Devices operating in the bands 5250-5350 MHz, 5470-5600 MHz and 5650-5725 MHz band shall comply with the following:

(a) Devices shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems (see Note below). The minimum DFS radar signal detection threshold is -62dBm for devices with a maximum e.i.r.p. less than 200mW, and -64dBm for devices with a maximum e.i.r.p. of 200mW to 1 W. The detection threshold power is the received power, averaged over a 1-microsecond reference to a 0dBi antenna. The DFS process shall provide a uniform spreading of the load over all the available channels.

Note: Test procedures for demonstrating compliance with the DFS radar detection requirements set out in this section are being evaluated by Industry Canada. As an interim measure, the Department will, until further notice, accept utilization of the DFS test procedures published by the U.S. Federal Communications Commission (FCC) 3 to demonstrate compliance with the requirements of this section.

(b) Operational requirements: the requirement for channel availability check time applies in the master operational mode. The requirement for channel move time applies in both the master and slave operational modes.

(i) In-service monitoring: an LE-LAN device should be able to monitor the operating channel to check that a co-channel radar has not moved or started operation within range of the LE-LAN device. During in-service monitoring, the LE-LAN radar detection function continuously searches for radar signals between normal LE-LAN transmissions.

(ii) Channel availability check time: the device shall check if there is a radar system already operating on the channel before it initiates a transmission on a channel and when it moves to a channel. The device may start using the channel if no radar signals with a power level greater than the interference threshold value specified in A9.3 (a) above is detected within 60 seconds.

(iii) Channel move time: after a radar's signal is detected, the device shall cease all transmissions on the operating channel within 10 seconds. Transmission during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. Intermittent management and control signals may also be sent during the remaining time to facilitate vacating the operating channel.

(iv) Channel closing time: the maximum channel closing time is 260 ms.

(v) Non-occupancy period: a channel that has been flagged as containing a radar signal, either by a channel availability check or in-service monitoring, is subject to a 30-minute non-occupancy period where the channel cannot be used by the LE-LAN device. The non-occupancy period starts from the time that the radar signal is detected.

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### 16.2.1. Limit:

**Table 1: Applicability of DFS requirements prior to use of a channel**

Requirement	Operational Mode		
	Master	Client(without radar detection)	Client(with radar detection)
Non-occupancy Period	Yes	Yes	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required

**Table 2: Applicability of DFS requirements during normal operation**

Requirement	Operational Mode		
	Master	Client(without radar detection)	Client(with radar detection)
Cannel Closing Transmission time	Yes	Yes	Yes
Channel Move time	Yes	Yes	Yes

**Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring**

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
<p>Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna</p> <p>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.</p>	

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**Table 4: DFS Response requirement values**

Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	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.

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**Table 5: Radar Test Waveforms**

**Short Pulse Radar**

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

**Long Pulse Radar**

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

**Frequency Hopping Radar**

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

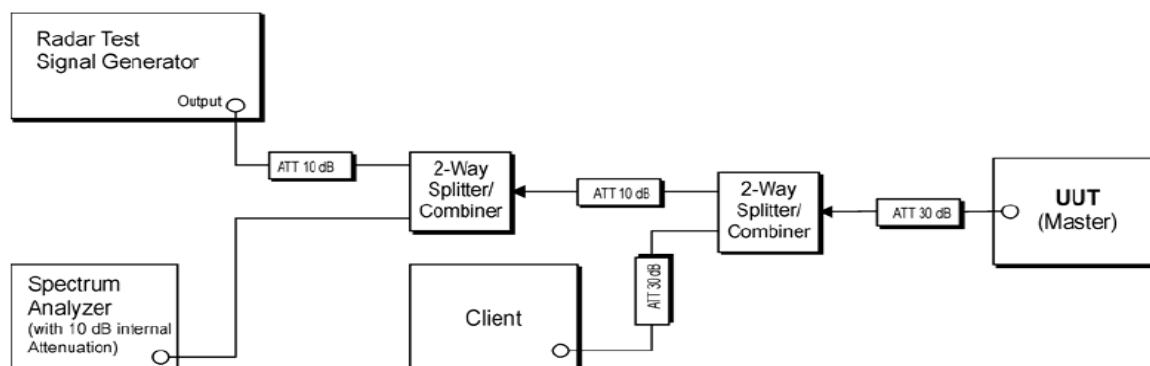
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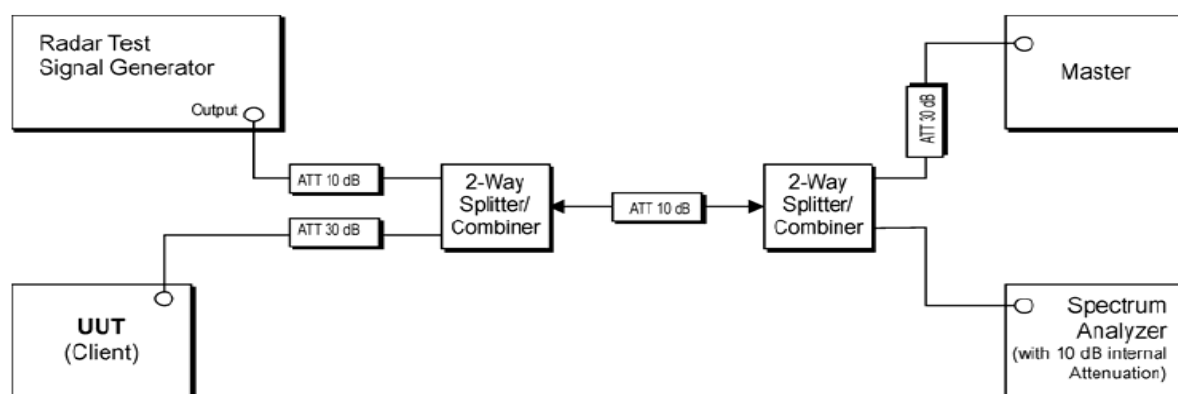
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## 16.2.2. Test Setup

