

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**Product Name:** ClickShare  
**Brand Name:** Barco  
**Marketing Name:** ClickShare  
**Model No.:** R9861017  
**Model Difference:** N/A  
**FCC ID:** 2AAED-R9861017  
**Report No.:** E2/2014/80048  
**Issue Date:** Oct. 09, 2014  
**FCC Rule Part:** §15.247, Cat: DTS  
**Prepared for:** Barco NV  
President Kennedypark 35 8500 Kortrijk Belgium  
SGS Taiwan Ltd.  
Electronics & Communication Laboratory  
**Prepared by:** No.134, Wu Kung Road, New Taipei Industrial  
Park, Wuku District, New Taipei City, Taiwan  
24803



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## VERIFICATION OF COMPLIANCE

**Applicant:** Barco NV  
President Kennedypark 35 8500 Kortrijk Belgium

**Product Name:** ClickShare

**Brand Name:** Barco

**Marketing Name:** ClickShare

**Model No.:** R9861017

**Model Difference:** N/A

**FCC ID:** 2AAED-R9861017

**File Number:** E2/2014/80048

**Date of test:** Aug. 21, 2014 ~ Oct. 02, 2014

**Date of EUT Received:** Aug. 21, 2014

## 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. 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 15.247.

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

Test By:

Curry Chen

Date

Oct. 09, 2014

Curry Chen / Engineer

Prepared By:

Violetta Tang

Date

Oct. 09, 2014

Violetta Tang / Clerk

Approved By:

Jim Chang

Date

Oct. 09, 2014

Jim Chang / Supervisor

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## Version

Version No.	Date	Description
00	Oct. 09, 2014	Initial creation of document

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## Table of Contents

<b>1</b>	<b>GENERAL INFORMATION.....</b>	<b>6</b>
1.1	Product description.....	6
1.2	Related Submittal(s) / Grant (s) .....	9
1.3	Test Methodology.....	9
1.4	Test Facility .....	9
1.5	Special Accessories .....	9
1.6	Equipment Modifications .....	9
<b>2</b>	<b>SYSTEM TEST CONFIGURATION.....</b>	<b>10</b>
2.1	EUT Configuration.....	10
2.2	EUT Exercise .....	10
2.3	Test Procedure .....	10
2.4	Configuration of Tested System .....	11
<b>3</b>	<b>SUMMARY OF TEST RESULTS.....</b>	<b>12</b>
<b>4</b>	<b>DESCRIPTION OF TEST MODES.....</b>	<b>13</b>
<b>5</b>	<b>MEASUREMENT UNCERTAINTY .....</b>	<b>14</b>
<b>6</b>	<b>CONDUCTED EMISSION TEST .....</b>	<b>15</b>
6.1	Standard Applicable: .....	15
6.2	Measurement Equipment Used: .....	15
6.3	EUT Setup:.....	15
6.4	Test SET-UP (Block Diagram of Configuration) .....	16
6.5	Measurement Procedure:.....	16
6.6	Measurement Result:.....	16
<b>7</b>	<b>PEAK OUTPUT POWER MEASUREMENT .....</b>	<b>19</b>
7.1	Standard Applicable: .....	19
7.2	Measurement Equipment Used: .....	20
7.3	Test Set-up:.....	20
7.4	Measurement Procedure:.....	21
7.5	Measurement Result:.....	25
<b>8</b>	<b>6dB BANDWIDTH.....</b>	<b>28</b>
8.1	Standard Applicable: .....	28
8.2	Measurement Equipment Used: .....	28
8.3	Test Set-up:.....	29
8.4	Measurement Procedure:.....	29
8.5	Measurement Result:.....	30

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<b>9</b>	<b>BAND EDGES MEASUREMENT .....</b>	<b>37</b>
9.1	Standard Applicable: .....	37
9.2	Measurement Equipment Used: .....	37
9.3	Test SET-UP: .....	39
9.4	Measurement Procedure: .....	40
9.5	Field Strength Calculation: .....	41
9.6	Measurement Result: .....	41
<b>10</b>	<b>SPURIOUS EMISSION TEST.....</b>	<b>54</b>
10.1	Standard Applicable .....	54
10.2	Measurement Equipment Used: .....	54
10.3	Test SET-UP: .....	54
10.4	Measurement Procedure: .....	55
10.5	Field Strength Calculation.....	55
10.6	Measurement Result: .....	55
<b>11</b>	<b>PEAK POWER SPECTRAL DENSITY .....</b>	<b>92</b>
11.1	Standard Applicable: .....	92
11.2	Measurement Equipment Used: .....	92
11.3	Test Set-up: .....	92
11.4	Measurement Procedure (following the measurement procedure 10.2 of KDB558074): .....	92
11.5	Measurement Result: .....	93
<b>12</b>	<b>ANTENNA REQUIREMENT.....</b>	<b>100</b>
12.1	Standard Applicable: .....	100
12.2	Antenna Connected Construction: .....	100
<b>13</b>	<b>MAXIMUM PERMISSIBLE EXPOSURE (MPE).....</b>	<b>101</b>
13.1	Standard Applicable .....	101
13.2	Maximum Permissible Exposure (MPE) Evaluation .....	102

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## 1 GENERAL INFORMATION

### 1.1 Product description

General:

Product Name:	ClickShare	
Brand Name:	Barco	
Marketing Name:	ClickShare	
Model No.:	R9861017	
Model Difference:	N/A	
Hardware Version:	WM8750 v0.53	
Software Version:	N/A	
Power Supply:	5V from AC/DC Power Adapter	
	Adapter:	Model No.: 3A-154WP05, Supplier: N/A

WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Peak)	Modulation Technology
11b/g	2412-2462	11	b: 21.53dBm g: 23.78dBm	DSSS, OFDM
11n HT20	2412-2462	11	22.05dBm	OFDM
11n HT40	2422-2452	7	20.06dBm	OFDM
Antenna Designation:	Dipole Antenna, Peak Gain: 2.0dBi Model No.: AN2450-4828RS, Supplier: N/A			
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM			
Transition Rate:	802.11 b: 1/2/5.5/11 Mbps 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps 802.11 n_40MHz: 13.5 – 150Mbps			

The 2.4G max antenna gain is 2.0dBi which was choosing for Radiated Spurious Emission test.

The test report applies for WLAN 802.11 b/g/n function.

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# IEEE 802.11n Spec:

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(Mbps)			
									800nsGI		400nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5	7.200	15
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0	14.400	30
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5	21.700	45
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0	28.900	60
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0	43.300	90
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0	57.800	120
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5	65.000	135
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0	72.200	150

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bite per single carrier
NCBPS	Number of coded bite per symbol
NDBPS	Number of data bite per symbol
GI	Guard interval

# 802.11n\_HT20 MCS8 -15

MCS Index	Modulation	R	$N_{BPSCS}(i_{SS})$	$N_{SD}$	$N_{SP}$	$N_{CBPS}$	$N_{DBPS}$	Data rate (Mb/s)	
								800 ns GI	400 ns GI (see NOTE)
8	BPSK	1/2	1	52	4	104	52	13.0	14.4
9	QPSK	1/2	2	52	4	208	104	26.0	28.9
10	QPSK	3/4	2	52	4	208	156	39.0	43.3
11	16-QAM	1/2	4	52	4	416	208	52.0	57.8
12	16-QAM	3/4	4	52	4	416	312	78.0	86.7
13	64-QAM	2/3	6	52	4	624	416	104.0	115.6
14	64-QAM	3/4	6	52	4	624	468	117.0	130.0
15	64-QAM	5/6	6	52	4	624	520	130.0	144.4

NOTE—The 400 ns GI rate values are rounded to 1 decimal place.

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## 802.11n\_HT40 MCS8 -15

MCS Index	Modulation	$R$	$N_{BPSCS(i_{SS})}$	$N_{SD}$	$N_{SP}$	$N_{CBPS}$	$N_{DBPS}$	Data rate (Mb/s)	
								800 ns GI	400 ns GI
8	BPSK	1/2	1	108	6	216	108	27.0	30.0
9	QPSK	1/2	2	108	6	432	216	54.0	60.0
10	QPSK	3/4	2	108	6	432	324	81.0	90.0
11	16-QAM	1/2	4	108	6	864	432	108.0	120.0
12	16-QAM	3/4	4	108	6	864	648	162.0	180.0
13	64-QAM	2/3	6	108	6	1296	864	216.0	240.0
14	64-QAM	3/4	6	108	6	1296	972	243.0	270.0
15	64-QAM	5/6	6	108	6	1296	1080	270.0	300.0

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

This submittal(s) (test report) is intended for **FCC ID: 2AAED-R9861017** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with Subpart B is authorized under the certification procedure.

## 1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4:2009. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with Jun 2014 KDB558074 D01 v03r02 for compliance to FCC 47CFR 15.247 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: 990257. The address of SGS Taiwan Ltd. Electronics & Communication Laboratory 1F, No.134, Wukung Road New Taipei City TAIWAN 24803, Canada Registration Number: 4620A-5

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan Township, Taoyuan County, Taiwan which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. FCC Registration Number: 455997. The address of SGS Taiwan Ltd. Electronics & Communication Laboratory 1F, No.134, Wukung Road New Taipei City TAIWAN 24803, IC Registration Number: 4620A-6.

## 1.5 Special Accessories

There are no special accessories used while test was conducted.

## 1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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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

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

### 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 general criterion in Section 7.1 of ANSI C63.4:2009, conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz, and the measurement procedure 7.3 in ANSI C63.4:2009 is followed to carry out the test. The CISPR Quasi-Peak and Average detector mode is employed according to §15.107.

#### 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 of ANSI C63.4:2009 and RSS-Gen:2010.

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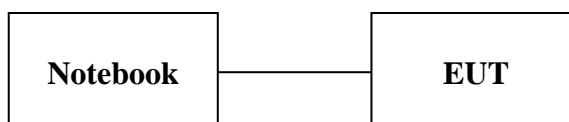
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## 2.4 Configuration of Tested System

**Fig. 2-1 Radiated Emission & AC Power Line Conducted Emission**



**Fig. 2-2 Conducted (Antenna Port) Configuration**



**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	ClickShare Base Unit	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L420	LR-7HXZA	shielding	Un-shielding

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### 3 SUMMARY OF TEST RESULTS

FCC	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.247(d)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.247(d)	Spurious Emission	Compliant
§15.247(e)	Peak Power Density	Compliant
§15.203	Antenna Requirement	Compliant
§2.1091	Maximum Permissible Exposure	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 and receiving mode is programmed.

802.11 b mode: Channel low (2412MHz), mid (2437MHz) and high (2462MHz) with 1Mbps lowest data rate are chosen for full testing.

802.11 g mode: Channel low (2412MHz), mid (2437MHz) and high (2462MHz) with 6Mbps lowest data rate are chosen for full testing.

802.11 n\_20MHz mode: Channel low (2412MHz), mid (2437MHz) and high (2462MHz) with 6.5Mbps lowest data rate are chosen for full testing.

802.11 n\_40MHz: Lowest (2422MHz) and mid (2437MHz) and high (2452MHz) with 13.5Mbps lowest data rate are chosen for full testing.

The worst case is determined by the output power that generates the highest emission. As examined in the section of output power measurement, the section 7.5, the lowest data rate at b/g/n\_HT20/n\_HT40 resulted the highest level of fundamental emission, and therefore, the lowest data rate is chosen as the worst-case to conduct the remaining of other mandatory test cases.

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 1.55dB (for Spectrum) +/- 1.42 dB (for Power Meter)
6dB Bandwidth	+/- 123.36 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.96 dB
Peak Power Density	+/- 1.67 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

Radiated Spurious Emission:

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

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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## 6 CONDUCTED EMISSION TEST

### 6.1 Standard Applicable:

According to §15.207, frequency range within 150KHz to 30MHz 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 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/26/2014	05/25/2015
LISN	Rolf-Heine	NNB-2/16Z	99012	03/26/2014	03/25/2015
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/19/2014	03/18/2015
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2013	11/25/2014

### 6.3 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 EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

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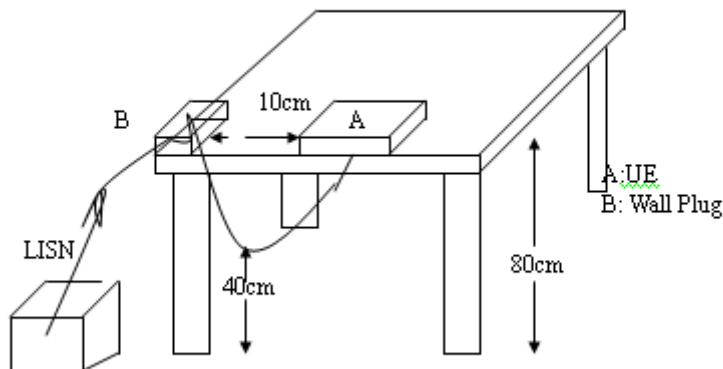
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#### 6.4 Test SET-UP (Block Diagram of Configuration)



#### 6.5 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 phases of power being supplied by given UE are completed

#### 6.6 Measurement Result:

Note: Refer to next page for measurement data and plots.

Note2: The \* reveals the worst-case results that closet to the limit

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

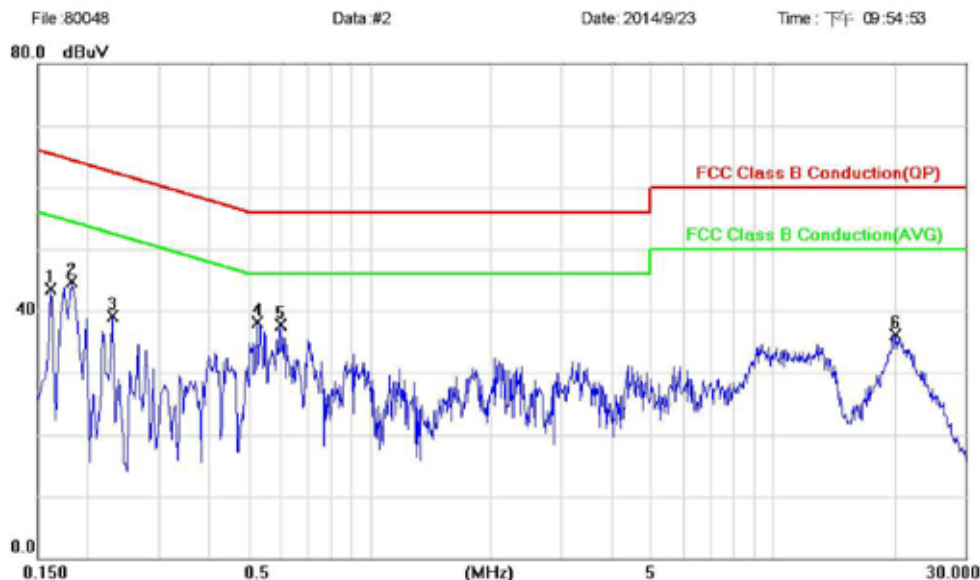
Operation Mode:	Operation mode			Test Date:	Sep. 23, 2014
Temperature:	26	Humidity:	60 %	Test By:	Curry

Site: ConductionRoom  
 Limit: FCC Class B Conduction(QP)  
 Mode: Operation  
 Note: Adapter:3A145WP05

Phase: L1  
 Power: AC 120V/60Hz

Temperature: 26 °C  
 Humidity: 60%

## Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1620	43.48	0.05	43.53	65.36	-21.83	peak	
2		0.1820	44.65	0.06	44.71	64.39	-19.68	peak	
3		0.2300	39.03	0.06	39.09	62.45	-23.36	peak	
4 *		0.5260	38.05	0.08	38.13	56.00	-17.87	peak	
5		0.6020	37.72	0.08	37.80	56.00	-18.20	peak	
6		20.1700	35.56	0.59	36.15	60.00	-23.85	peak	

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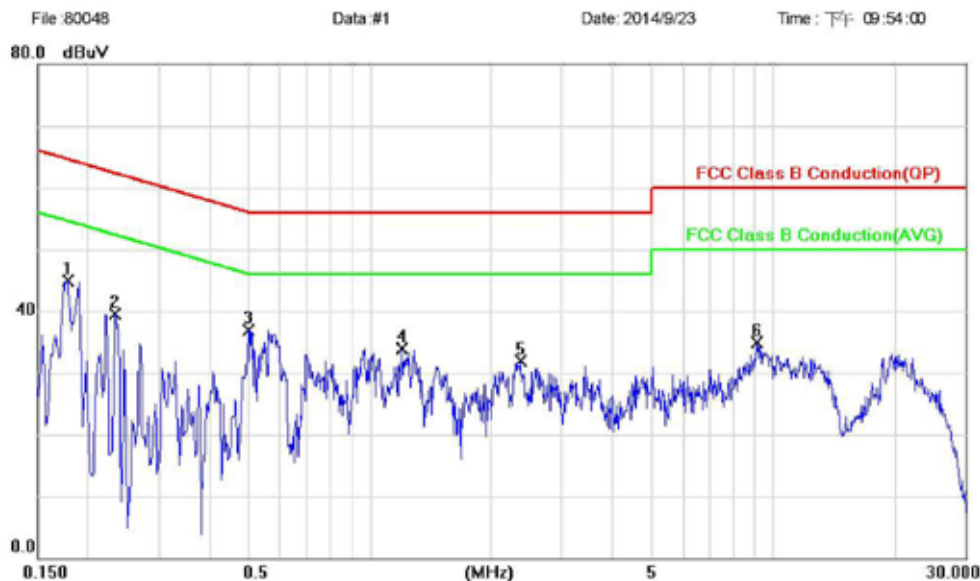
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Site: ConductionRoom  
Limit: FCC Class B Conduction(QP)  
Mode: Operation  
Note: Adapter:3A145WP05

Phase: N  
Power: AC 120V/60Hz

Temperature: 28 °C  
Humidity: 60%

## Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1780	44.79	0.06	44.85	64.58	-19.73	peak	
2		0.2340	39.52	0.06	39.58	62.31	-22.73	peak	
3	*	0.5020	36.92	0.08	37.00	56.00	-19.00	peak	
4		1.2060	33.75	0.10	33.85	56.00	-22.15	peak	
5		2.3660	31.68	0.14	31.82	56.00	-24.18	peak	
6		9.1380	34.67	0.31	34.98	60.00	-25.02	peak	

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## 7 PEAK OUTPUT POWER MEASUREMENT

### 7.1 Standard Applicable:

According to §15.247 (b)

(3) For systems using digital modulation in the 902-928 MHz and 2400-2483.5 MHz: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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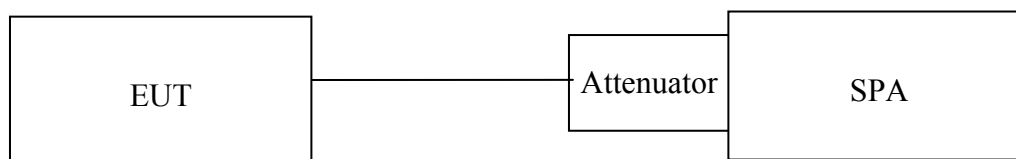
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## 7.2 Measurement Equipment Used:

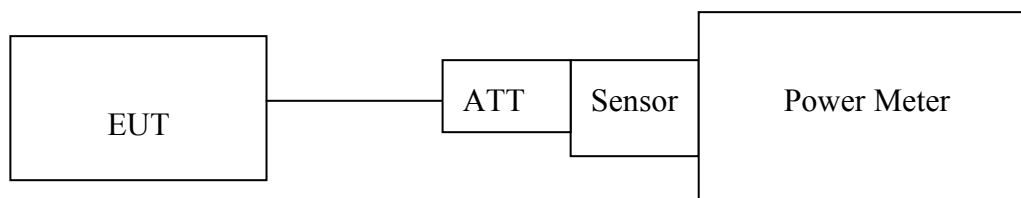
Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	01/13/2014	01/12/2015
Power Sensor	Anritsu	MA2411B	917032	01/13/2014	01/12/2015
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/19/2014	05/18/2015
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/08/2014	03/07/2015
DC Block	Mini-Circuits	BLK-18-S+	1	02/27/2014	02/26/2015
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/03/2014	01/02/2015
Attenuator	Mini-Circuit	BW-S10W2+	002	02/27/2014	02/26/2015
Splitter	Agilent	11636B	N/A	02/27/2014	02/26/2015

## 7.3 Test Set-up:

Spectrum:



Power Meter:



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#### 7.4 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 or spectrum. (**Peak power setting on Spectrum:** Channel power function, RBW = 1MHz, VBW = 3MHz, Span: 30/60MHz, Detector = peak, Sweep = Auto. Setting on spectrum is adjusted based on the mandatory procedure in 9.1.2 of the KDB558074). Power Meter is used as the auxiliary test equipment to conduct the output power measurement. 9.1.3 in KDB558074 is followed.  
(**Avg. power setting on Spectrum:** Channel power function, RBW = 1MHz, VBW = 3MHz, Span: 30/60MHz, Detector = Avg., Trace avg = 100, Sweep = Auto, Setting on spectrum is adjusted based on the mandatory procedure in 9.2.2.4 of the KDB558074). Power Meter is used as the auxiliary test equipment to conduct the output power measurement. 9.2.3, option 3 in KDB558074 is followed.
3. Record the max. Reading as observed from Spectrum or Power Meter.
4. Repeat above procedures until all frequency of interest measured was complete.