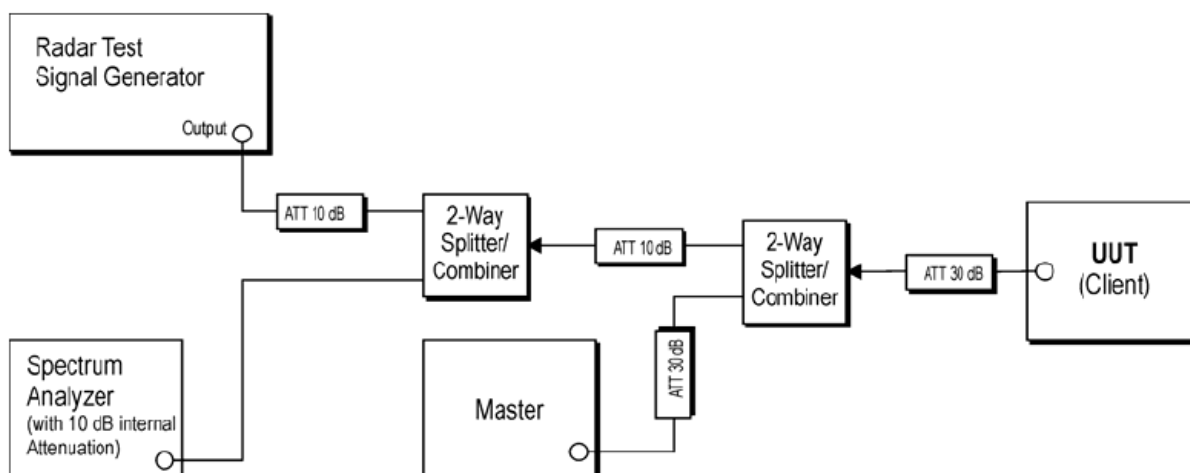
### Setup for Master with injection at the Master



### Setup for Client with injection at the Master



### Setup for Client with injection at the Client



## 16.2.3. Test Equipment Used:

Refer to section 7.3 for details.

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#### 16.2.4. Description of EUT:

EUT operates over the 5250-5350MHz and 5470-5725MHz ranges and EUT is a slave device (client equipment) w/o radar detection and DFS capability. EUT has a gain of 2.54dBi in the 5GHz Band.

The EUT utilizes the 802.11a architecture, with a nominal channel bandwidth of 20MHz  
WLAN traffic is generated by streaming the mpeg file from the master to slave in full monitor video mode using the media player.

The rated output power of the master unit is >23dBm(EIRP).therefore the required interference threshold level is -64dBm.after correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is  $-64+6=-58$ , and the master device as employed for the applicable DFS test is CISCO router whose FCC ID= LDK102061

#### 16.2.5. Test results

Refer to next page for the plots.

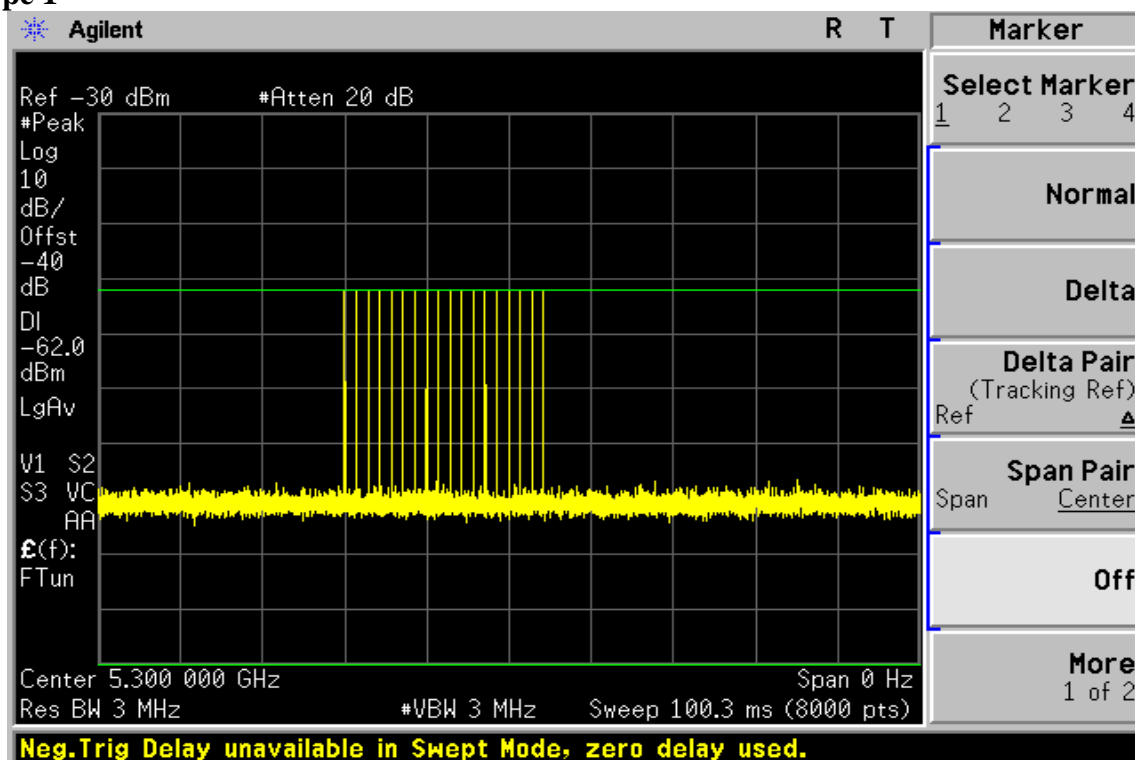
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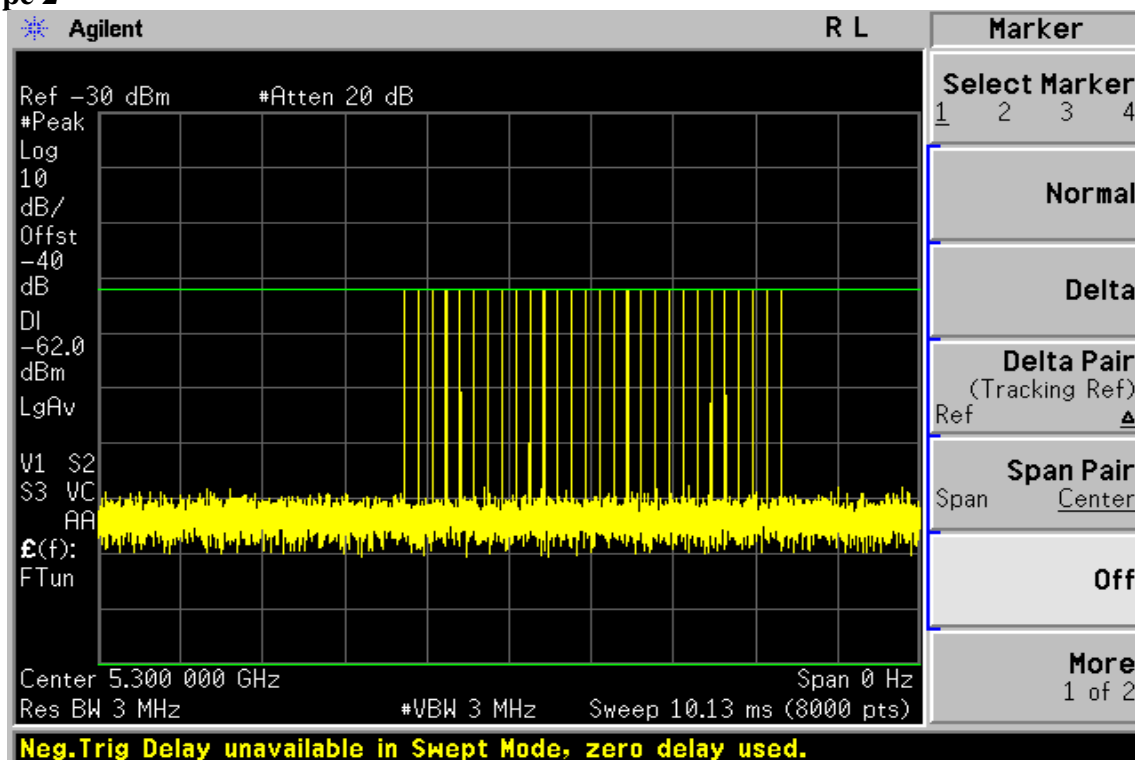
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## Calibration plots for each of the required radar waveforms