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*Pre-analysis Check: While conducting average power measurement, duty cycle of each mode (a/n\_ht20/n\_ht40) shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones:  $b = 100\%$ ,  $g = 100\%$ , and  $n\_ht\_20 = 100\%$ ,  $n\_ht\_40 = 100\%$ , where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.*

**Formula:**

$$\text{Duty Cycle} = T_{on} / (T_{on} + T_{off})$$

**Test Procedure:**

Set span = 0, RBW = 8MHz, VBW = 8MHz, Detector = Peak

Duty Cycle:

	Duty Cycle	Duty Factor (dBm)
802.11b	1	0
802.11g	1	0
802.11n_20 (2.4G)	1	0
802.11n_40 (2.4G)	1	0

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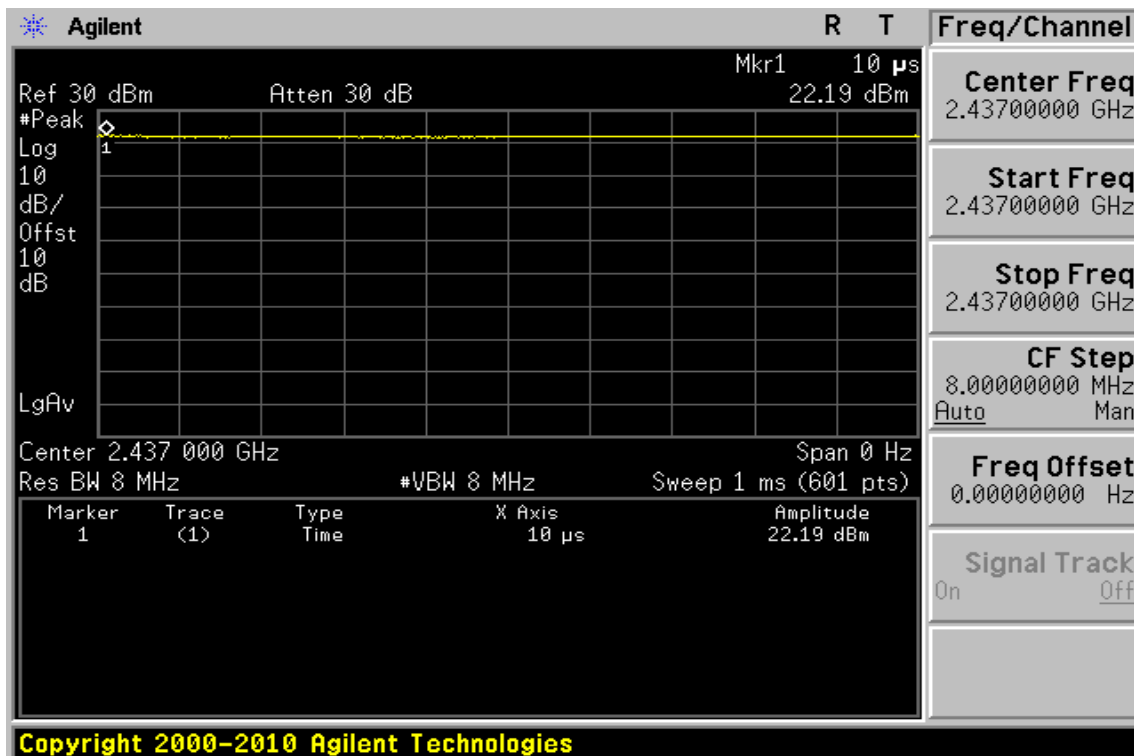
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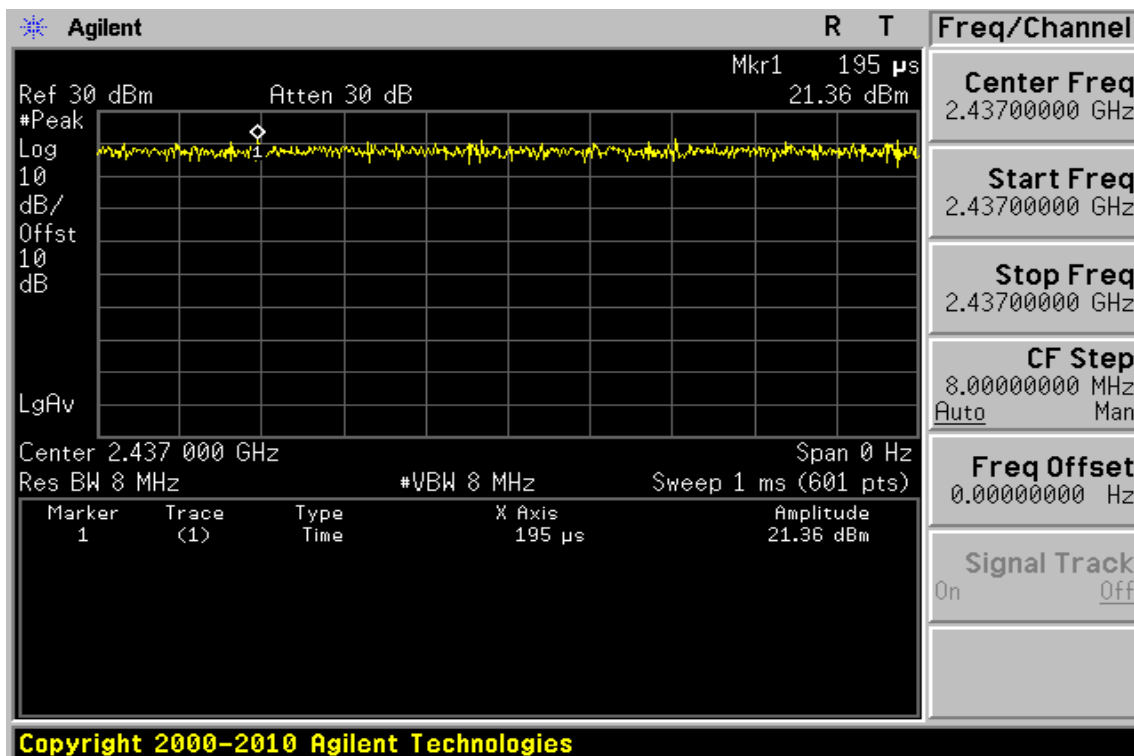
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## Duty Factor:

802.11 b



802.11 g



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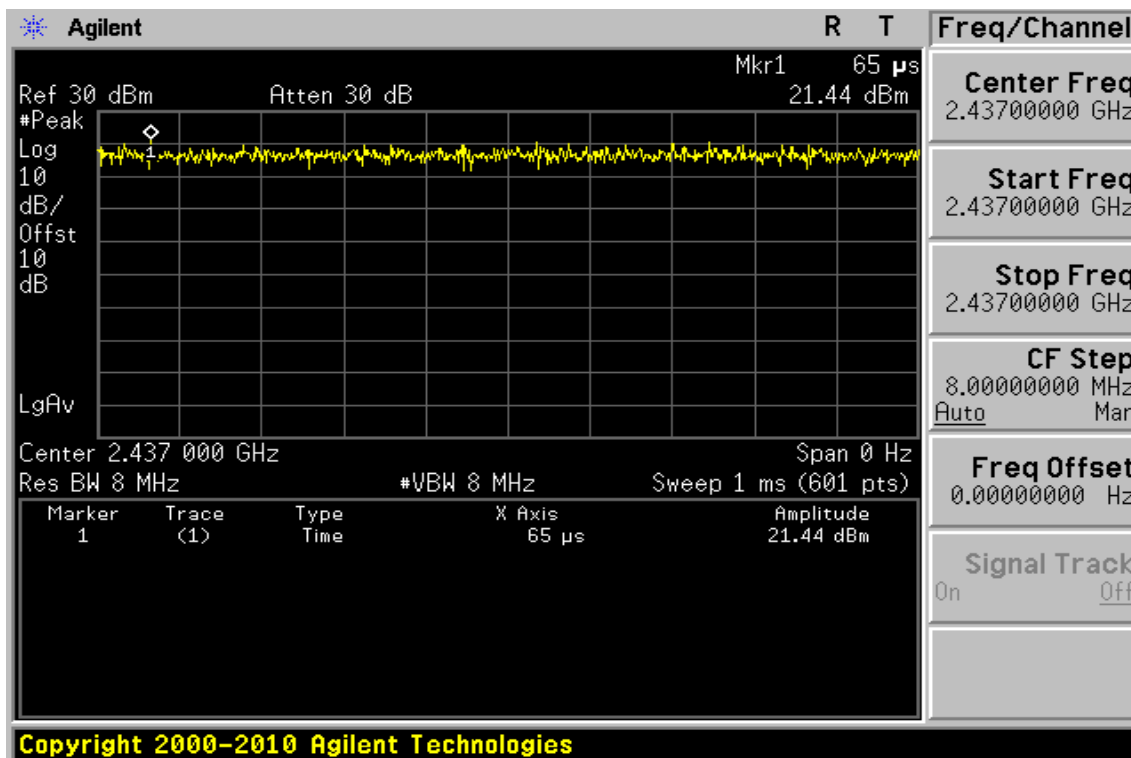
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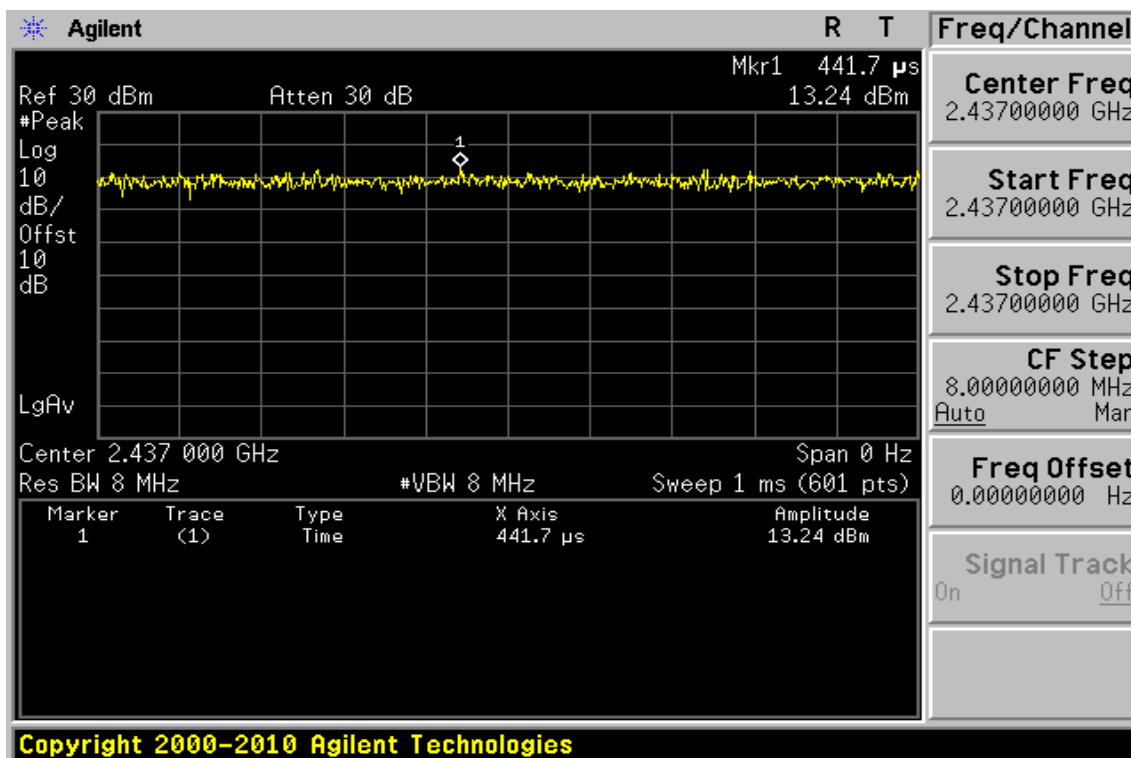
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## 802.11 n\_20 MHz



## 802.11 n\_40 MHz



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## 7.5 Measurement Result:

### 802.11b

		Peak Power Output (dBm)				
CH	Frequency (MHz)	Data Rate				Required Limit
		1	2	5.5	11	
1	2412	21.53	21.43	21.34	21.06	1 Watt = 30 dBm
6	2437	20.21	19.95	19.74	19.54	1 Watt = 30 dBm
11	2462	20.11	19.97	19.78	19.64	1 Watt = 30 dBm

		Average Power Output (dBm)				
CH	Frequency (MHz)	Data Rate				Required Limit
		1	2	5.5	11	
1	2412	19.69	19.44	19.39	19.18	1 Watt = 30 dBm
6	2437	18.30	18.08	17.85	17.67	1 Watt = 30 dBm
11	2462	18.21	17.89	17.68	17.68	1 Watt = 30 dBm

### 802.11g

		Peak Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
1	2412	23.33	23.12	22.97	22.90	22.62	22.45	22.22	22.01	1 Watt = 30 dBm
6	2437	23.66	23.38	23.24	23.09	23.01	22.73	22.67	22.38	1 Watt = 30 dBm
11	2462	23.78	23.66	23.54	23.34	23.16	23.03	22.94	22.80	1 Watt = 30 dBm

		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
1	2412	15.32	15.13	15.11	15.02	14.73	14.68	14.40	14.35	1 Watt = 30 dBm
6	2437	15.70	15.41	15.17	15.07	15.05	14.84	14.81	14.52	1 Watt = 30 dBm
11	2462	15.90	15.81	15.57	15.44	15.23	15.14	15.09	14.94	1 Watt = 30 dBm

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## 802.11n\_20M

		Peak Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2412	21.46	21.22	20.91	20.68	20.47	20.30	20.12	20.02	1 Watt = 30 dBm
6	2437	21.87	21.81	21.66	21.40	21.17	21.16	20.86	20.72	1 Watt = 30 dBm
11	2462	22.05	21.99	21.71	21.69	21.49	21.32	21.07	20.74	1 Watt = 30 dBm

		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2412	13.48	13.25	12.99	12.73	12.73	12.69	12.56	12.29	1 Watt = 30 dBm
6	2437	14.22	14.08	13.94	13.84	13.52	13.22	12.97	12.64	1 Watt = 30 dBm
11	2462	14.23	14.15	13.82	13.62	13.51	13.31	13.31	13.04	1 Watt = 30 dBm

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## 802.11n\_40M

		Peak Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2422	20.06	20.01	19.73	19.61	19.39	19.22	19.02	18.97	1 Watt = 30 dBm
6	2437	18.93	18.89	18.69	18.46	18.15	17.90	17.89	17.74	1 Watt = 30 dBm
11	2452	18.87	18.73	18.45	18.37	18.04	17.74	17.44	17.29	1 Watt = 30 dBm

		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2422	11.42	11.13	11.06	11.01	11.00	10.97	10.91	10.85	1 Watt = 30 dBm
6	2437	10.61	10.30	10.05	9.85	9.72	9.59	9.31	9.19	1 Watt = 30 dBm
11	2452	10.47	10.45	10.44	10.24	9.96	9.79	9.56	9.30	1 Watt = 30 dBm

\* Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.

\* Note: Offset =10dB for 2.4G 802.11b/g/n20/n40

\* Note: Measured by Power meter

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## 8 6dB BANDWIDTH

### 8.1 Standard Applicable:

According to §15.247(a)(2), Systems using digital modulation techniques may operate in the 902 - 928 MHz and 2400 - 2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

### 8.2 Measurement Equipment Used:

SGS Conducted Room					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	Agilent	N9010A	MY53400256	2013/10/26	2014/10/25
Power Meter	Anritsu	ML2496A	1326001	2014/06/20	2015/06/19
Power Sensor	Anritsu	MA2411B	1315048	2014/06/20	2015/06/19
Power Sensor	Anritsu	MA2411B	1315049	2014/06/20	2015/06/19
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	2	2014/01/06	2015/01/05
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	3	2014/01/06	2015/01/05
Coaxial Cable 80cm	WOKEN	00100A1F1A185C	1	2014/01/06	2015/01/05
DC Block	Mini-Circuits	BLK-18-S+	4	2014/01/06	2015/01/05
DC Block	PASTERNAK	PE8210	5	2014/01/06	2015/01/05
Splitter	RF-LAMBDA	RFLT2W1G18G	11-JSPF412-019	2014/01/06	2015/01/05
Splitter	WOKEN	NA	DOM35LW1A2	2014/01/06	2015/01/05
Attenuator	Mini-Circuits	BW-S10W2+	6	2014/01/06	2015/01/05
Attenuator	WOKEN	218FS-10	7	2014/01/06	2015/01/05
Temperature Chamber	TERCHY	MHK-120LK	1020582	2014/06/18	2015/06/17
Communication Tester	R&S	CMW500	131121	2014/01/16	2015/01/15
Communication Tester	Anritsu	MT8820C	6201107337	2014/04/24	2015/04/23
DC Power Supply	Agilent	E3640A	MY53140006	2014/05/31	2015/05/30
DC Power Supply	Agilent	E3640A	MY53130054	2014/05/21	2015/05/20

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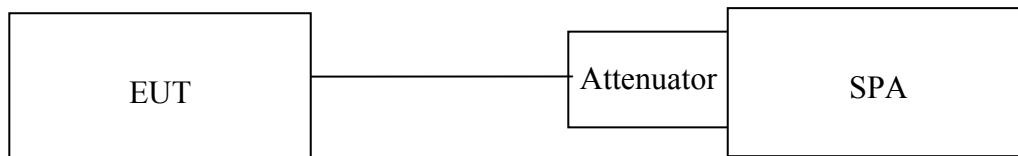
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### 8.3 Test Set-up:



### 8.4 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 RBW = 100 kHz, VBW = 3\*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto, the setting on spectrum is adjusted based on the procedure as guide in 8.1 option 1 of KDB558074.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency of interest measured was complete.

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## 8.5 Measurement Result:

## 802.11b

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2412	12071	> 500	PASS
2437	12070	> 500	PASS
2462	10045	> 500	PASS

## 802.11g

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2412	16522	> 500	PASS
2437	16544	> 500	PASS
2462	16492	> 500	PASS

## 802.11n\_20M

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2412	17387	> 500	PASS
2437	17605	> 500	PASS
2462	17665	> 500	PASS

## 802.11n\_40M

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2422	36429	> 500	PASS
2437	36416	> 500	PASS
2452	36390	> 500	PASS

\* Note: Offset = 10dB for 2.4G 802.11b/g/n20/n40

\* Note: The arrow “->” reveals X decibel level, and refer to next page for plots

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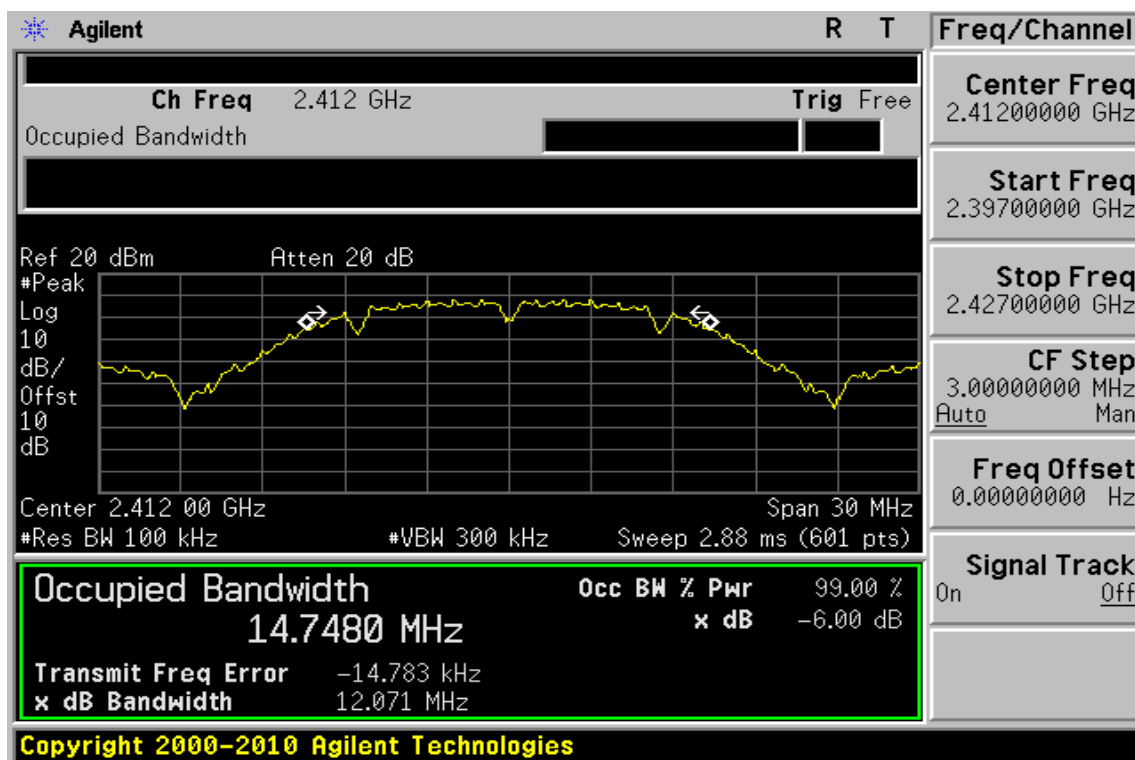
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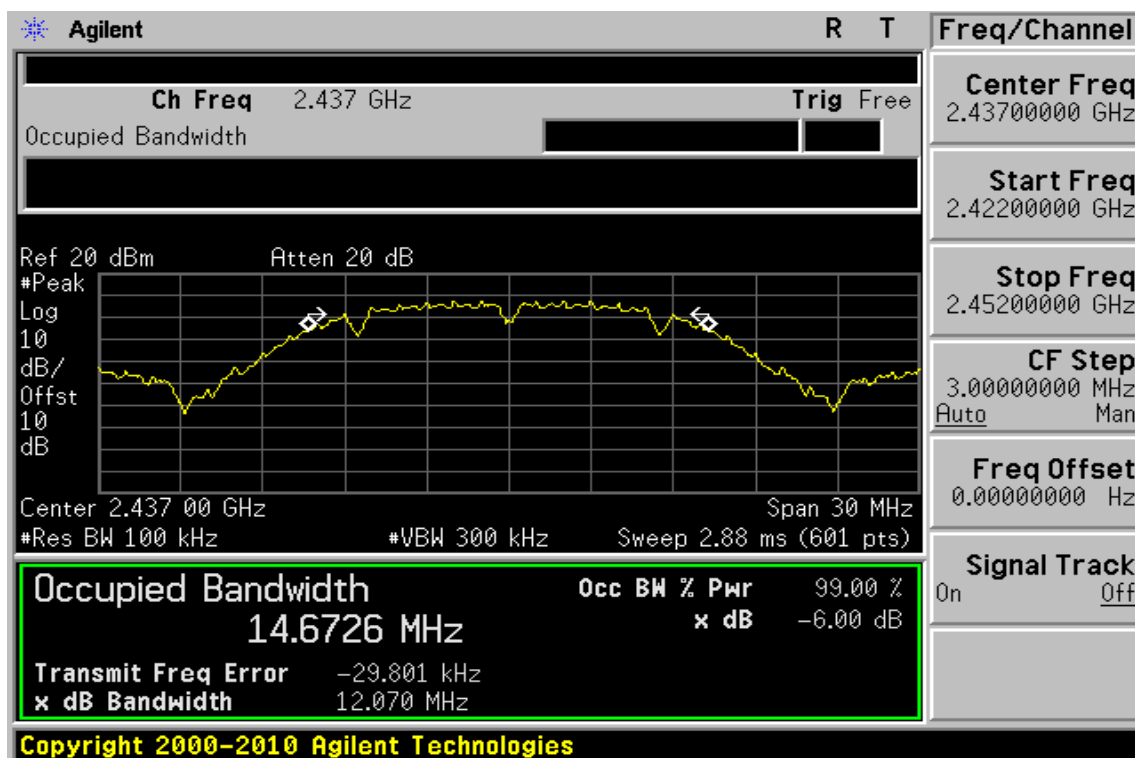
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## 802.11b