### Radar type 1



### Radar type 2

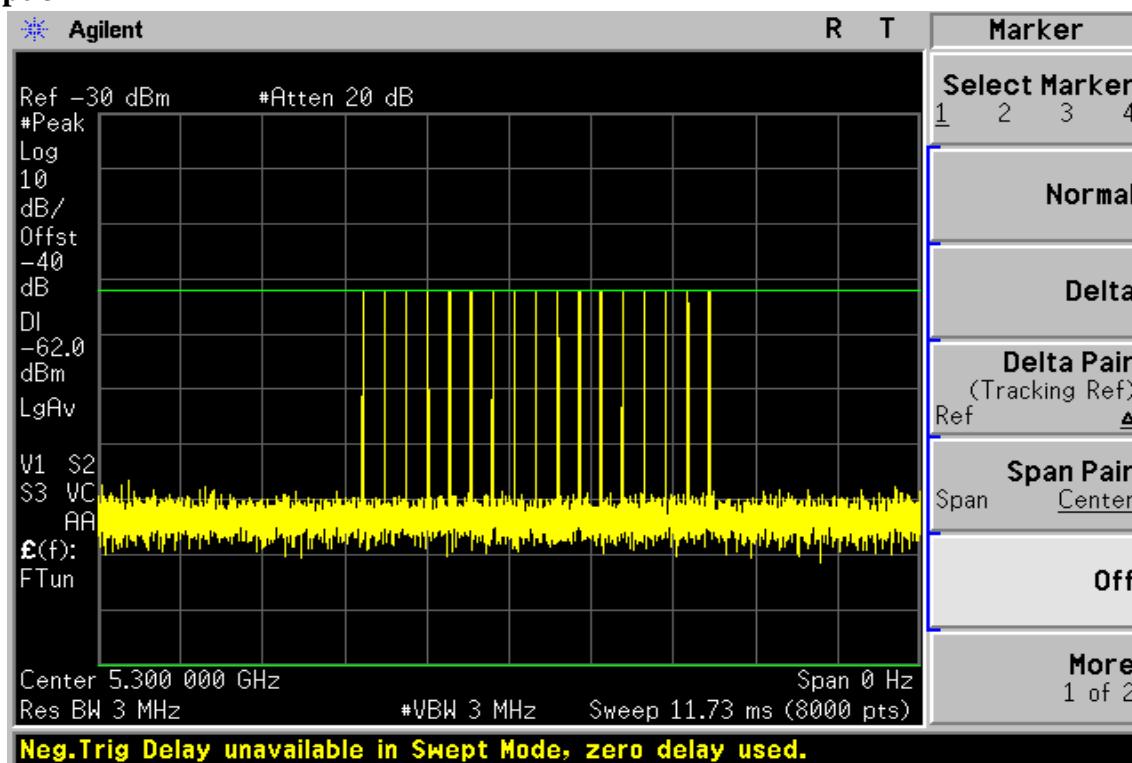


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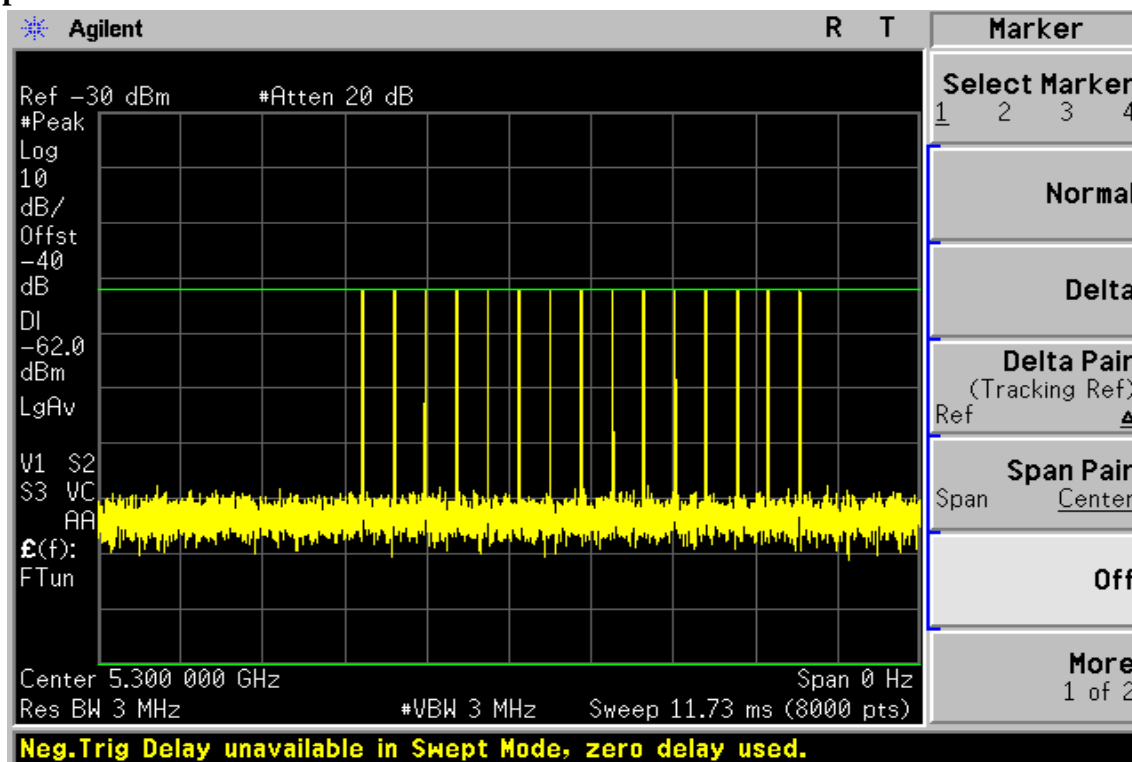
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## Radar type 3



## Radar type 4

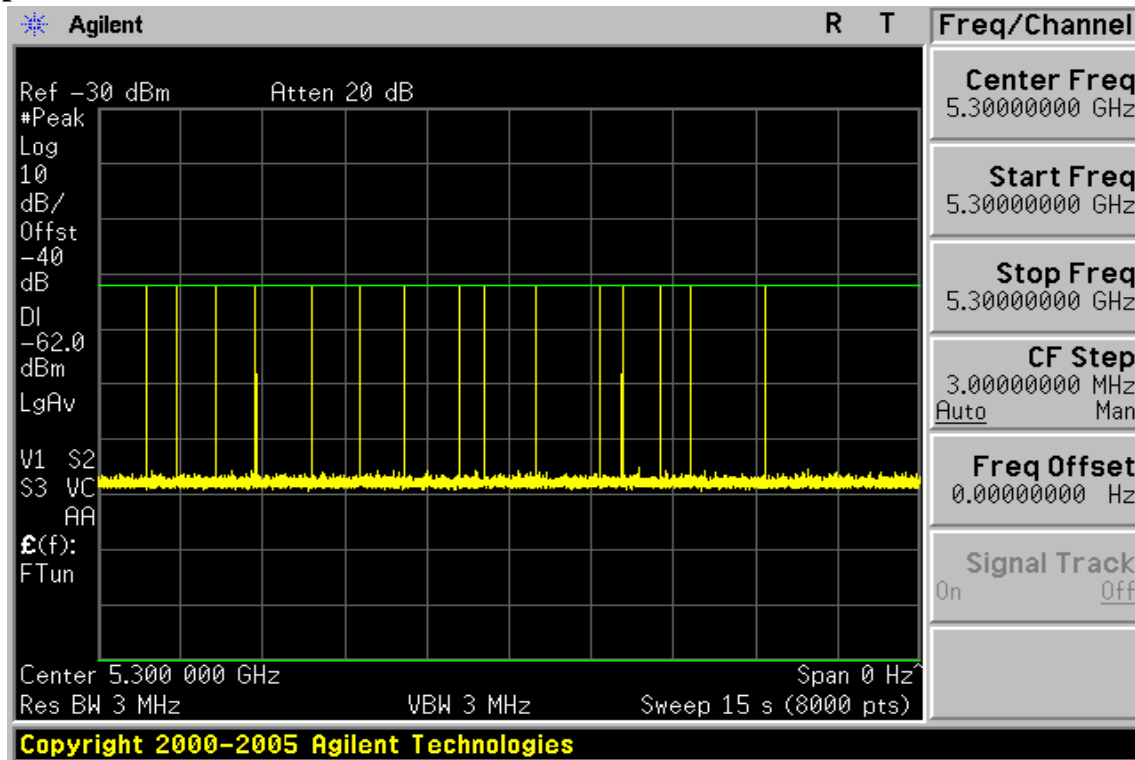


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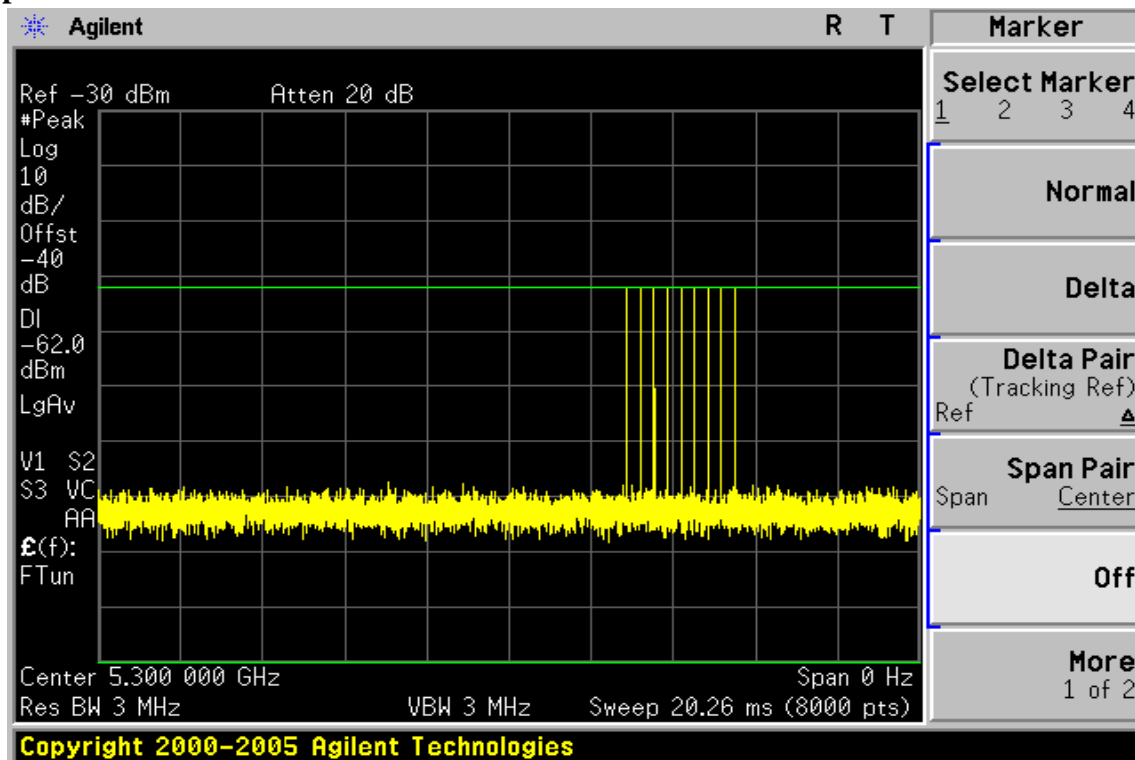
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## Radar type 5