### 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



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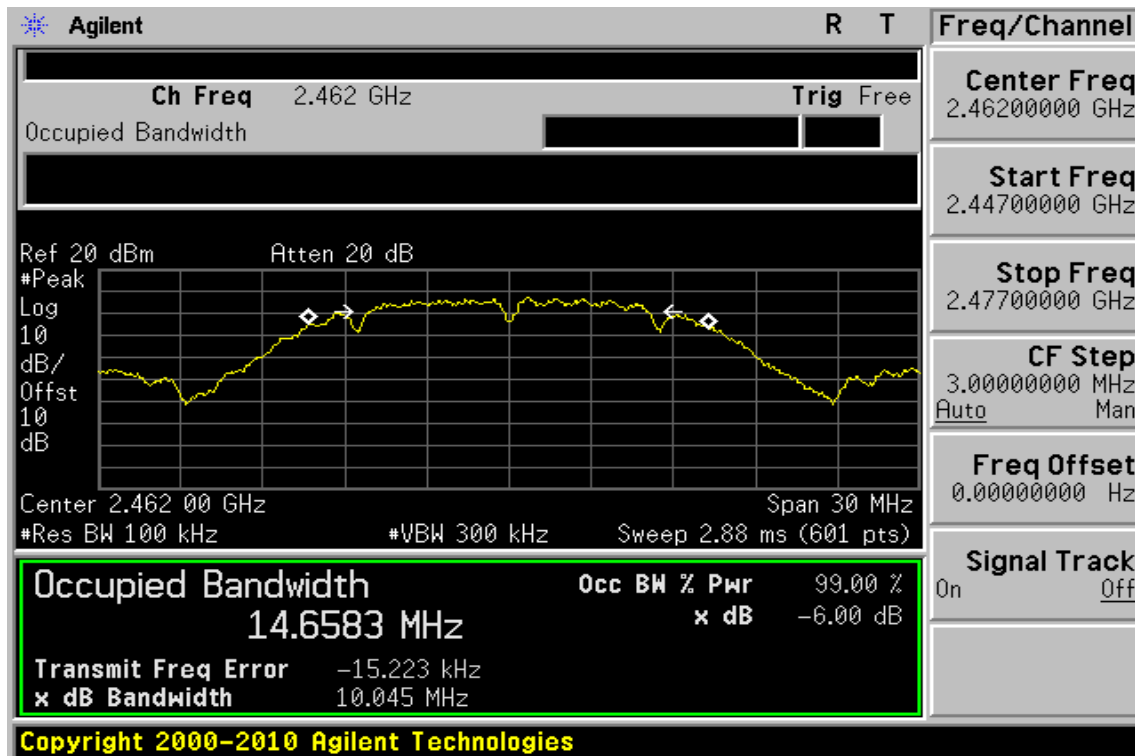
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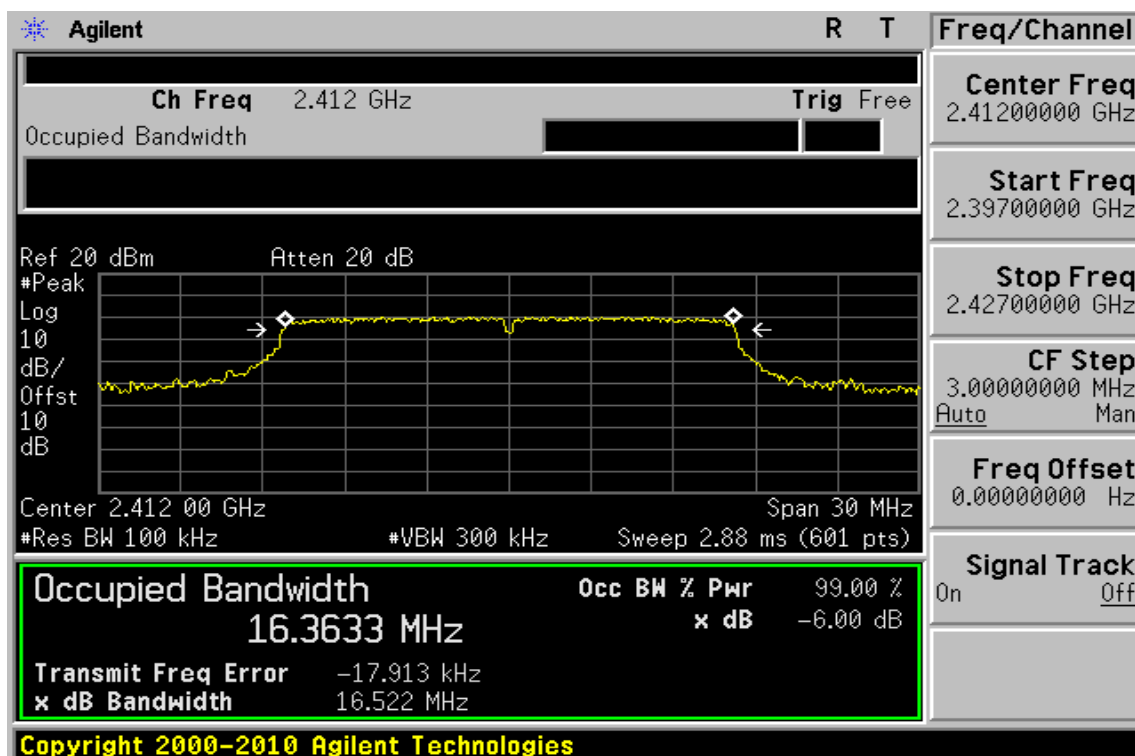
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## 6dB Band Width Test Data CH-High



## 802.11g

## 6dB Band Width Test Data CH-Low



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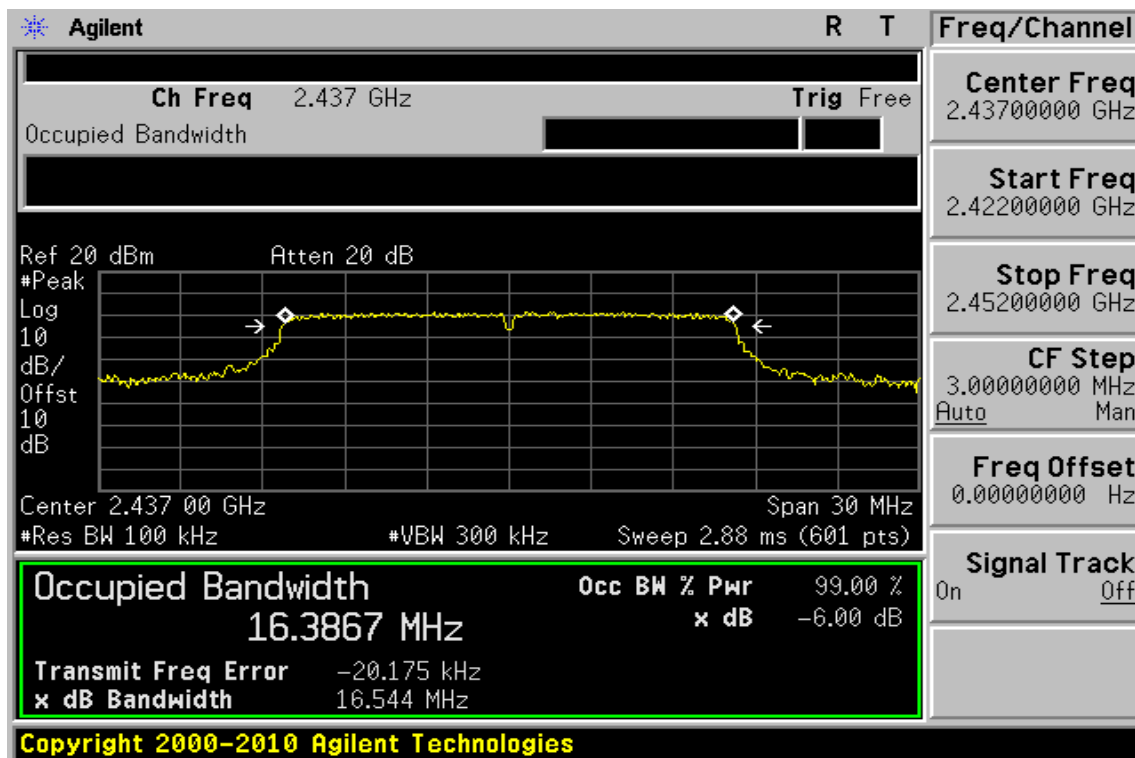
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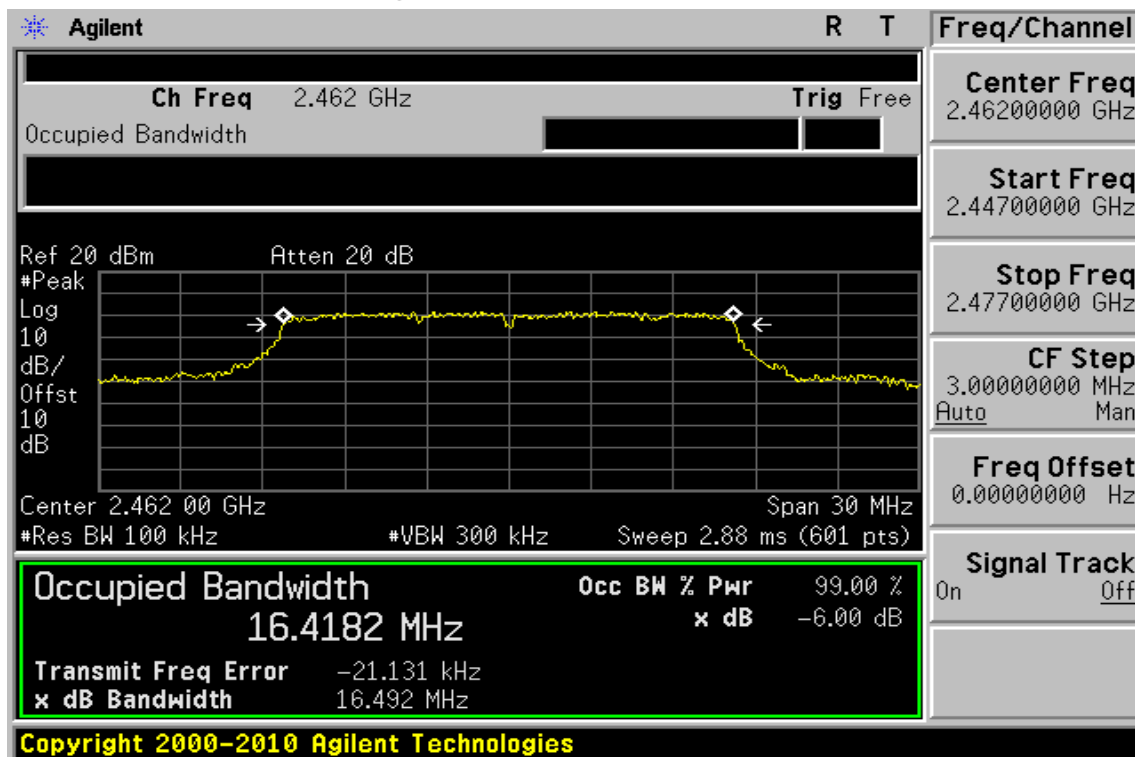
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## 6dB Band Width Test Data CH-Mid



## 6dB Band Width Test Data CH-High



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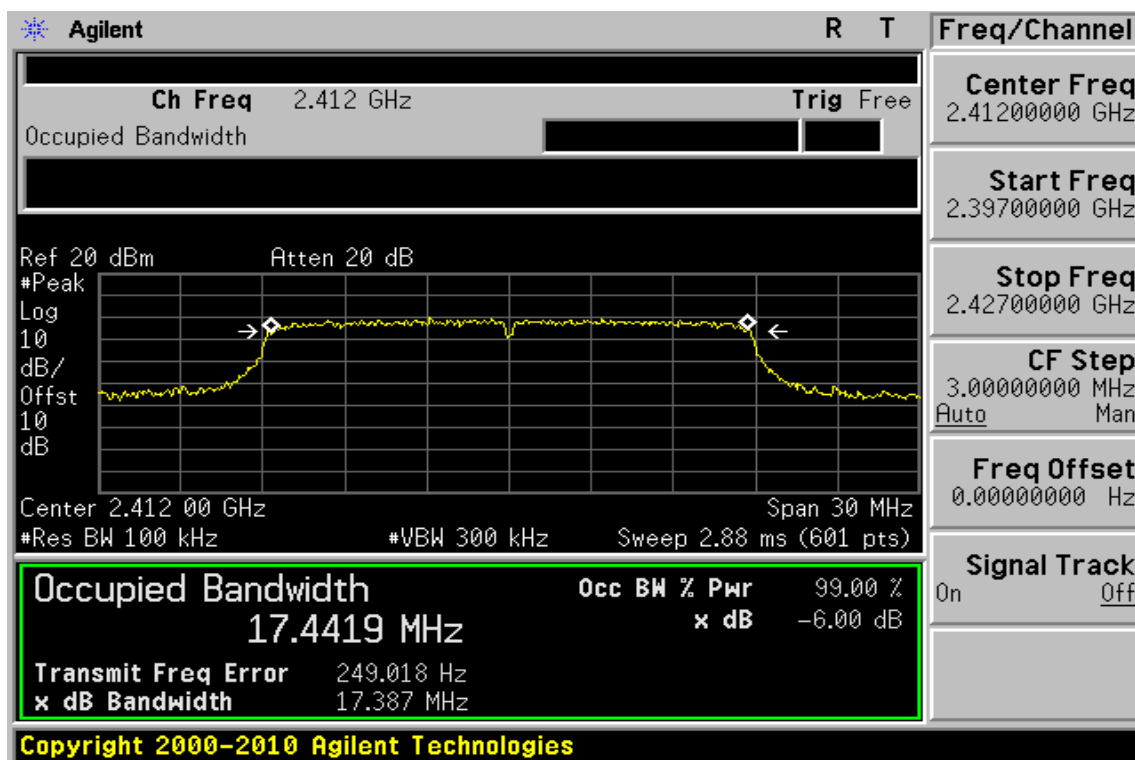
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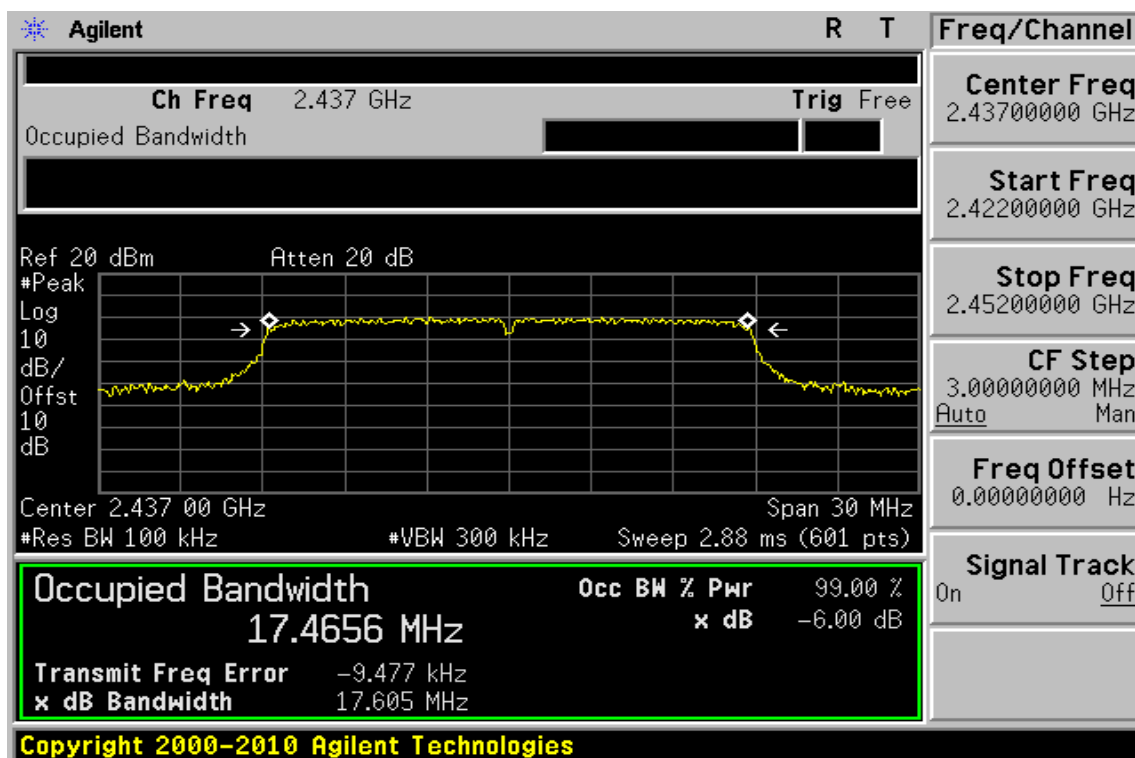
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## 802.11n\_20M

### 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



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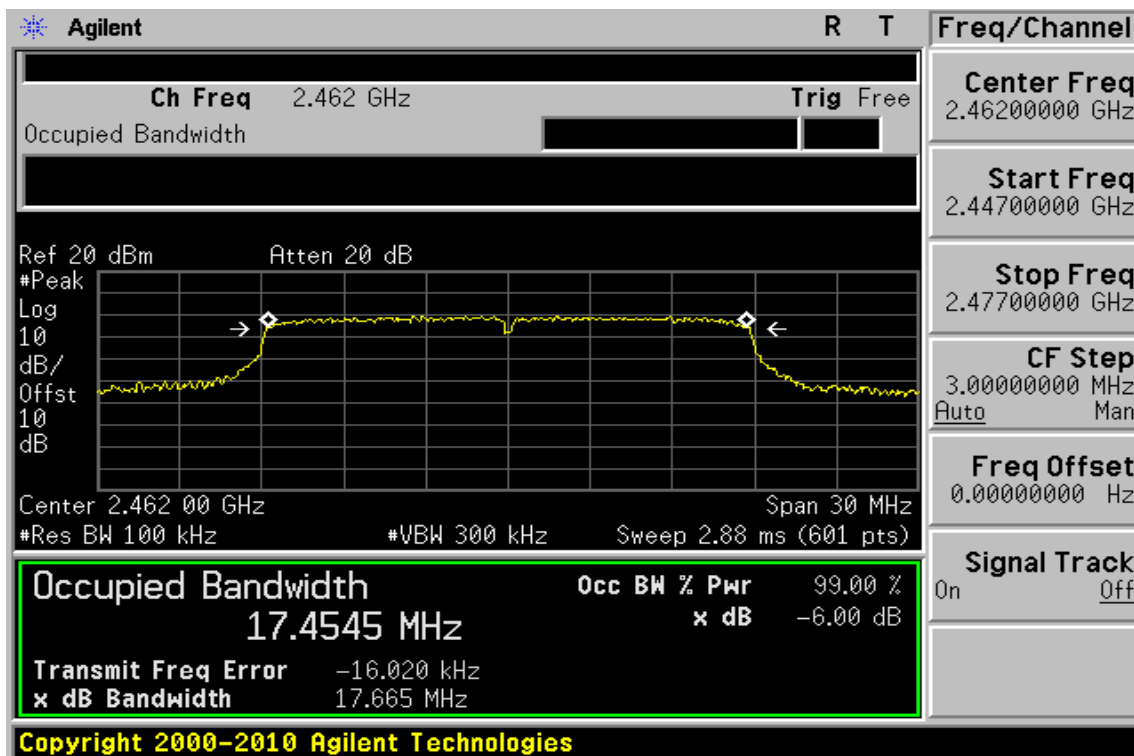
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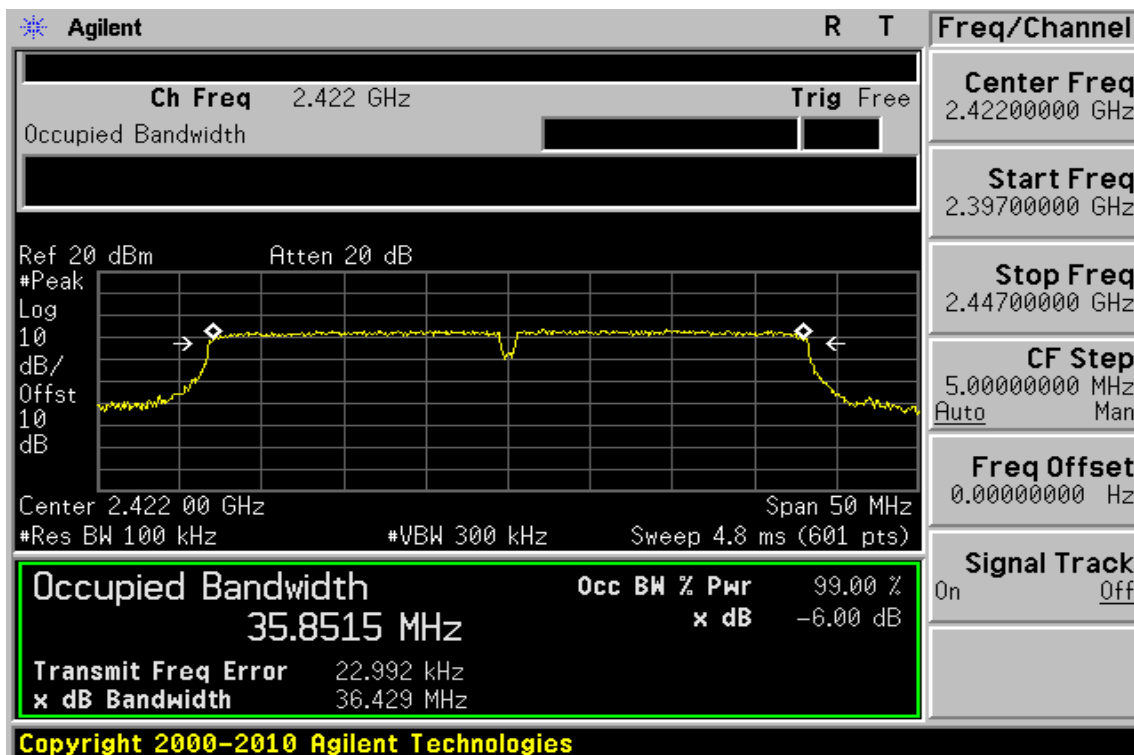
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## 6dB Band Width Test Data CH-High