## Radar type 6



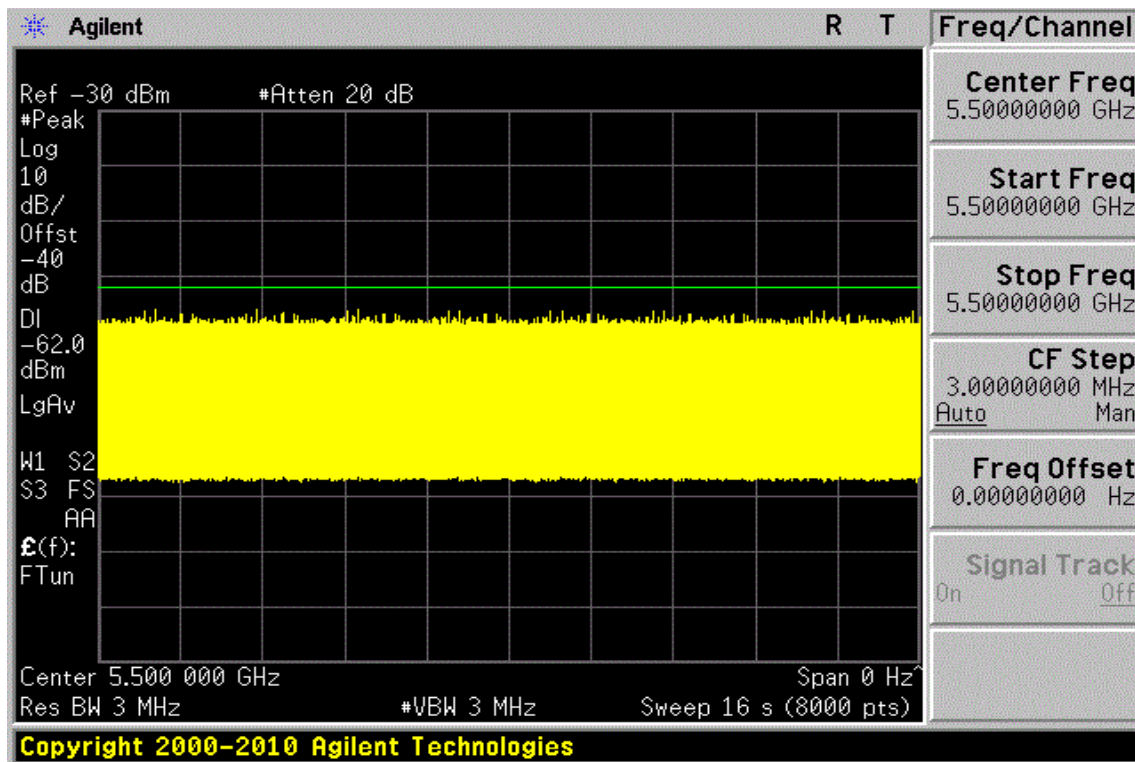
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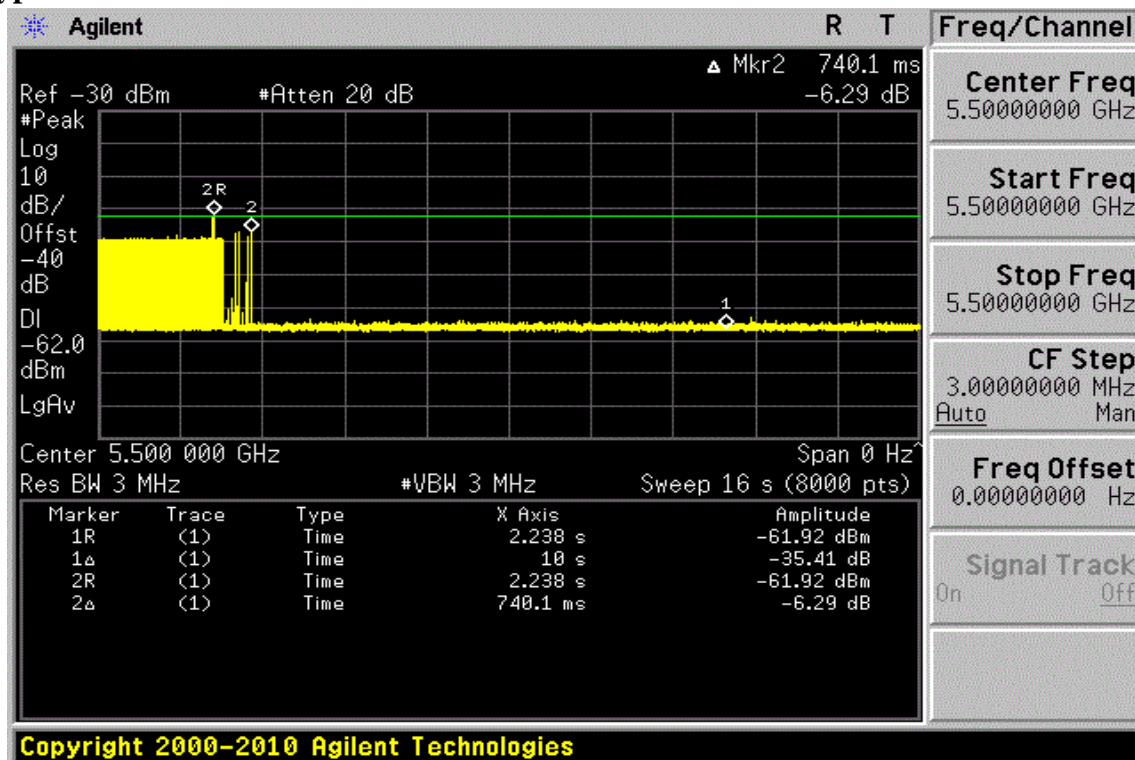
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## WLAN traffic