## 802.11n\_40M

## 6dB Band Width Test Data CH-Low



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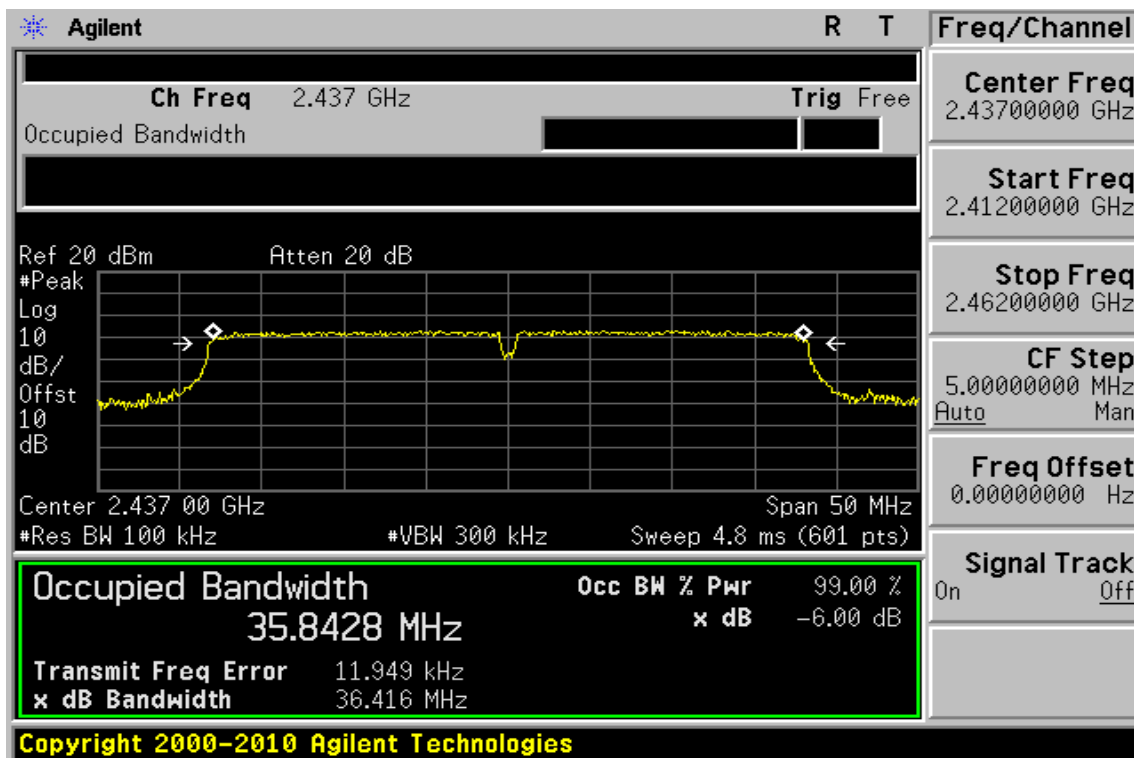
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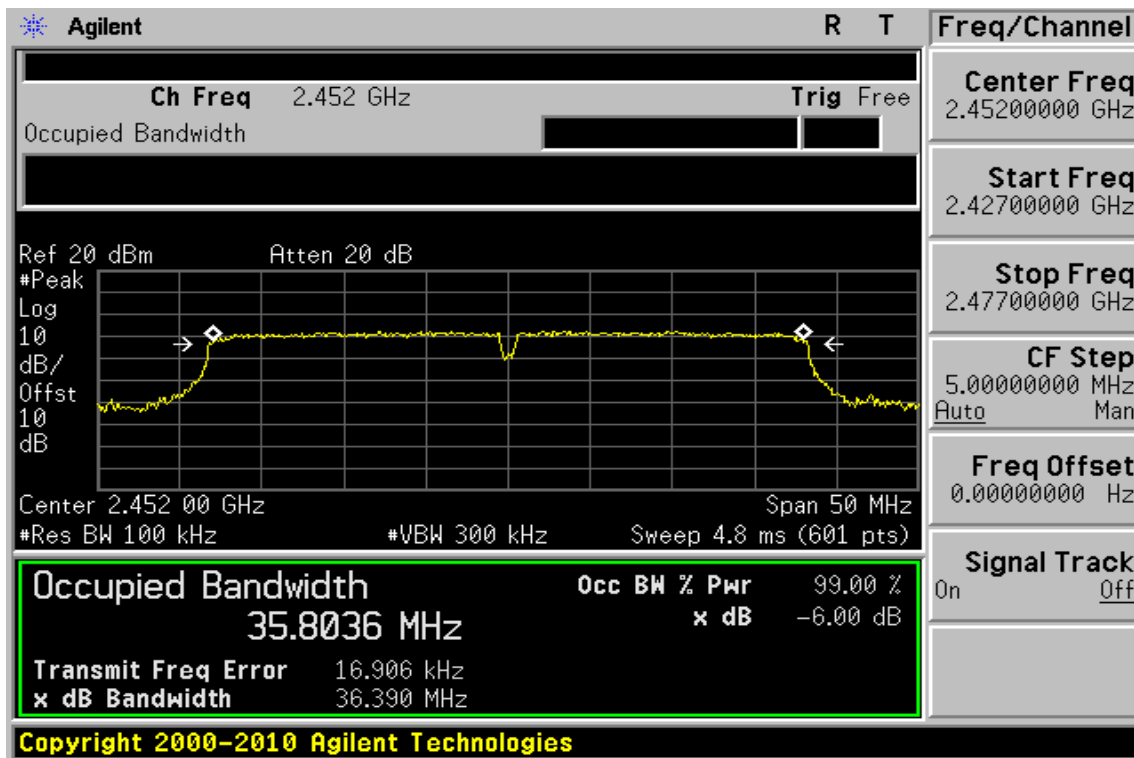
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## 6dB Band Width Test Data CH-Mid



## 6dB Band Width Test Data CH-High



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## 9 BAND EDGES MEASUREMENT

### 9.1 Standard Applicable:

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

### 9.2 Measurement Equipment Used:

#### 9.2.1 Conducted Emission at antenna port:

Refer to section 7.2 for details.

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## 9.2.2 Radiated emission:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/26/2014	05/25/2015
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/19/2014	05/18/2015
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	01/20/2014	01/19/2015
Spectrum Analyzer	R&S	FSV-30	101398	10/22/2013	10/21/2014
Loop Antenna	ETS.LINDGREN	6502	00148045	07/03/2014	07/02/2015
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/02/2014	01/01/2015
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2014	05/18/2015
Horn Antenna	Schwarzbeck	BBHA9170	184	01/23/2014	01/22/2015
Pre-Amplifier	Agilent	8447D	2944A07676	01/03/2014	01/02/2015
Pre-Amplifier	Agilent	8449B	3008A00578	01/03/2014	01/02/2015
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/24/2014	01/23/2015
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M2	02/27/2014	02/26/2015
Attenuator	Mini-Circuit	BW-S10W2+	004	02/27/2014	02/26/2015
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	01/03/2014	01/02/2015
3m Site NSA	SGS	966 chamber	N/A	07/15/2014	07/14/2015

Note: N.C.R refers to Not Calibrated Required.

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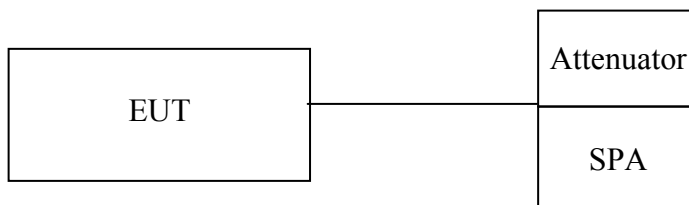
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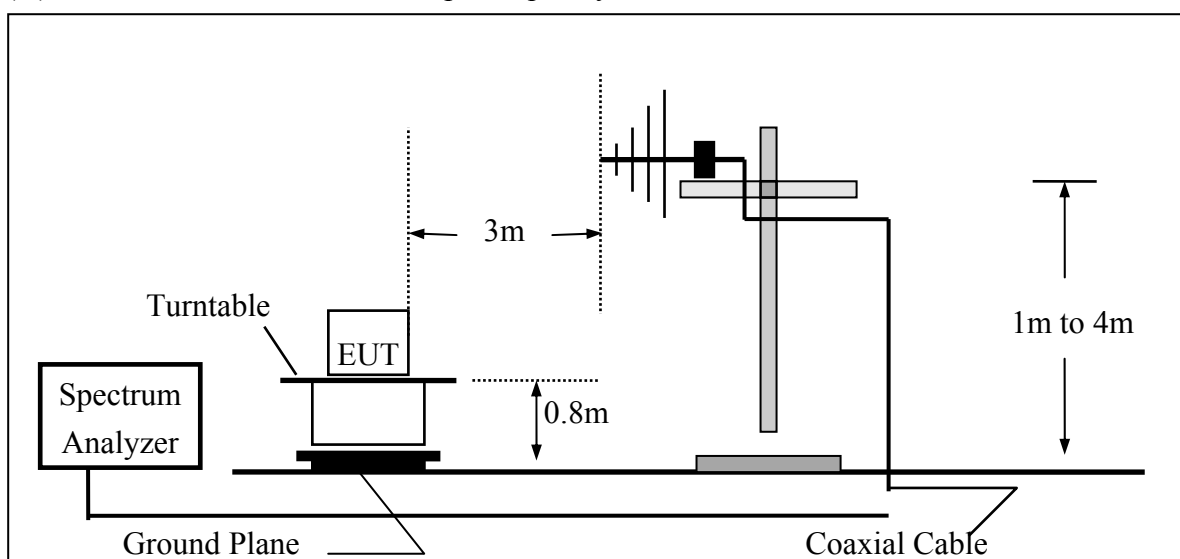
## 9.3 Test SET-UP:

### 9.3.1 Conducted Emission at antenna port:

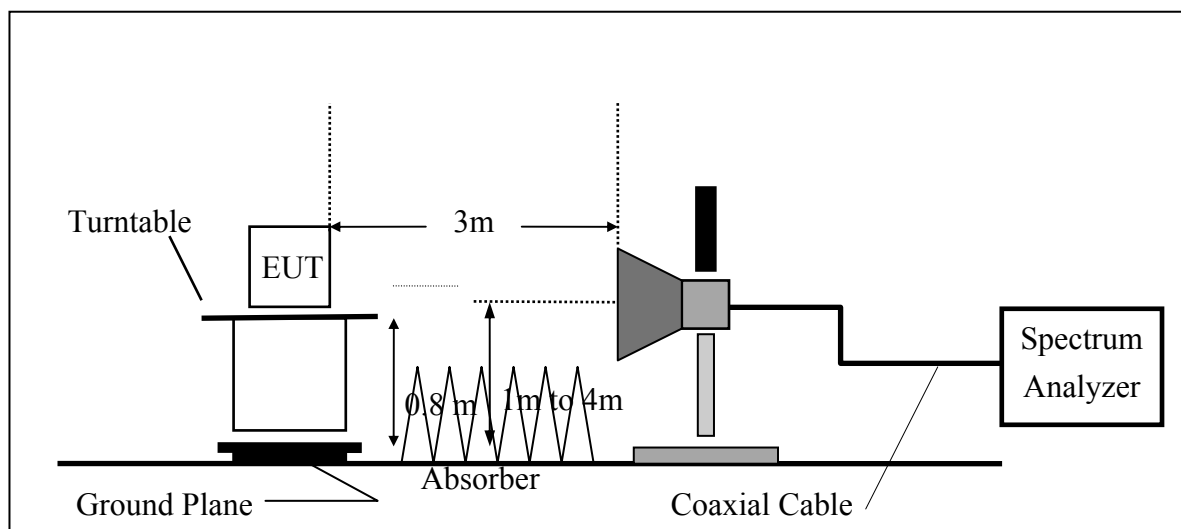


### 9.3.2 Radiated emission:

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



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



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#### 9.4 Measurement Procedure:

Unwanted Emissions into Non-Restricted Frequency Bands, Measurement Procedure followed by 11.1 of KDB558074 D01

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 start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
4. Set the spectrum analyzer as RBW, VBW=300KHz, Detector = Peak, Sweep = auto
5. Mark the highest reading of the emission as the reference level measurement.
6. Set DL as the limit = reading on marker 1 – 20dBm
7. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 KHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

Unwanted Emission falling into Restricted Frequency Bands, Measurement Procedure followed by 12.1 of KDB558074:

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. When 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.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. On spectrum, following 8.1.2, and RBW = 1MHz, VBW = 3MHz, & Marker 2390MHz, and 2483.5MHz (Peak Measurement). Average Measurement: following 8.2 with the modification span to 1MHz, & RBW = 1MHz, VBW = 3MHz and peak marker function to obtain the highest reading on 2390, and 2483.5MHz.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete

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## 9.5 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	

## 9.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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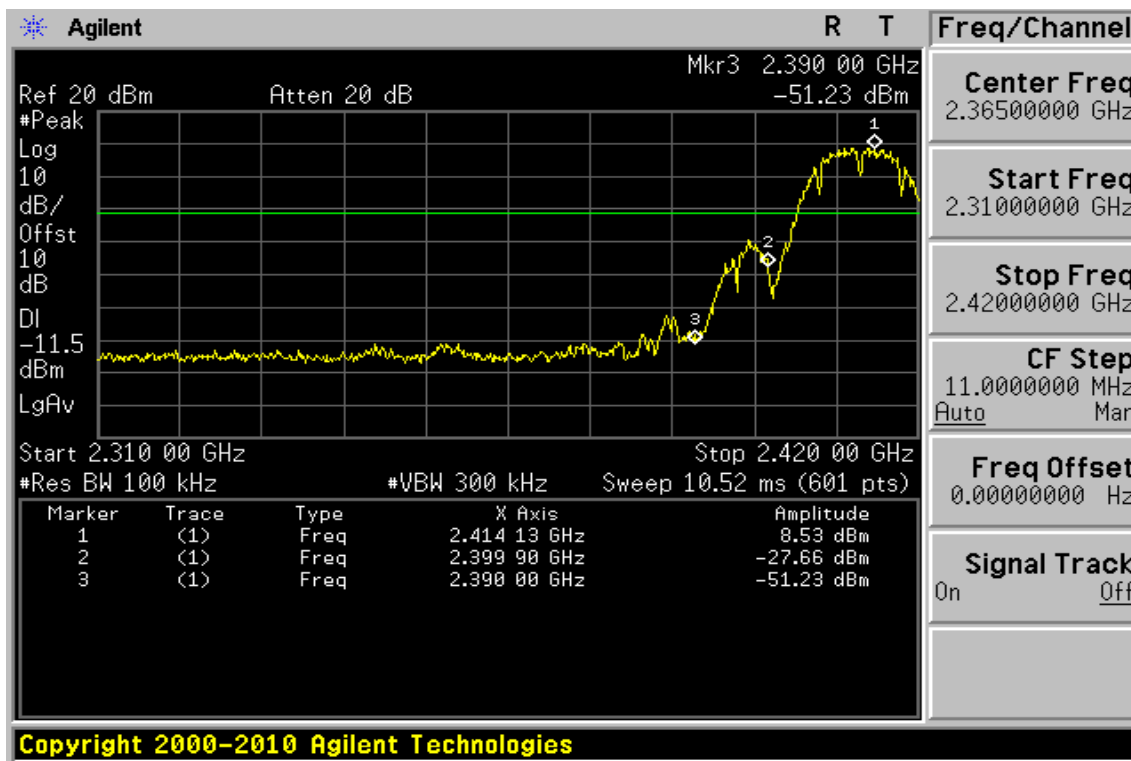
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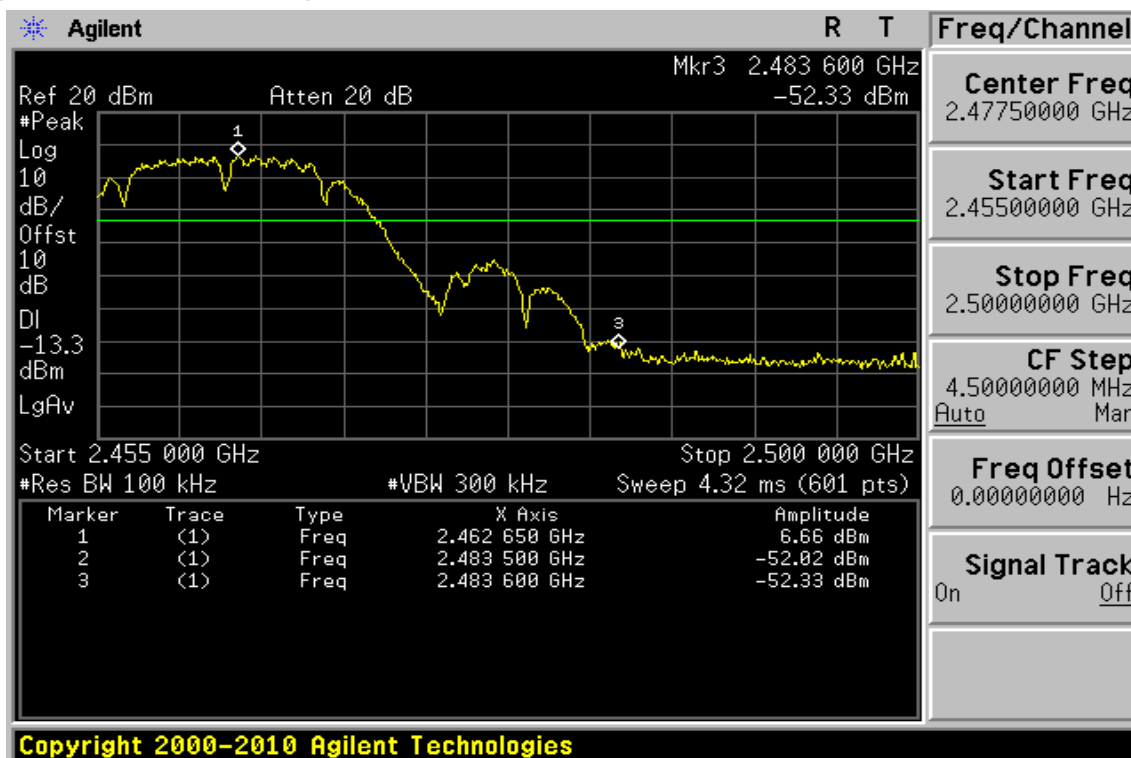
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## 802.11b - Unwanted Emissions into Non-Restricted Frequency Bands

### Band Edges Test Data CH-Low



### Band Edges Test Data CH-High



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**Radiated Emission:**

(Unwanted Emissions into Restricted Frequency Bands): 802.11 b mode

Operation Band	:802.11 b	Test Date	:2014-09-29
ARFCN	:CH 01	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:Band Edge LOW	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2386.20	S	Average	49.13	2.46	51.59	54.00	-2.41
2386.20	S	Peak	57.91	2.46	60.37	74.00	-13.63
2390.00	E	Average	41.84	2.48	44.32	54.00	-9.68
2390.00	E	Peak	55.28	2.48	57.76	74.00	-16.24

Operation Band	:802.11 b	Test Date	:2014-09-29
ARFCN	:CH 01	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:Band Edge LOW	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	34.28	2.48	36.76	54.00	-17.24
2390.00	E	Peak	51.76	2.48	54.24	74.00	-19.76

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Operation Band :802.11 b  
 ARFCN :CH 11 Test Date :2014-09-29  
 Fundamental Frequency :2462 MHz Temp./Humi. :23 deg\_C/62 RH  
 Operation Mode :Band Edge HIGH Engineer :Curry  
 EUT Pol. :E2 Plane 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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	45.55	2.84	48.39	54.00	-5.61
2483.50	E	Peak	54.81	2.84	57.65	74.00	-16.35

Operation Band :802.11 b  
 ARFCN :CH 11 Test Date :2014-09-29  
 Fundamental Frequency :2462 MHz Temp./Humi. :23 deg\_C/62 RH  
 Operation Mode :Band Edge HIGH Engineer :Curry  
 EUT Pol. :E2 Plane 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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	38.55	2.84	41.39	54.00	-12.61
2483.50	E	Peak	53.88	2.84	56.72	74.00	-17.28

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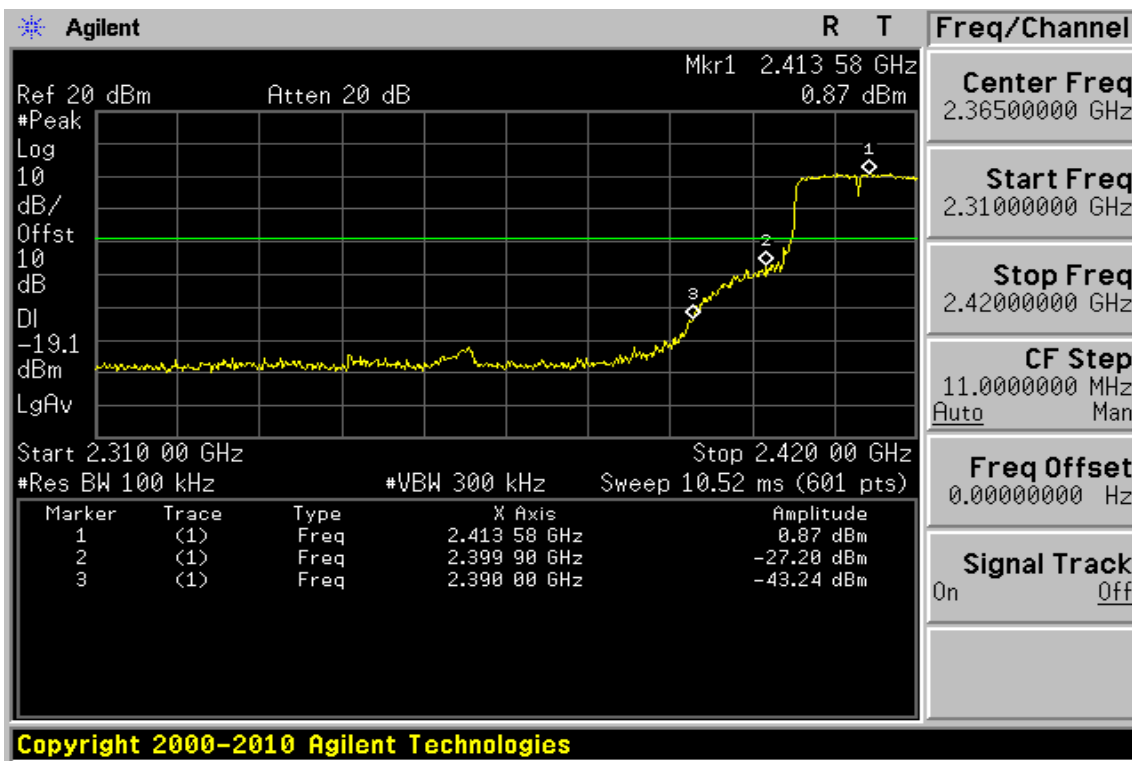
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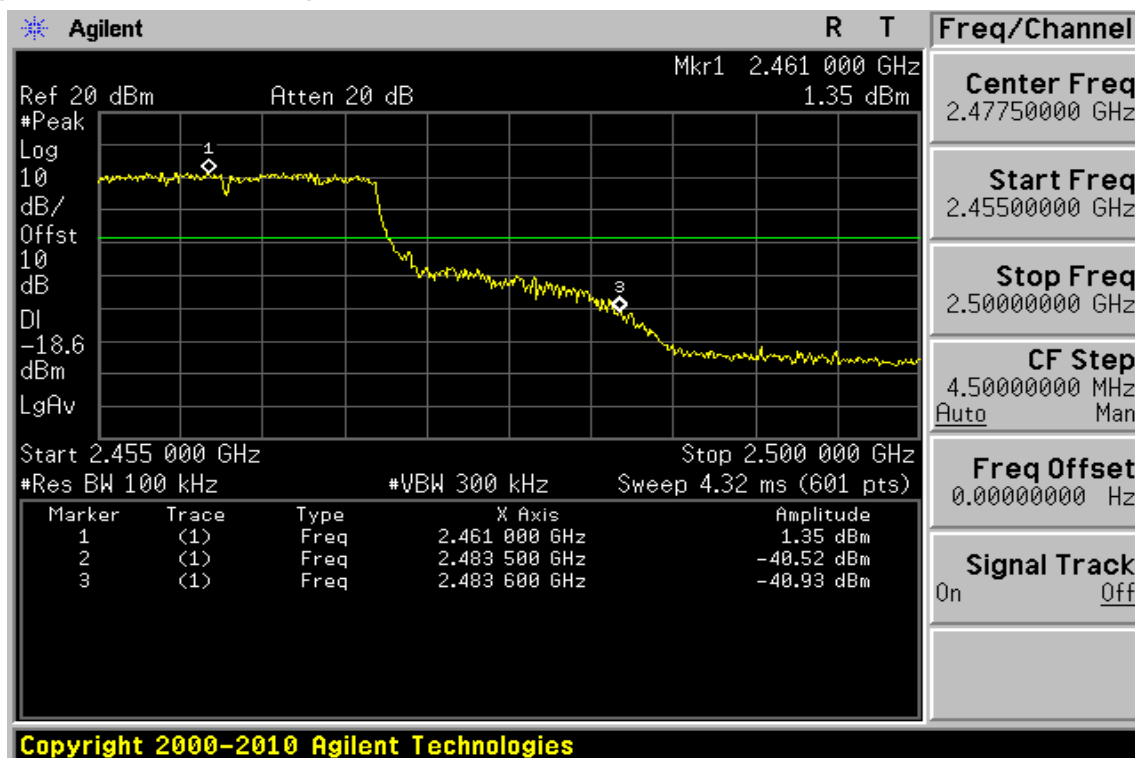
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## 802.11g - Unwanted Emissions into Non-Restricted Frequency Bands