## Radar Type 1 Channel Move Time

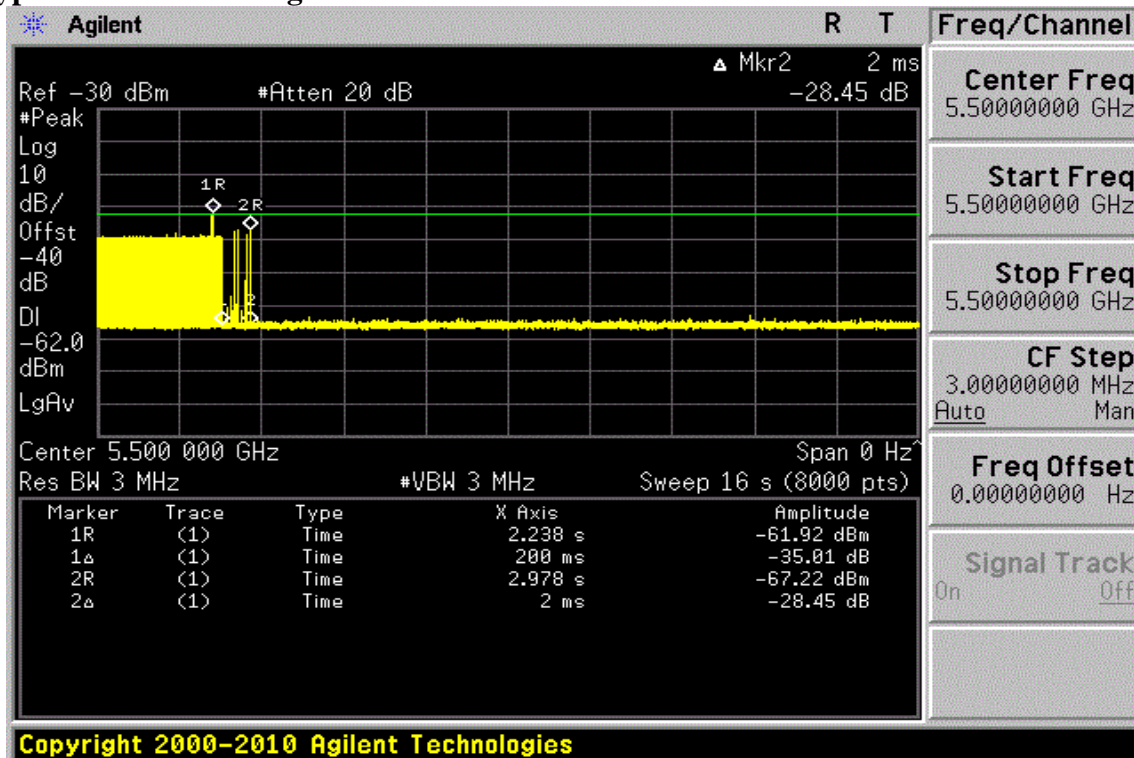


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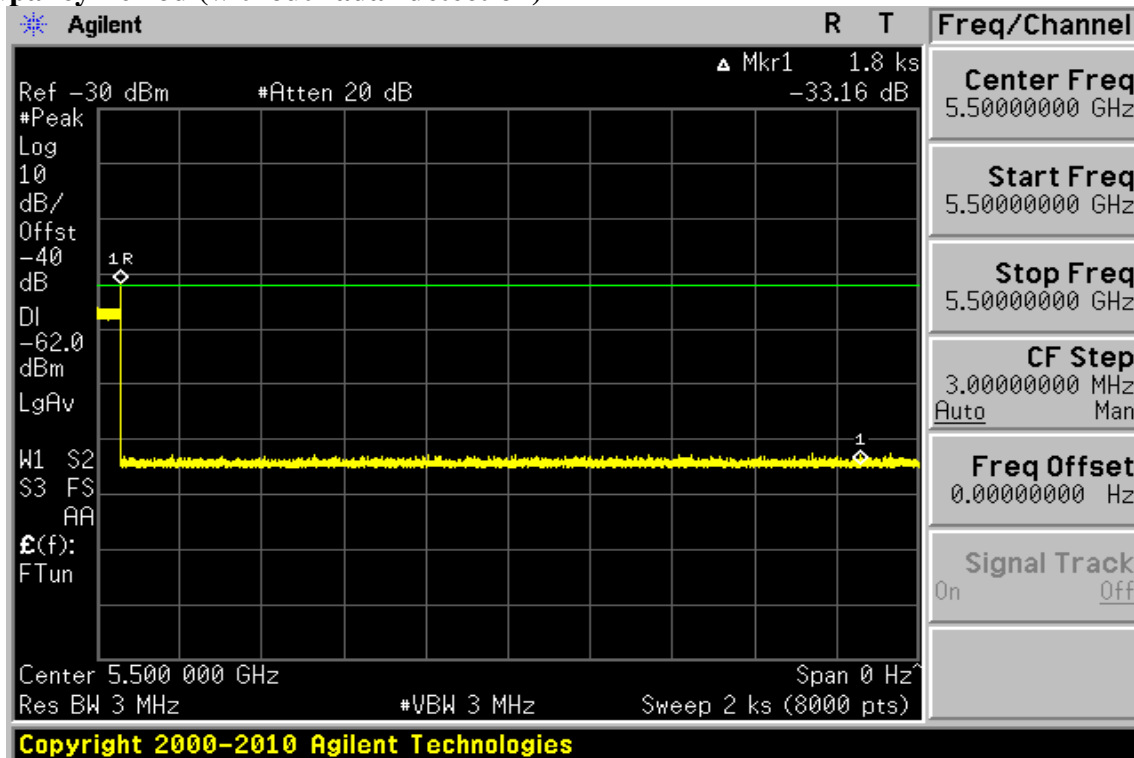
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## Radar Type 1 Channel Closing Transmission Time



2ms \* 4 = 8ms

## Non-occupancy Period (without radar detection)



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## 17. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 17.1 Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

\* = Plane-wave equipment power density

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**17.2 Maximum Permissible Exposure (MPE) Evaluation****802.11a 5150~5250****Power Table**

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5180.00	14.94	14.94	0.03119	1
5220.00	<b>15.06</b>	15.06	0.03206	1
5240.00	14.99	14.99	0.03155	1

**MPE Prediction (802.11a 5150~5250)**

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	15.06	(dBm)
Maximum peak output power at antenna input terminal:	32.06269325	(mW)
Duty cycle:	100	(%)
Maximum Pav :	32.06269325	(mW)
Antenna gain (typical):	3.92	(dBi)
Maximum antenna gain:	2.466039337	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5220	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.015738	(mW/cm <sup>2</sup> )

**Measurement Result**

The predicted power density level at 20 cm is 0.015738mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 5220MHz.

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**802.11a 5250~5350  
Power Table**

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5260.00	<b>15.27</b>	15.27	0.03365	1