## Band Edges Test Data CH-Low



## Band Edges Test Data CH-High



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**Radiated Emission:**

(Unwanted Emissions into Restricted Frequency Bands): 802.11 g mode

Operation Band	:802.11 g	Test Date	:2014-09-29
ARFCN	:CH 01	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:Band Edge LOW	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	49.52	2.48	52.00	54.00	-2.00
2390.00	E	Peak	70.75	2.48	73.23	74.00	-0.77

Operation Band	:802.11 g	Test Date	:2014-09-29
ARFCN	:CH 01	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:Band Edge LOW	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	41.92	2.48	44.40	54.00	-9.60
2390.00	E	Peak	61.90	2.48	64.38	74.00	-9.62

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Operation Band :802.11 g  
 ARFCN :CH 11 Test Date :2014-09-29  
 Fundamental Frequency :2462 MHz Temp./Humi. :23 deg\_C/62 RH  
 Operation Mode :Band Edge HIGH Engineer :Curry  
 EUT Pol. :E2 Plane 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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	50.14	2.84	52.98	54.00	-1.02
2483.50	E	Peak	67.47	2.84	70.31	74.00	-3.69

Operation Band :802.11 g  
 ARFCN :CH 11 Test Date :2014-09-29  
 Fundamental Frequency :2462 MHz Temp./Humi. :23 deg\_C/62 RH  
 Operation Mode :Band Edge HIGH Engineer :Curry  
 EUT Pol. :E2 Plane 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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	45.96	2.84	48.80	54.00	-5.20
2483.50	E	Peak	62.80	2.84	65.64	74.00	-8.36

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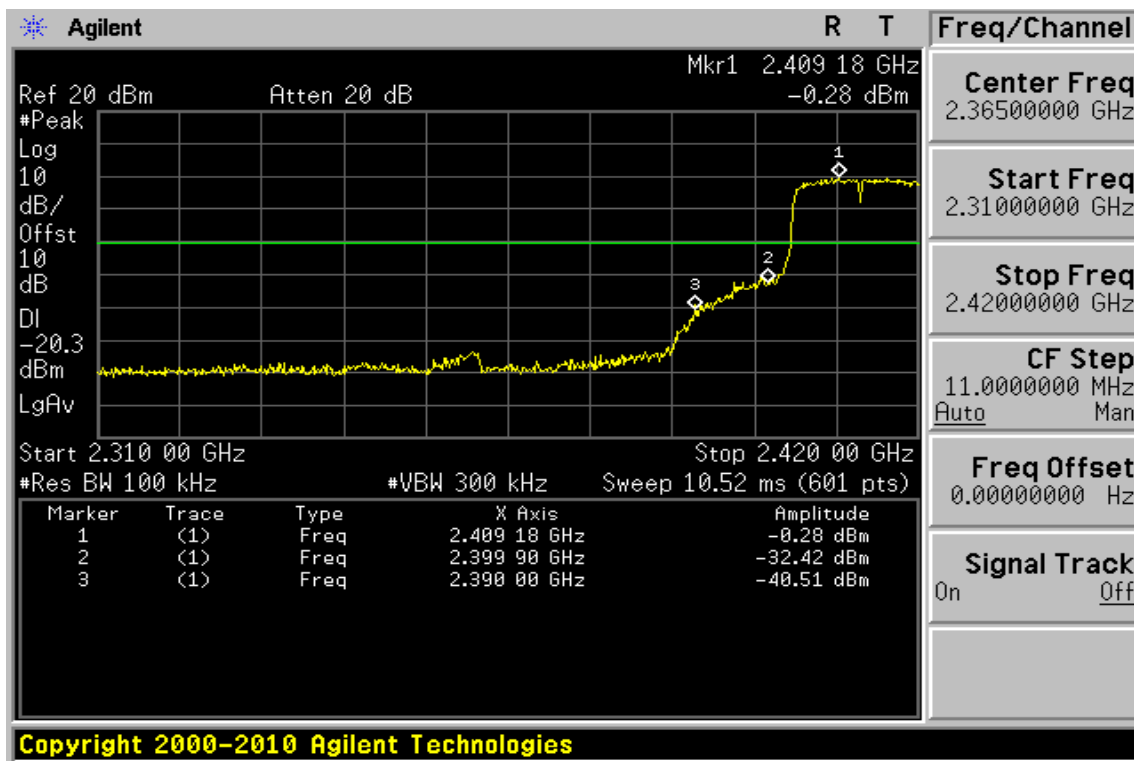
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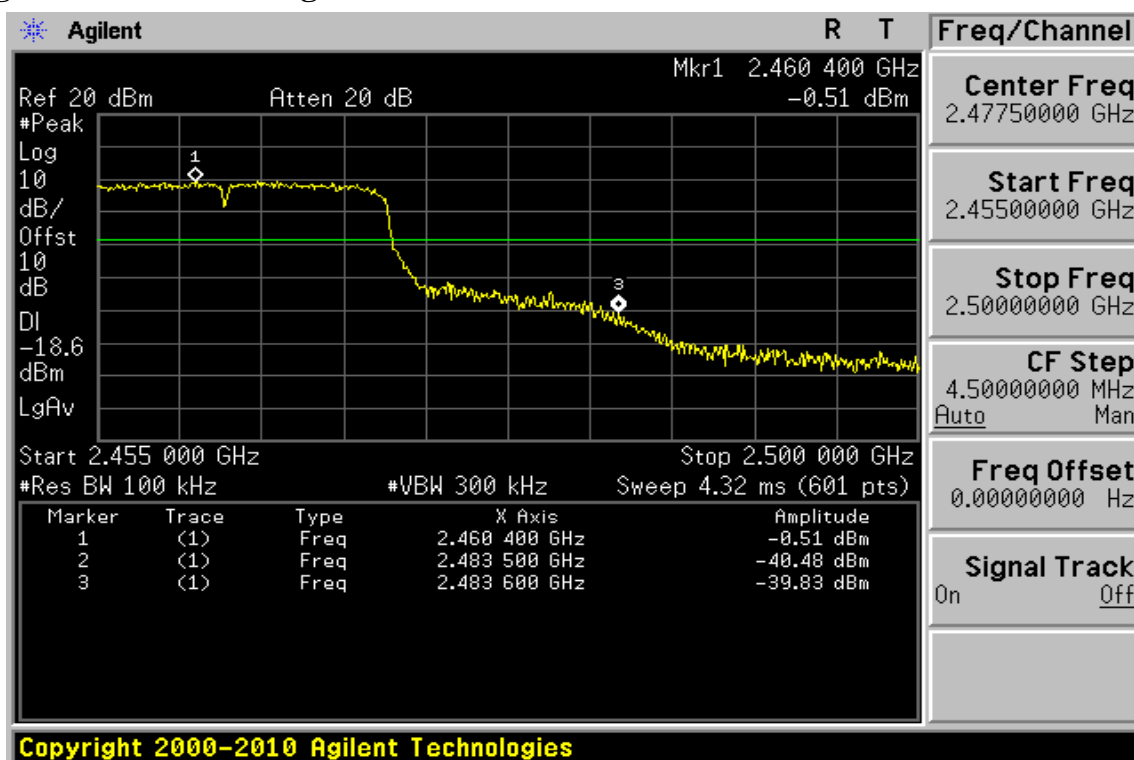


## 802.11n\_20M- Unwanted Emissions into Non-Restricted Frequency Bands

## Band Edges Test Data CH-Low



## Band Edges Test Data CH-High



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**Radiated Emission: 802.11 n\_20M mode**

(Unwanted Emissions into Restricted Frequency Bands): 802.11 n\_20M mode

Operation Band	:802.11 n20M		
ARFCN	:CH 01	Test Date	:2014-09-29
Fundamental Frequency	:2412 MHz	Temp./Humi.	:23 deg_C/62 RH
Operation Mode	:Band Edge LOW	Engineer	:Curry
EUT Pol.	:E2 Plane	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	50.12	2.48	52.60	54.00	-1.40
2390.00	E	Peak	69.00	2.48	71.48	74.00	-2.52

Operation Band	:802.11 n20M		
ARFCN	:CH 01	Test Date	:2014-09-29
Fundamental Frequency	:2412 MHz	Temp./Humi.	:23 deg_C/62 RH
Operation Mode	:Band Edge LOW	Engineer	:Curry
EUT Pol.	:E2 Plane	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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	42.21	2.48	44.69	54.00	-9.31
2390.00	E	Peak	60.23	2.48	62.71	74.00	-11.29

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Operation Band :802.11 n20M  
 ARFCN :CH 11 Test Date :2014-09-29  
 Fundamental Frequency :2462 MHz Temp./Humi. :23 deg\_C/62 RH  
 Operation Mode :Band Edge HIGH Engineer :Curry  
 EUT Pol. :E2 Plane 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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	48.51	2.84	51.35	54.00	-2.65
2483.50	E	Peak	69.49	2.84	72.33	74.00	-1.67

Operation Band :802.11 n20M  
 ARFCN :CH 11 Test Date :2014-09-29  
 Fundamental Frequency :2462 MHz Temp./Humi. :23 deg\_C/62 RH  
 Operation Mode :Band Edge HIGH Engineer :Curry  
 EUT Pol. :E2 Plane 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	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	43.23	2.84	46.07	54.00	-7.93
2483.50	E	Peak	63.56	2.84	66.40	74.00	-7.60

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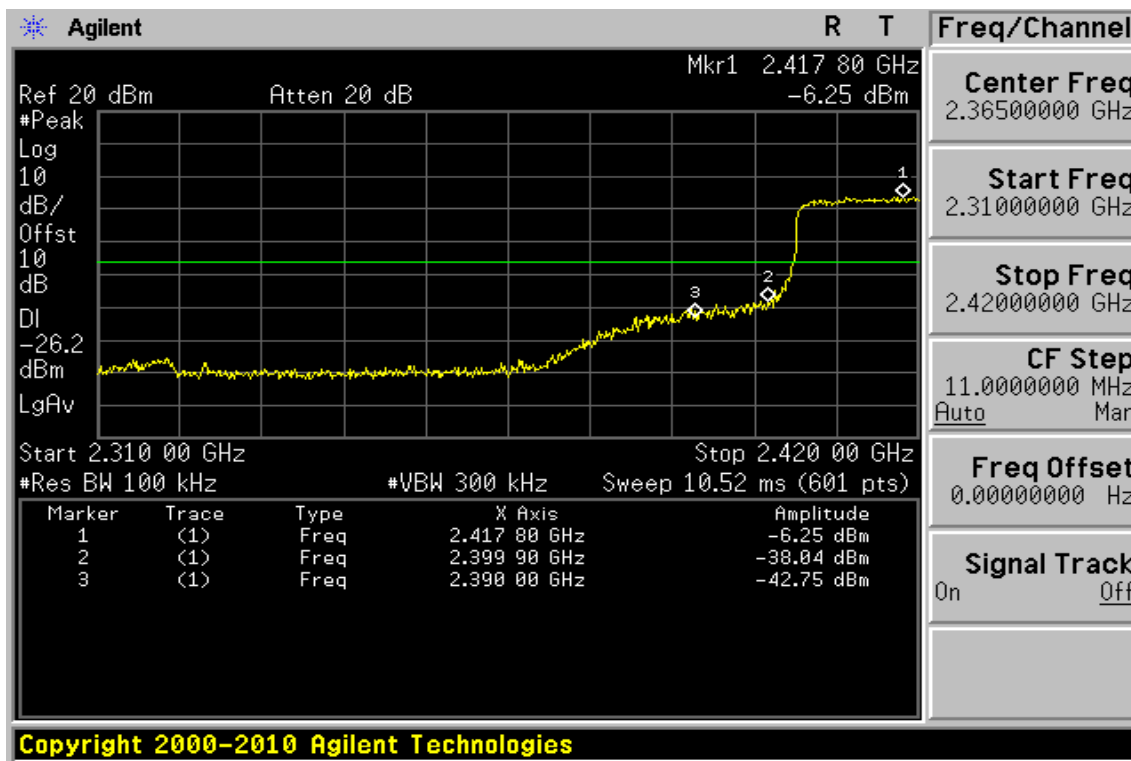
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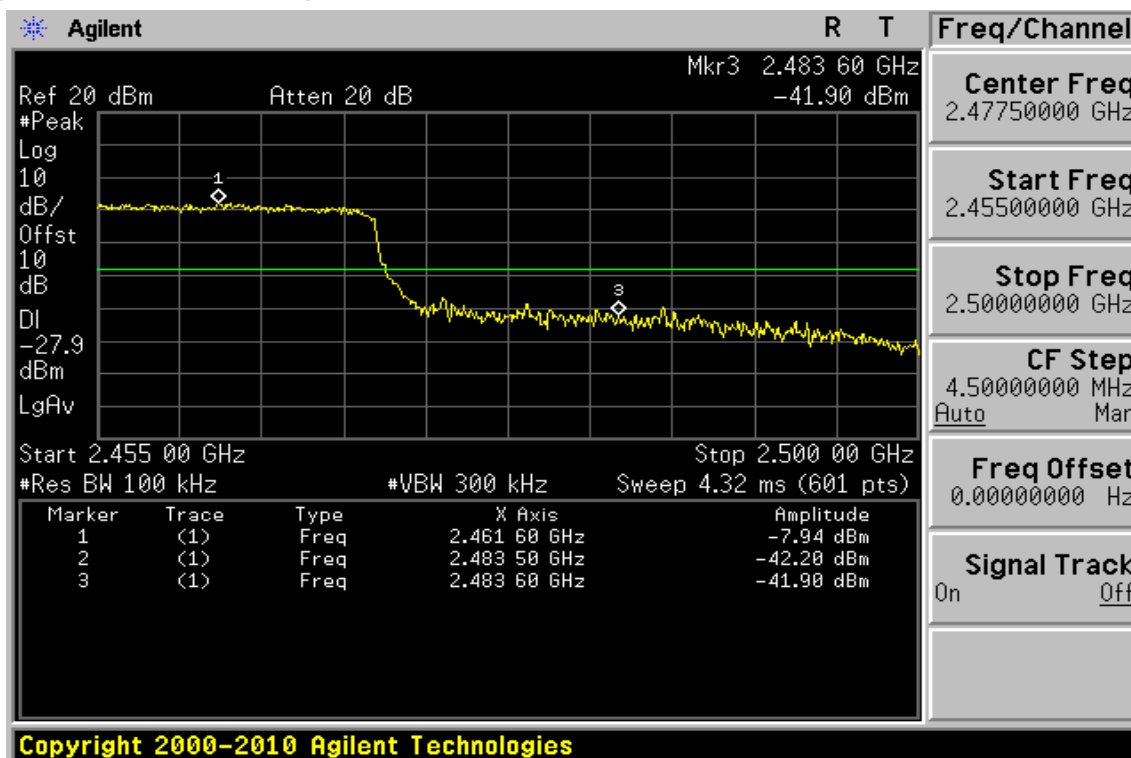
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## 802.11n\_40M - Unwanted Emissions into Non-Restricted Frequency Bands

### Band Edges Test Data CH-Low



### Band Edges Test Data CH-High



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**Radiated Emission: 802.11 n\_40M mode**

(Unwanted Emissions into Restricted Frequency Bands): 802.11 n\_40M mode

Operation Band	:802.11 n40M		
ARFCN	:CH 03	Test Date	:2014-09-29
Fundamental Frequency	:2422 MHz	Temp./Humi.	:23 deg_C/62 RH
Operation Mode	:Band Edge LOW	Engineer	:Curry
EUT Pol.	:E2 Plane	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	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2386.08	S	Average	49.20	2.46	51.66	54.00	-2.34
2386.08	S	Peak	68.78	2.46	71.24	74.00	-2.76
2390.00	E	Average	50.44	2.48	52.92	54.00	-1.08
2390.00	E	Peak	66.76	2.48	69.24	74.00	-4.76

Operation Band	:802.11 n40M		
ARFCN	:CH 03	Test Date	:2014-09-29
Fundamental Frequency	:2422 MHz	Temp./Humi.	:23 deg_C/62 RH
Operation Mode	:Band Edge LOW	Engineer	:Curry
EUT Pol.	:E2 Plane	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	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2385.84	S	Average	40.70	2.46	43.16	54.00	-10.84
2385.84	S	Peak	62.00	2.46	64.46	74.00	-9.54
2390.00	E	Average	42.28	2.48	44.76	54.00	-9.24
2390.00	E	Peak	58.74	2.48	61.22	74.00	-12.78

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Operation Band :802.11 n40M  
 ARFCN :CH 09 Test Date :2014-09-29  
 Fundamental Frequency :2452 MHz Temp./Humi. :23 deg\_C/62 RH  
 Operation Mode :Band Edge HIGH Engineer :Curry  
 EUT Pol. :E2 Plane 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	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	49.71	2.84	52.55	54.00	-1.45
2483.50	E	Peak	68.74	2.84	71.58	74.00	-2.42
2485.80	S	Average	48.77	2.85	51.62	54.00	-2.38
2485.80	S	Peak	70.10	2.85	72.95	74.00	-1.05

Operation Band :802.11 n40M  
 ARFCN :CH 09 Test Date :2014-09-29  
 Fundamental Frequency :2452 MHz Temp./Humi. :23 deg\_C/62 RH  
 Operation Mode :Band Edge HIGH Engineer :Curry  
 EUT Pol. :E2 Plane 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	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	42.87	2.84	45.71	54.00	-8.29
2483.50	E	Peak	62.11	2.84	64.95	74.00	-9.05
2485.60	S	Average	41.57	2.85	44.42	54.00	-9.58
2485.60	S	Peak	63.50	2.85	66.35	74.00	-7.65

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## 10 SPURIOUS EMISSION TEST

### 10.1 Standard Applicable

According to §15.247(d),

Emission at antenna port:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Radiated Spurious Emission

Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

### 10.2 Measurement Equipment Used:

#### 10.2.1 Conducted Emission at antenna port:

Refer to section 7.2 for details.

#### 10.2.2 Radiated emission:

Refer to section 9.2.2 for details.

### 10.3 Test SET-UP:

#### 10.3.1 Conducted Emission at antenna port:

Refer to section 7.3 for details.

#### 10.3.2 Radiated emission:

Refer to section 9.3.2 for details.

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## 10.4 Measurement Procedure:

### Radiated Emission:

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. When 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.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
7. Repeat above procedures until all default test channel measured were complete.

### Conducted Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 100K & VBW = 300K on Spectrum.
3. Sweep the frequency to determine spurious emission as seen on spectrum from span of 30 to 3G, 3G to 8G, 8G to 13G, 13G to 18G and 18G to 26.5GHz, 18G to 40GHz (applicable if operation mode is 5GHz)
4. Via Software, combine 5 spans of frequency range into one plot
5. Repeat above procedures until all default test channel measured were complete.

## 10.5 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	

## 10.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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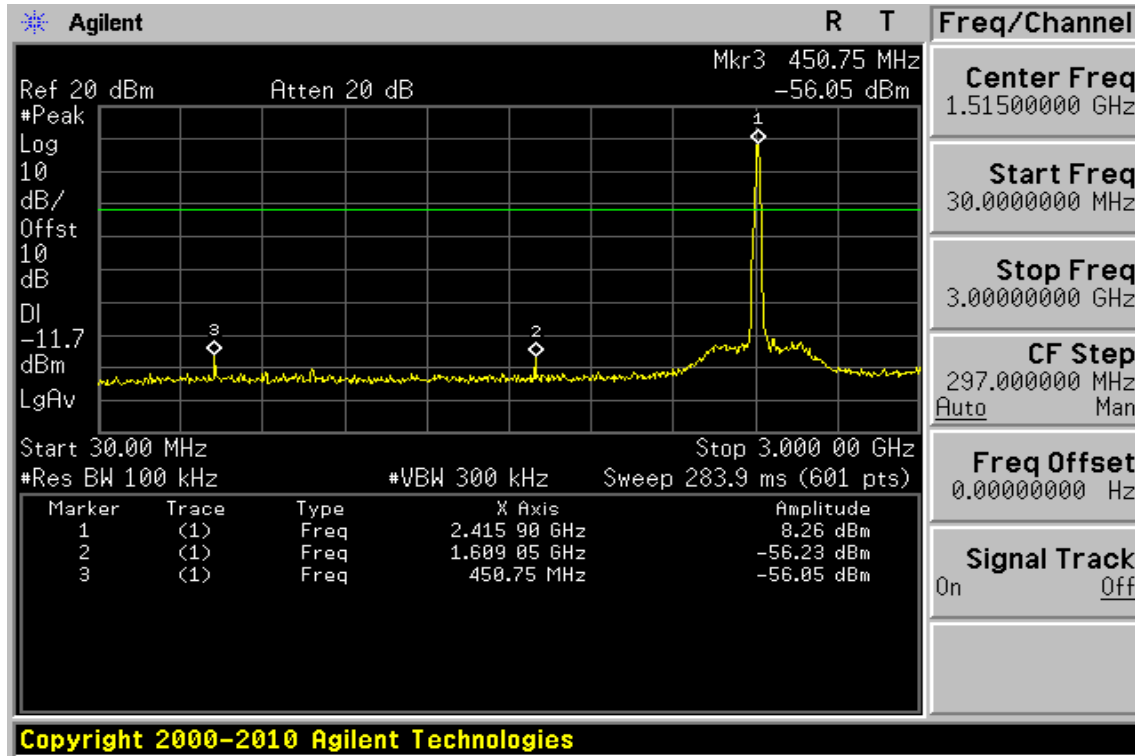
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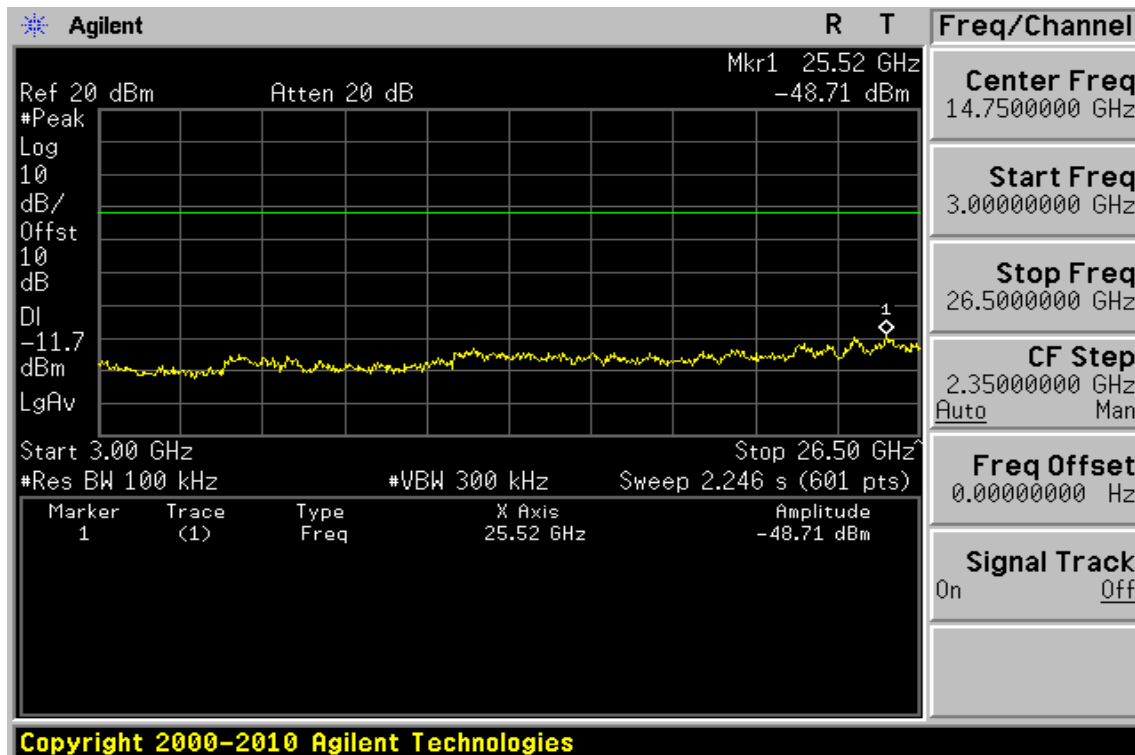
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## Conducted Spurious Emission Measurement Result (802.11b)

### Ch Low 30MHz – 3GHz



### Ch Low 3GHz – 26.5GHz



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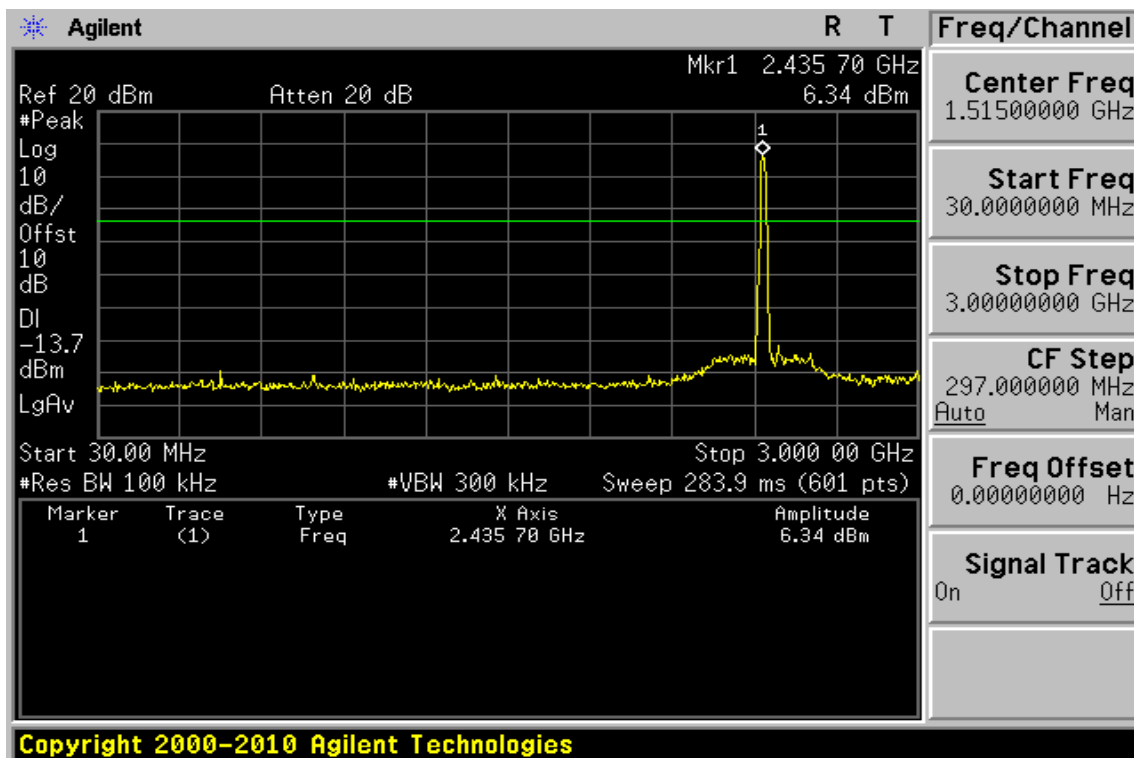
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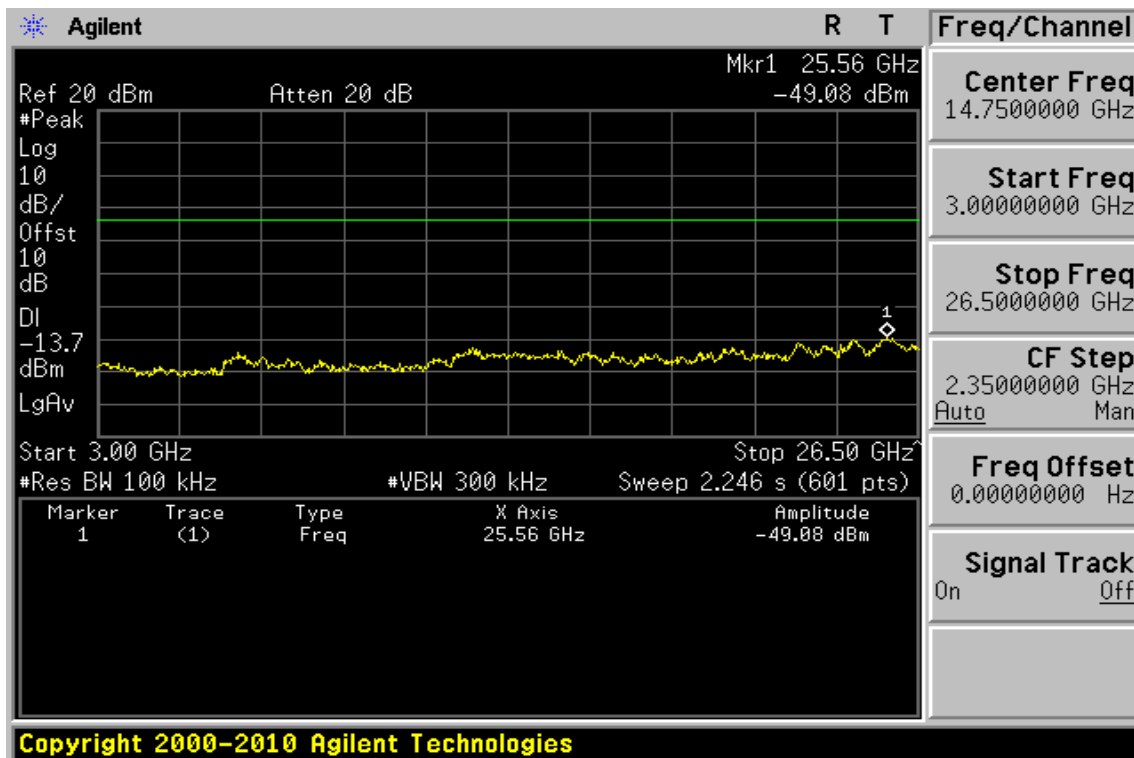
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## Ch Mid 30MHz – 3GHz



## Ch Mid 3GHz – 26.5GHz



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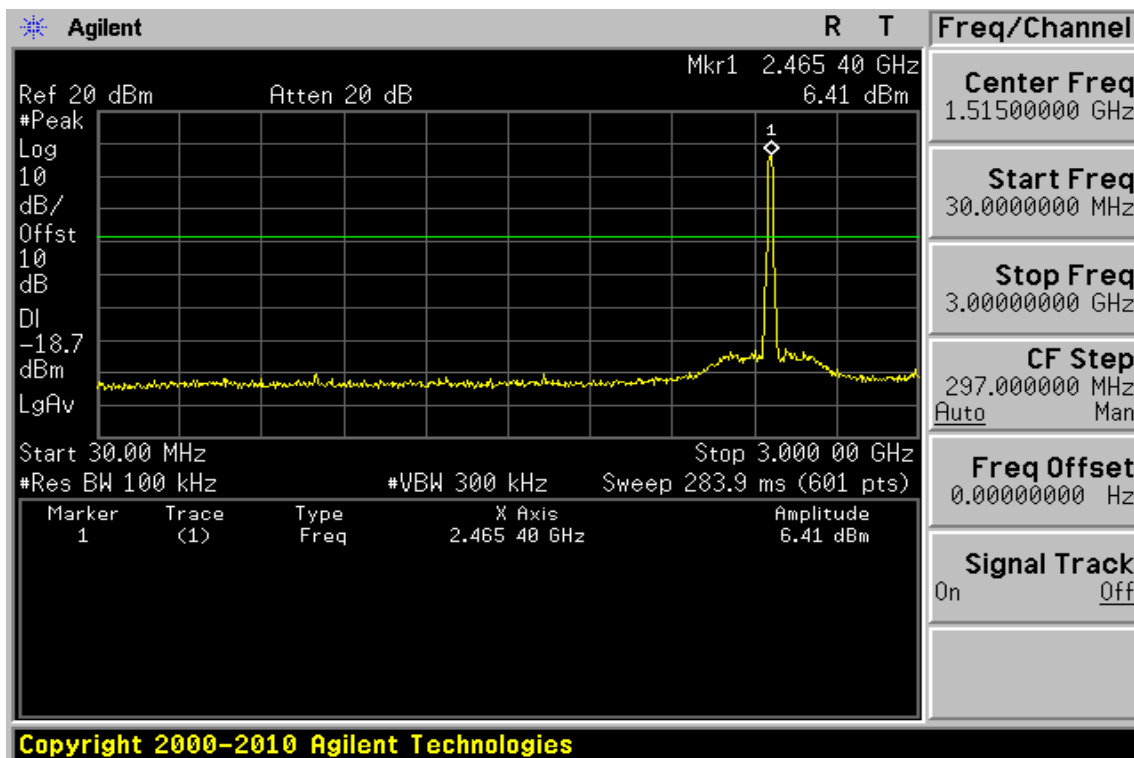
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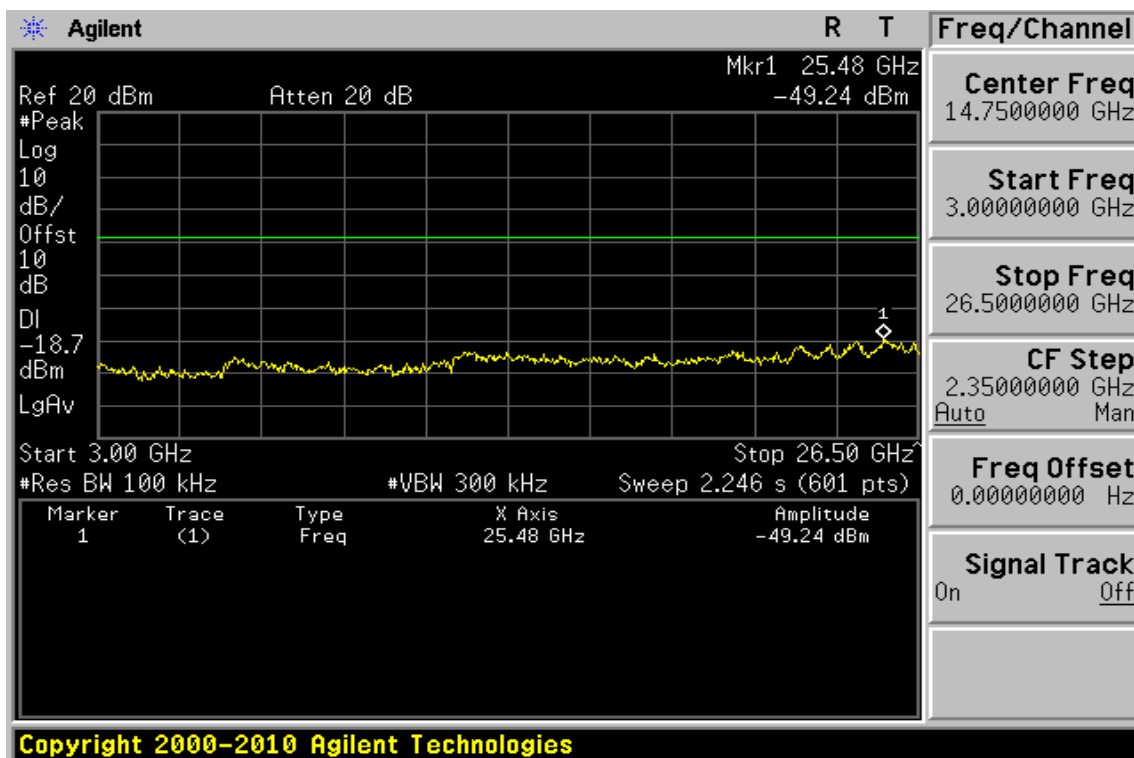
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## Ch High 30MHz – 3GHz



## Ch High 3GHz – 26.5GHz



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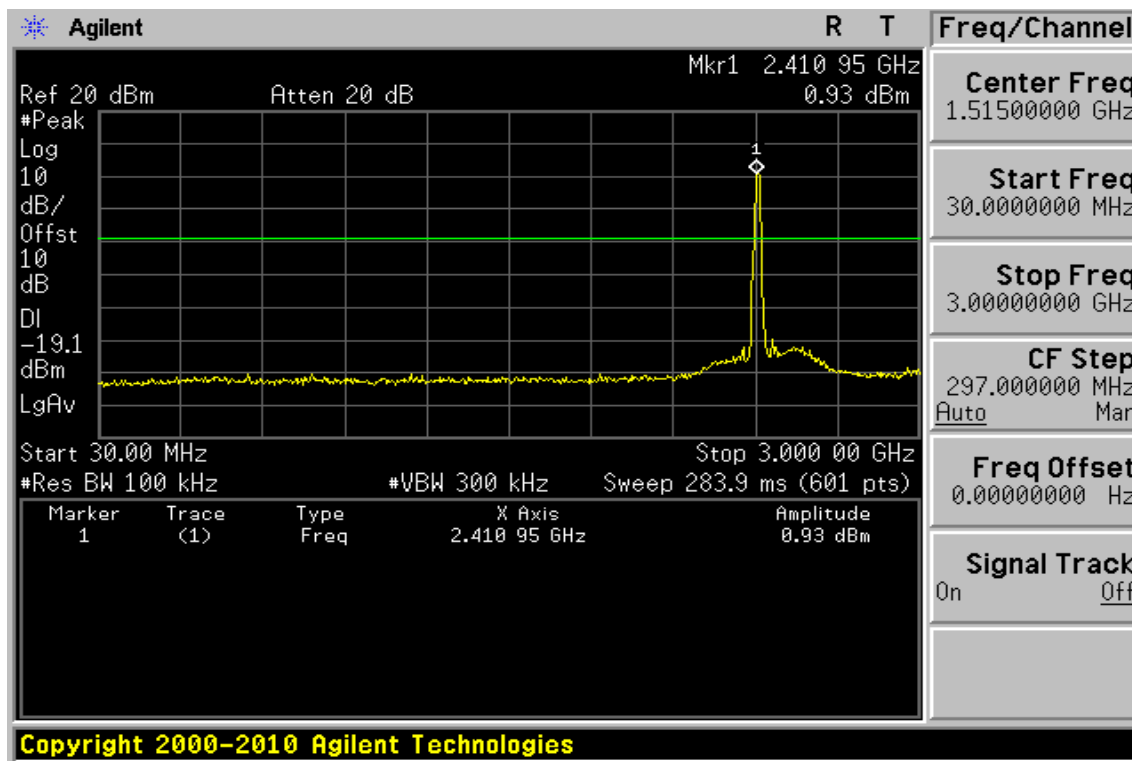
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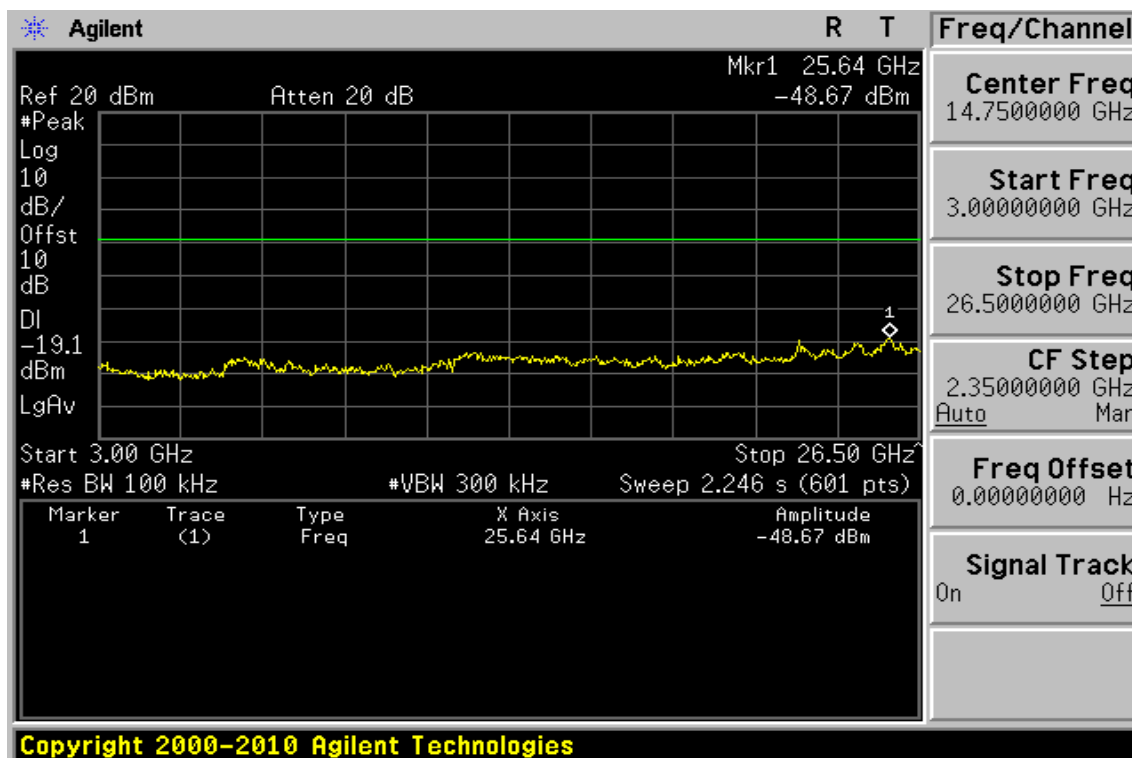
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## Conducted Spurious Emission Measurement Result (802.11g)

### Ch Low 30MHz – 3GHz



### Ch Low 3GHz – 26.5GHz



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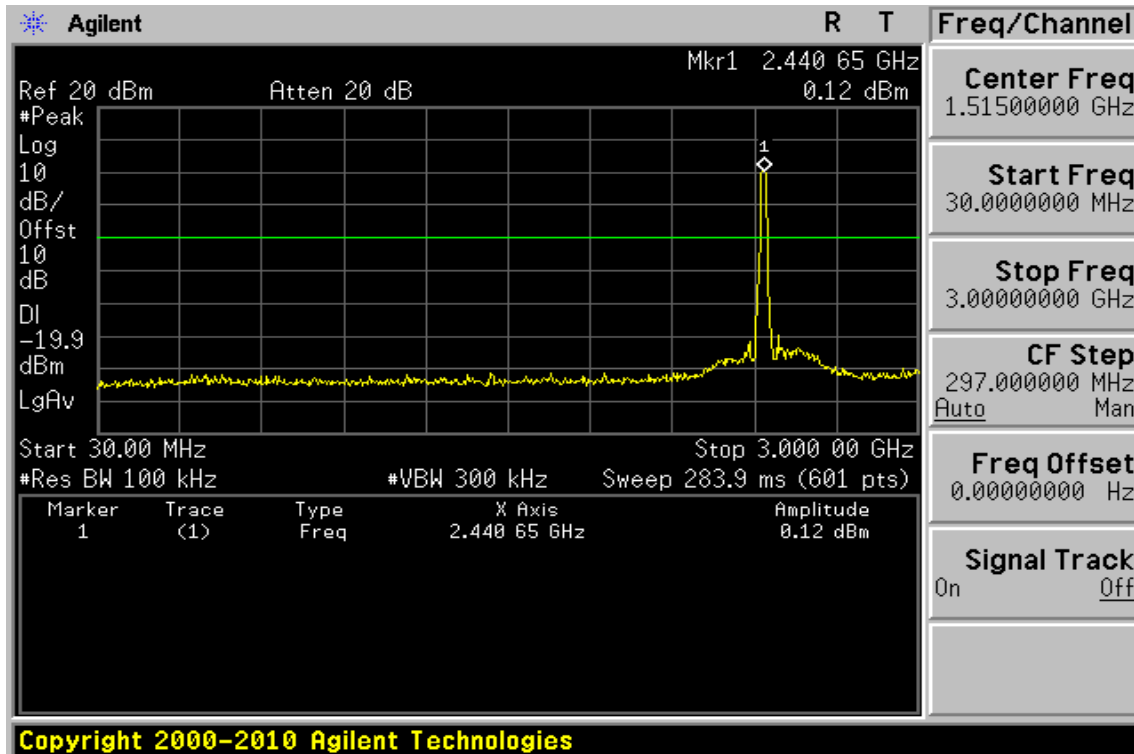
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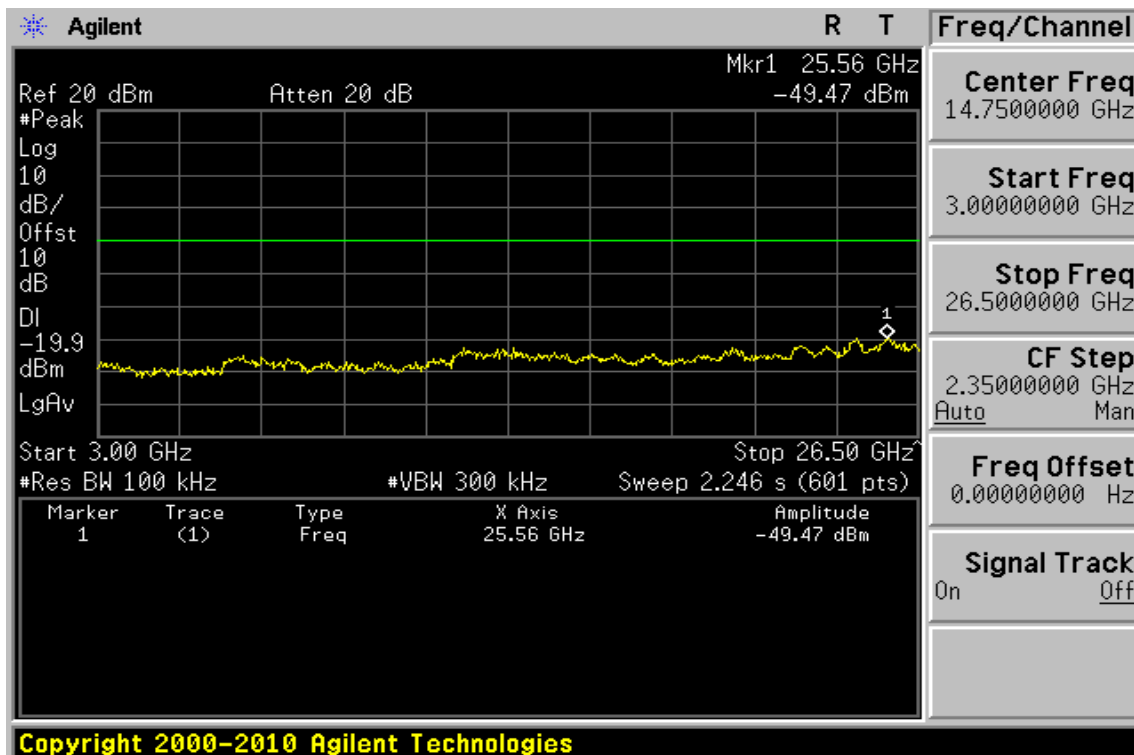
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## Ch Mid 30MHz – 3GHz