5300.00	14.86	14.86	0.03062	1
5320.00	14.57	14.57	0.02864	1

**MPE Prediction (802.11a 5250~5350)**

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	<b>15.27</b>	(dBm)
Maximum peak output power at antenna input terminal:	33.65115694	(mW)
Duty cycle:	<b>100</b>	(%)
Maximum Pav :	33.65115694	(mW)
Antenna gain (typical):	<b>3.92</b>	(dBi)
Maximum antenna gain:	2.466039337	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	<b>5260</b>	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.016518	(mW/cm <sup>2</sup> )

**Measurement Result**

The predicted power density level at 20 cm is 0.016518mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 5260MHz.

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**802.11a 5470~5725****Power Table**

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5500.00	14.19	14.19	0.02624	1
5580.00	14.91	14.91	0.03097	1
5700.00	<b>15.08</b>	15.08	0.03221	1

**MPE Prediction (802.11a 5470~5725)**

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	15.08	(dBm)
Maximum peak output power at antenna input terminal:	32.21068791	(mW)
Duty cycle:	100	(%)
Maximum Pav :	32.21068791	(mW)
Antenna gain (typical):	4.97	(dBi)
Maximum antenna gain:	3.140508694	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5700	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.020135	(mW/cm <sup>2</sup> )

**Measurement Result**

The predicted power density level at 20 cm is 0.020135mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 5700MHz.

**- End of Report -**

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