## Ch Mid 3GHz – 26.5GHz



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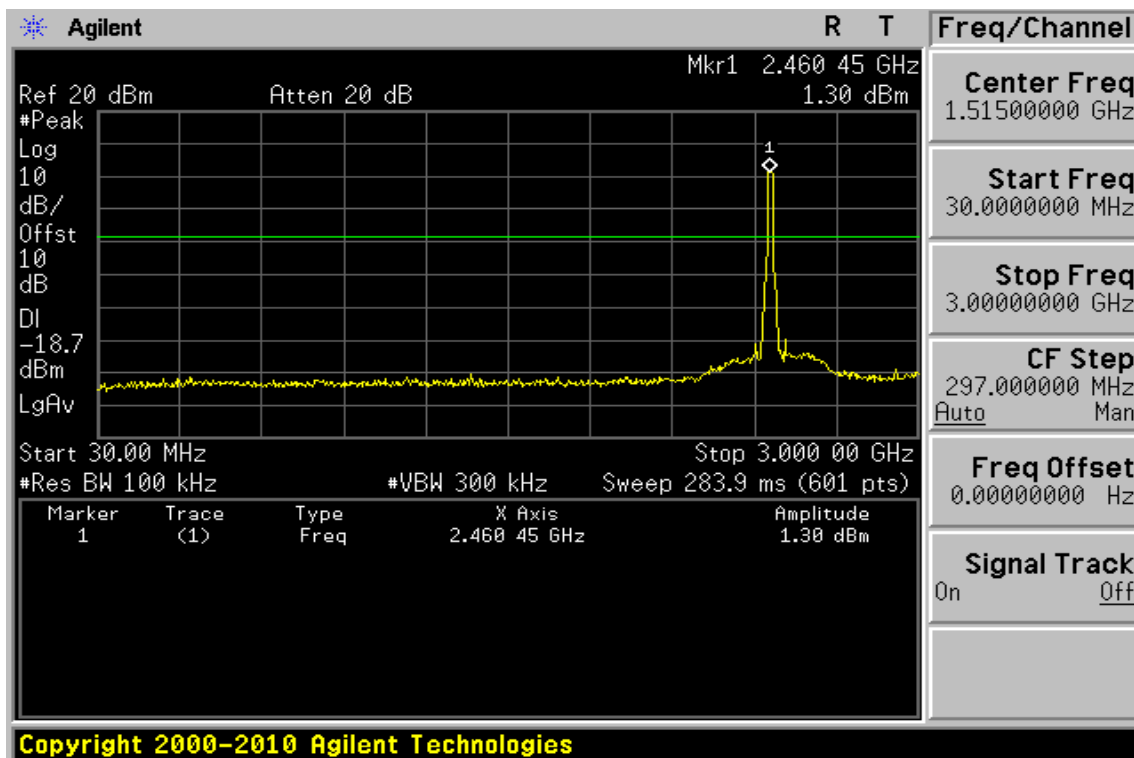
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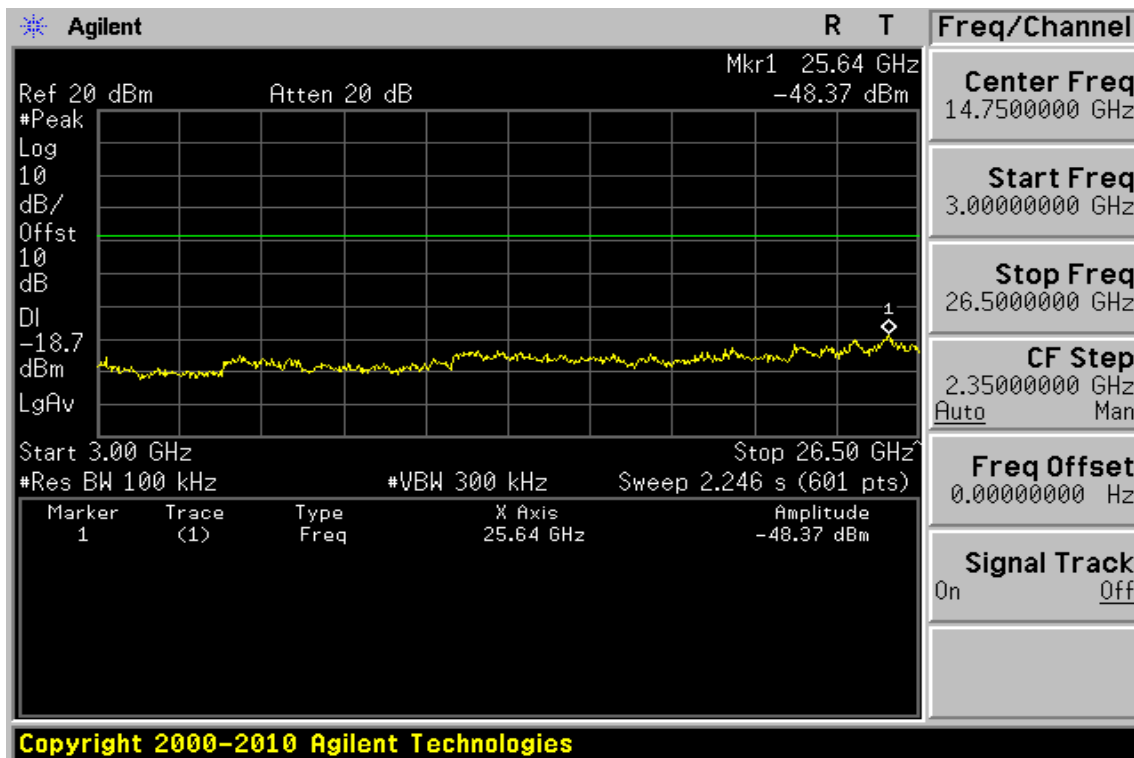
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## Ch High 30MHz – 3GHz



## Ch High 3GHz – 26.5GHz



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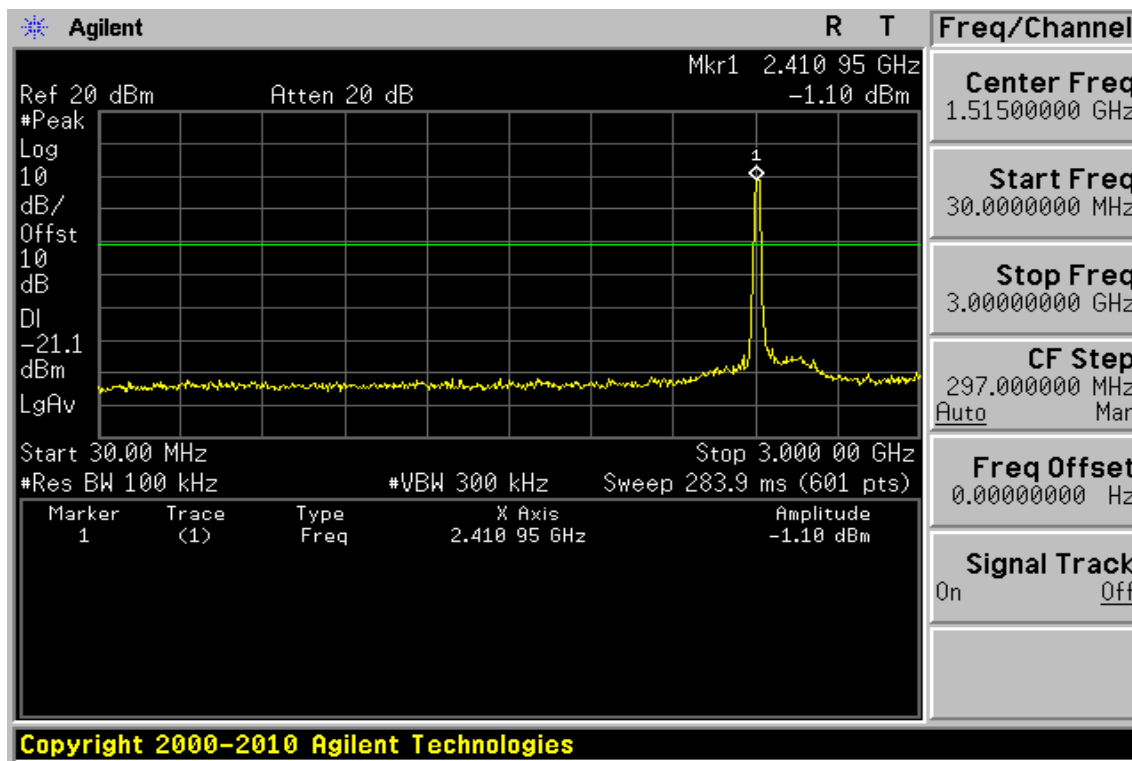
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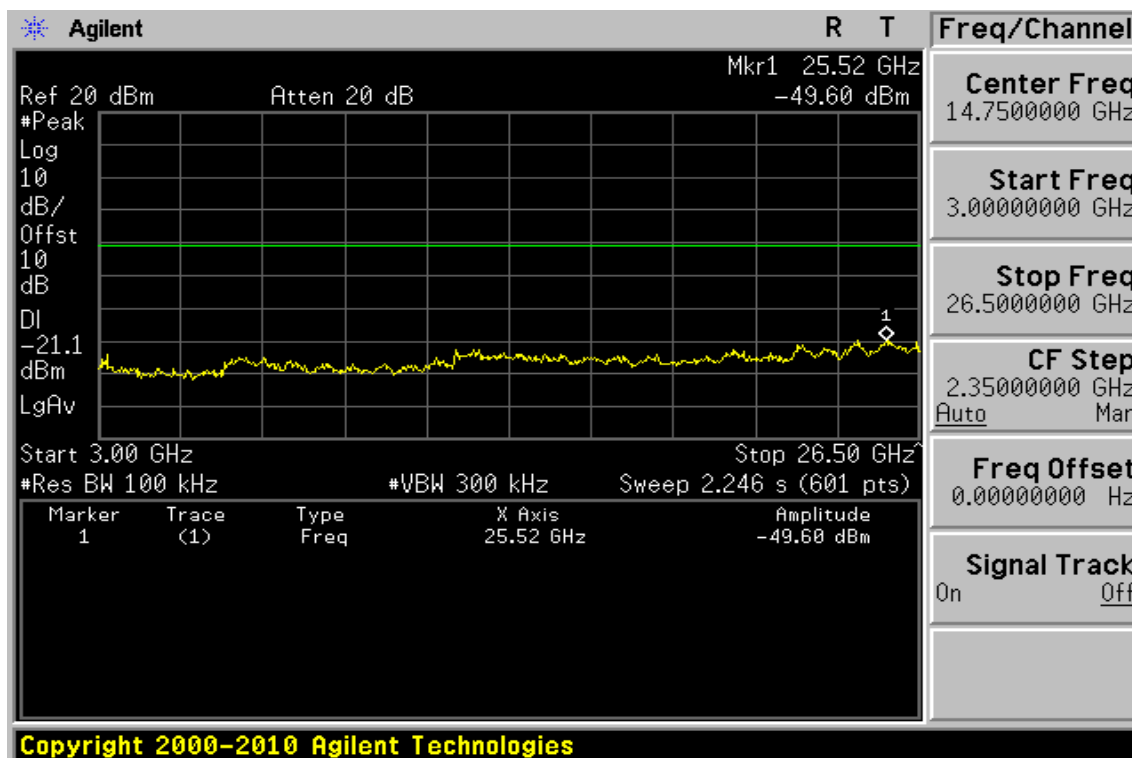
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## Conducted Spurious Emission Measurement Result (802.11n\_20M)

### Ch Low 30MHz – 3GHz



### Ch Low 3GHz – 26.5GHz



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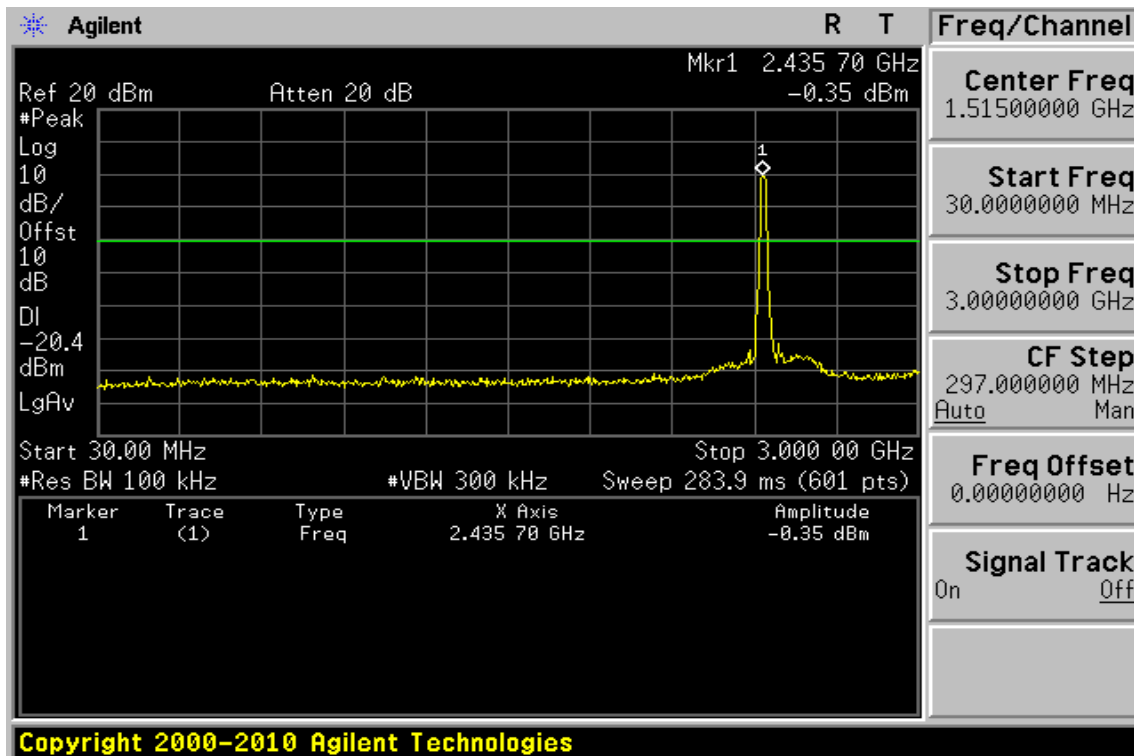
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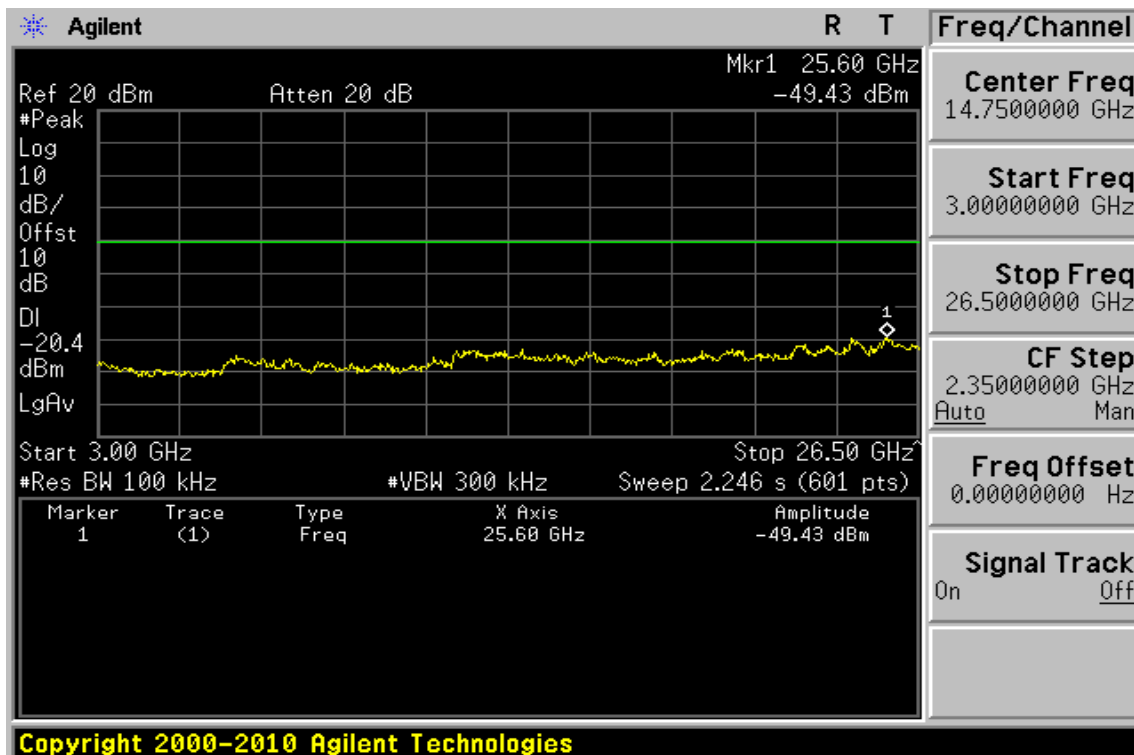
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## Ch Mid 30MHz – 3GHz



## Ch Mid 3GHz – 26.5GHz



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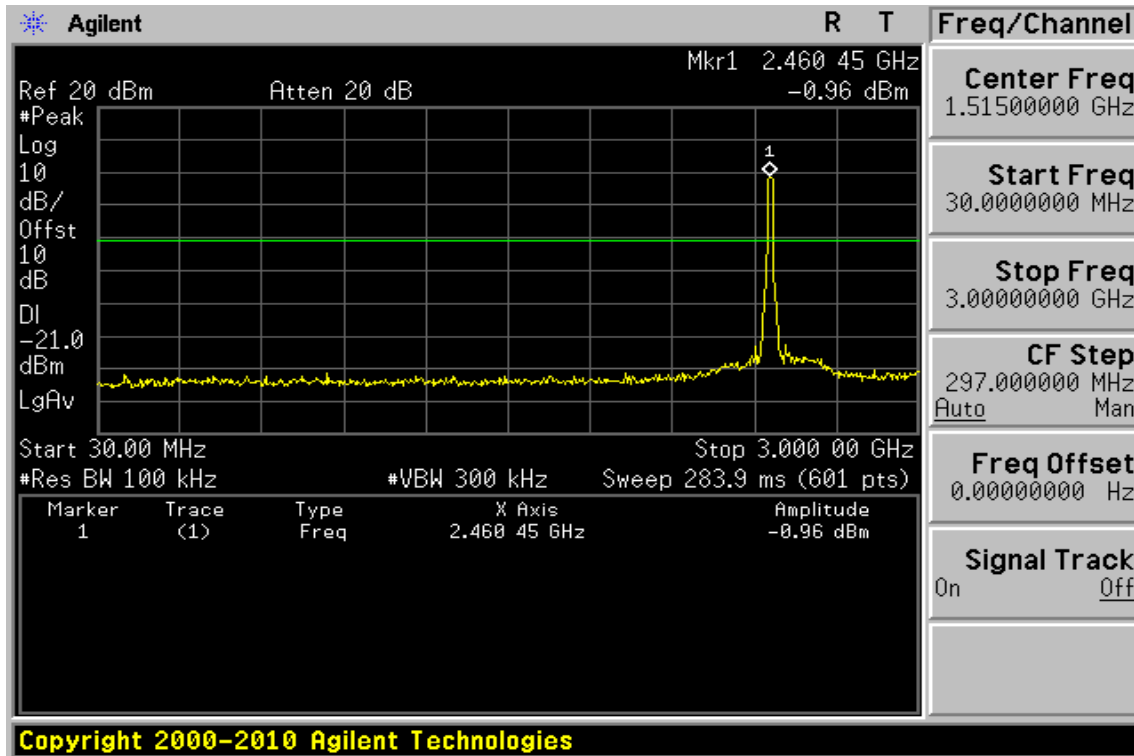
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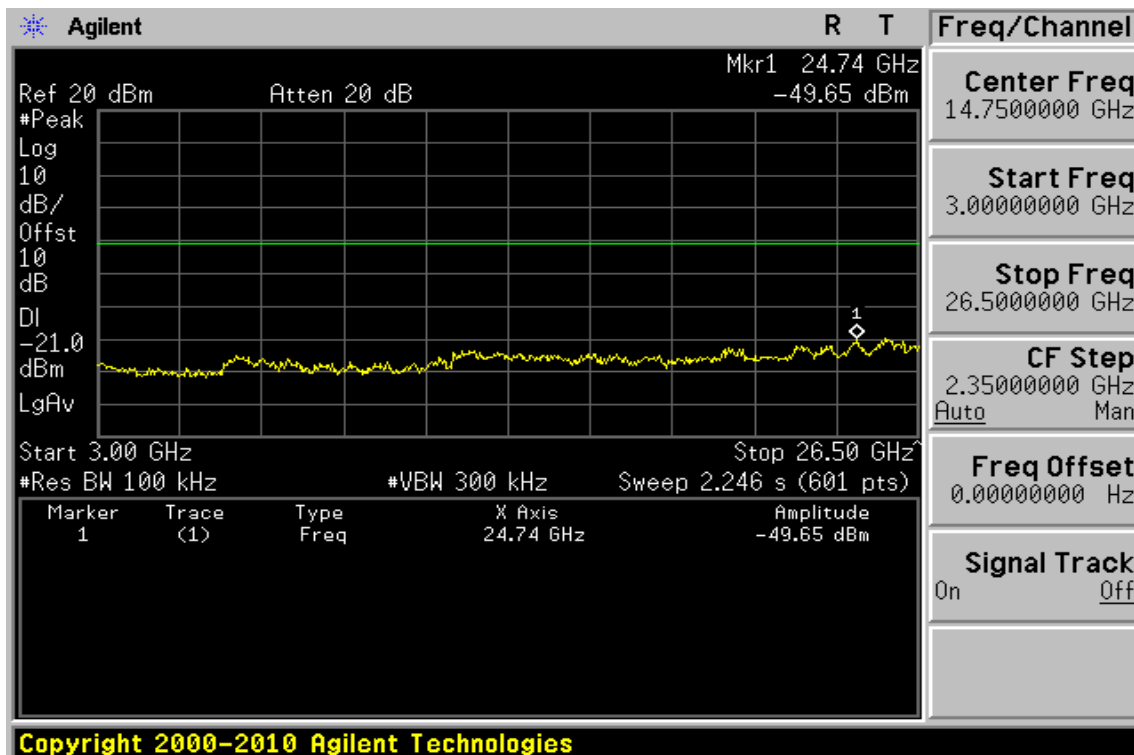
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## Ch High 30MHz – 3GHz



## Ch High 3GHz – 26.5GHz



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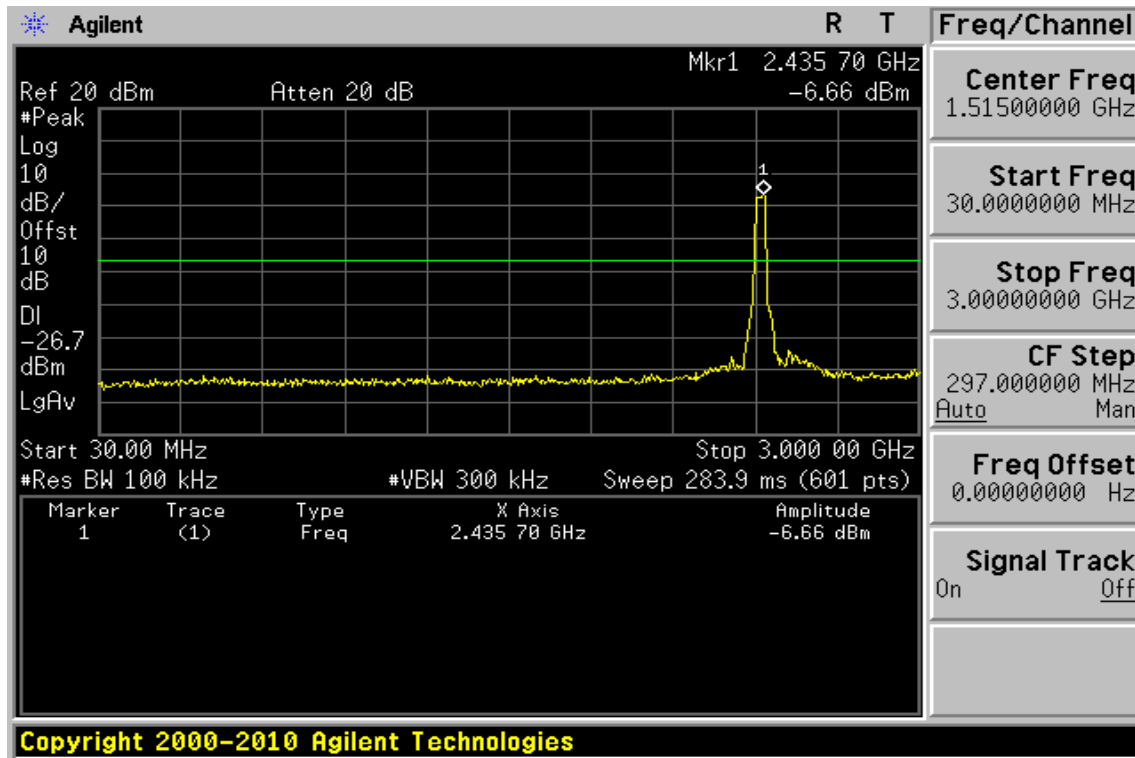
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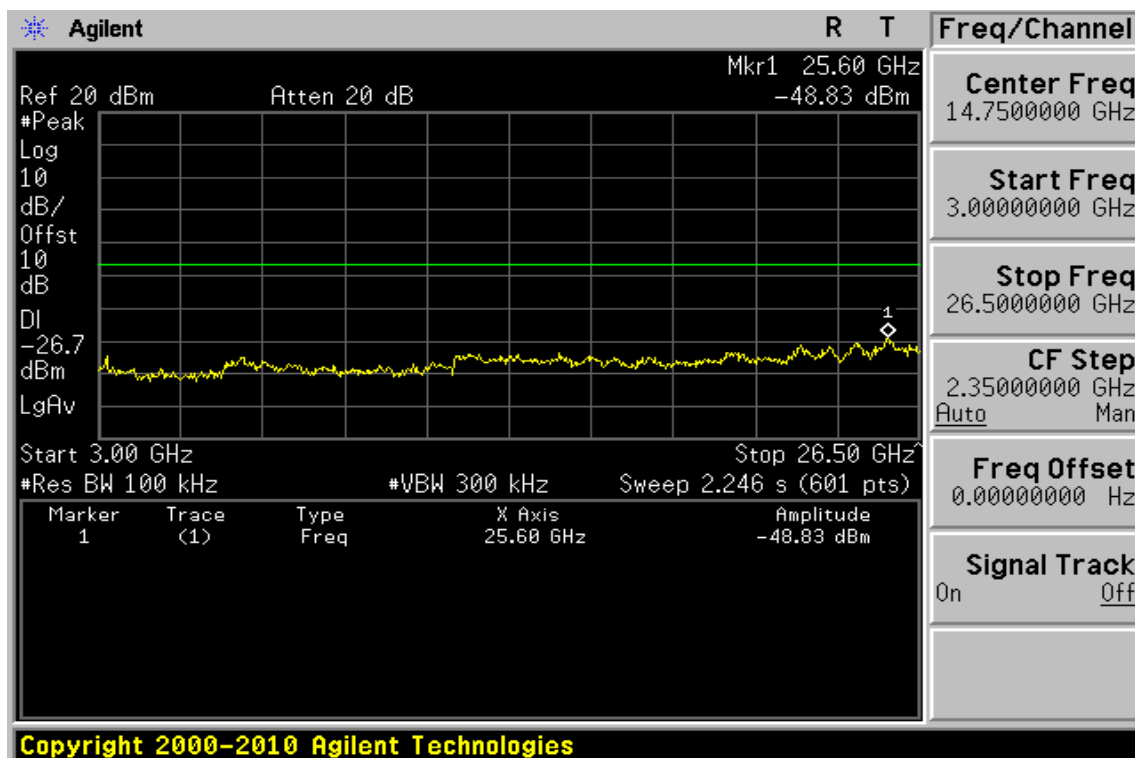


## Conducted Spurious Emission Measurement Result (802.11n\_40M)

### Ch Low 30MHz – 3GHz



### Ch Low 3GHz – 26.5GHz



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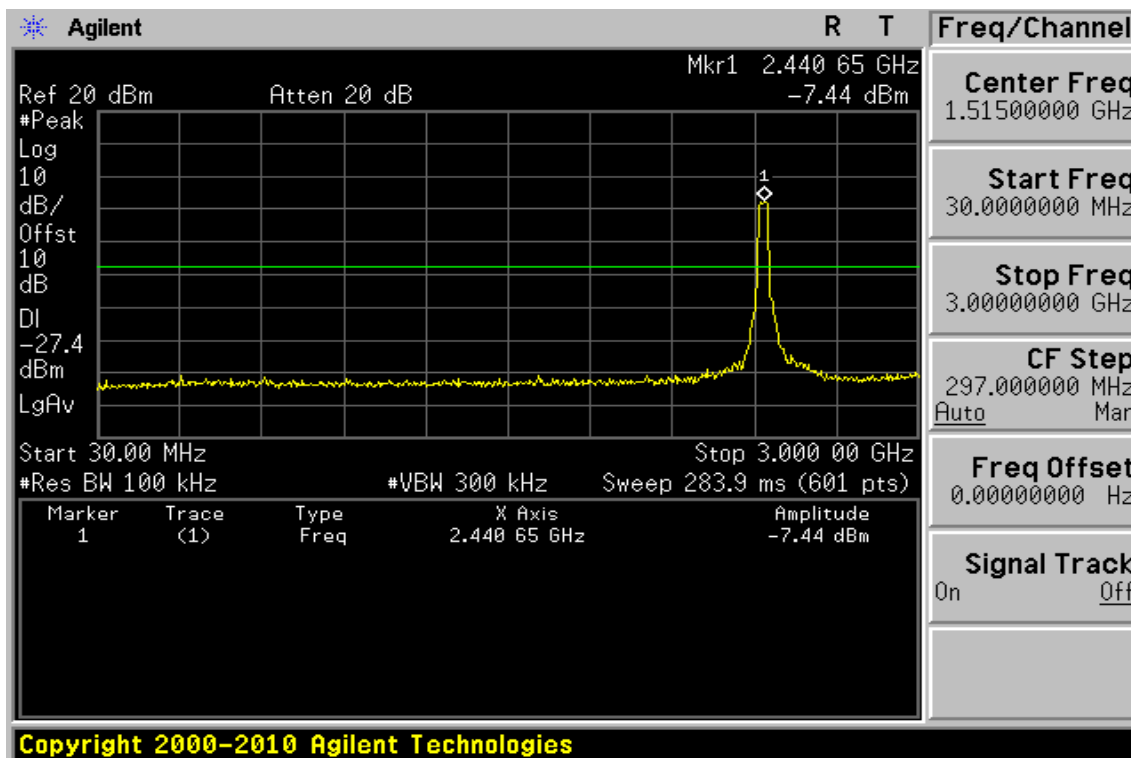
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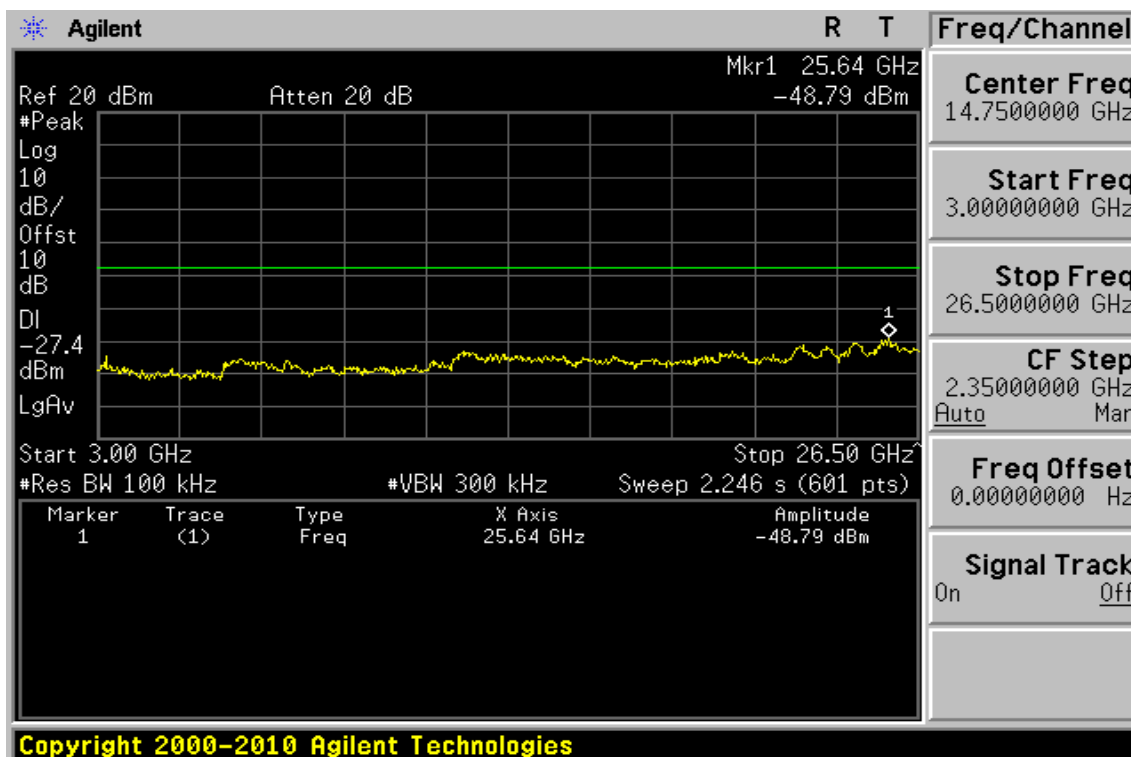
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## Ch Mid 30MHz – 3GHz



## Ch Mid 3GHz – 26.5GHz



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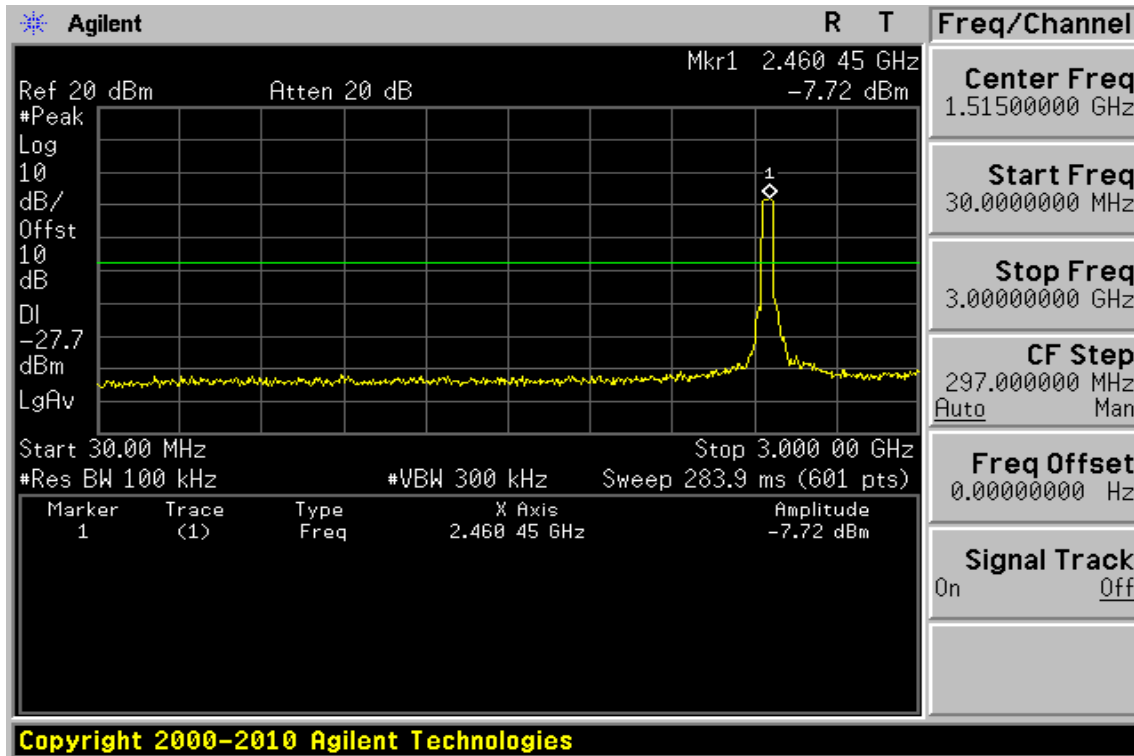
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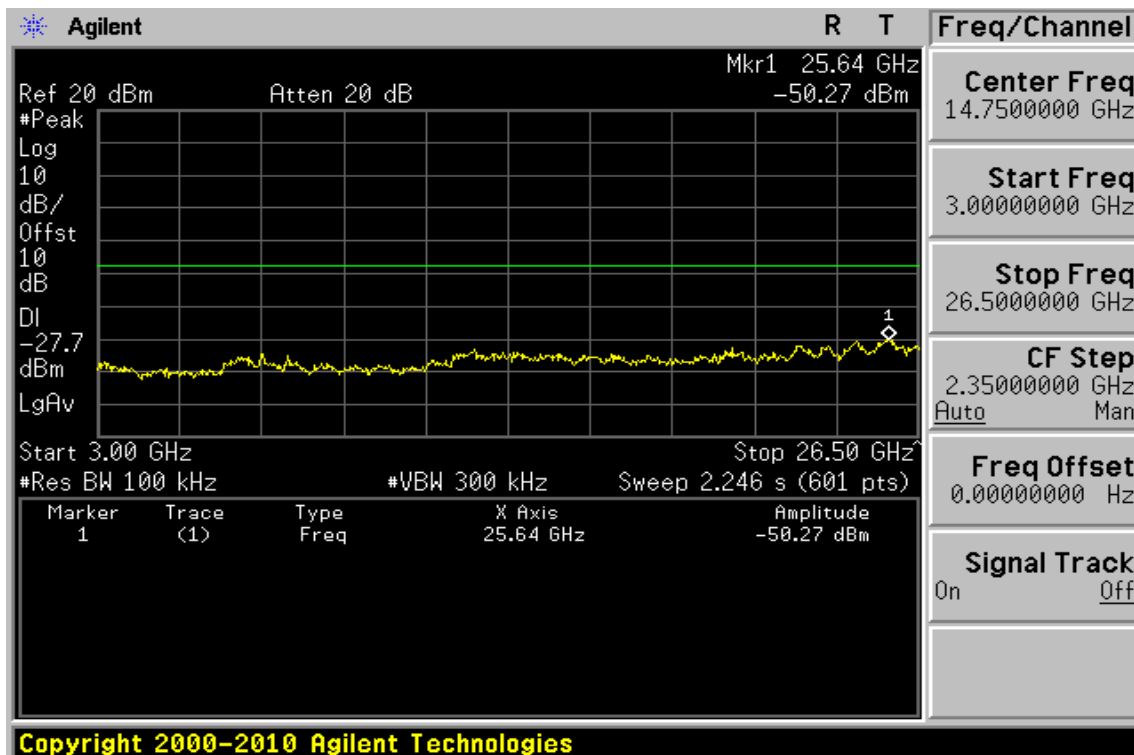
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## Ch High 30MHz – 3GHz



## Ch High 3GHz – 26.5GHz



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**Radiated Spurious Emission Measurement Result (802.11b)**

Operation Band	:802.11b	Test Date	:2014-09-29
ARFCN	:CH 01	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:TX LOW	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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
72.68	S	Peak	51.37	-15.74	35.63	40.00	-4.37
125.06	S	Peak	51.10	-14.58	36.52	43.50	-6.98
250.19	S	Peak	55.78	-13.06	42.72	46.00	-3.28
375.32	S	Peak	47.47	-9.57	37.90	46.00	-8.10
624.61	S	Peak	47.35	-5.82	41.53	46.00	-4.47
874.87	S	Peak	44.61	-1.50	43.11	46.00	-2.89
3219.00	S	Average	48.77	3.44	52.21	54.00	-1.79
3219.00	S	Peak	50.26	3.44	53.70	74.00	-20.30
4824.00	H	Average	44.11	6.85	50.96	54.00	-3.04
4824.00	H	Peak	46.85	6.85	53.70	74.00	-20.30
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

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Operation Band	:802.11b	Test Date	:2014-09-29
ARFCN	:CH 01	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:TX LOW	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.09	-14.58	40.51	43.50	-2.99
250.19	S	Peak	56.84	-13.06	43.78	46.00	-2.22
375.32	S	Peak	53.35	-9.57	43.78	46.00	-2.22
500.45	S	Peak	46.65	-7.42	39.23	46.00	-6.77
624.61	S	Peak	44.98	-5.82	39.16	46.00	-6.84
874.87	S	Peak	44.99	-1.50	43.49	46.00	-2.51
4824.00	H	Average	45.86	6.85	52.71	54.00	-1.29
4824.00	H	Peak	47.93	6.85	54.78	74.00	-19.22
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

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Operation Band	:802.11b	Test Date	:2014-09-29
ARFCN	:CH 06	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2437 MHz	Engineer	:Curry
Operation Mode	:TX MID	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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
73.65	S	Peak	52.45	-15.92	36.53	40.00	-3.47
125.06	S	Peak	51.39	-14.58	36.81	43.50	-6.69
250.19	S	Peak	55.58	-13.06	42.52	46.00	-3.48
375.32	S	Peak	47.58	-9.57	38.01	46.00	-7.99
624.61	S	Peak	47.43	-5.82	41.61	46.00	-4.39
874.87	S	Peak	44.91	-1.50	43.41	46.00	-2.59
3247.00	S	Average	45.57	3.46	49.03	54.00	-4.97
3247.00	S	Peak	47.96	3.46	51.42	74.00	-22.58
4874.00	H	Average	43.61	6.93	50.54	54.00	-3.46
4874.00	H	Peak	45.54	6.93	52.47	74.00	-21.53
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

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Operation Band	:802.11b	Test Date	:2014-09-29
ARFCN	:CH 06	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2437 MHz	Engineer	:Curry
Operation Mode	:TX MID	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.20	-14.58	40.62	43.50	-2.88
250.19	S	Peak	56.41	-13.06	43.35	46.00	-2.65
375.32	S	Peak	53.33	-9.57	43.76	46.00	-2.24
500.45	S	Peak	46.59	-7.42	39.17	46.00	-6.83
624.61	S	Peak	44.41	-5.82	38.59	46.00	-7.41
874.87	S	Peak	45.18	-1.50	43.68	46.00	-2.32
4874.00	H	Average	44.75	6.93	51.68	54.00	-2.32
4874.00	H	Peak	46.51	6.93	53.44	74.00	-20.56
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

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Operation Band	:802.11b	Test Date	:2014-09-29
ARFCN	:CH 11	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2462 MHz	Engineer	:Curry
Operation Mode	:TX HIGH	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
74.62	S	Peak	52.56	-16.11	36.45	40.00	-3.55
125.06	S	Peak	51.02	-14.58	36.44	43.50	-7.06
250.19	S	Peak	57.02	-13.06	43.96	46.00	-2.04
500.45	S	Peak	43.47	-7.42	36.05	46.00	-9.95
624.61	S	Peak	47.64	-5.82	41.82	46.00	-4.18
874.87	S	Peak	44.59	-1.50	43.09	46.00	-2.91
3282.00	S	Average	47.37	3.49	50.86	54.00	-3.14
3282.00	S	Peak	49.58	3.49	53.07	74.00	-20.93
4924.00	H	Average	46.26	6.99	53.25	54.00	-0.75
4924.00	H	Peak	48.07	6.99	55.06	74.00	-18.94
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

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Operation Band	:802.11b	Test Date	:2014-09-29
ARFCN	:CH 11	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2462 MHz	Engineer	:Curry
Operation Mode	:TX HIGH	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.37	-14.58	40.79	43.50	-2.71
250.19	S	Peak	56.31	-13.06	43.25	46.00	-2.75
375.32	S	Peak	53.06	-9.57	43.49	46.00	-2.51
500.45	S	Peak	46.24	-7.42	38.82	46.00	-7.18
624.61	S	Peak	44.81	-5.82	38.99	46.00	-7.01
874.87	S	Peak	44.97	-1.50	43.47	46.00	-2.53
4924.00	H	Average	46.05	6.99	53.49	54.00	-0.51
4924.00	H	Peak	49.28	6.99	56.27	74.00	-17.73
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

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**Radiated Spurious Emission Measurement Result (802.11g)**

Operation Band	:802.11 g	Test Date	:2014-09-29
ARFCN	:CH 01	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:TX LOW	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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
70.74	S	Peak	51.02	-15.35	35.67	40.00	-4.33
125.06	S	Peak	50.84	-14.58	36.26	43.50	-7.24
250.19	S	Peak	55.81	-13.06	42.75	46.00	-3.25
375.32	S	Peak	47.92	-9.57	38.35	46.00	-7.65
624.61	S	Peak	47.30	-5.82	41.48	46.00	-4.52
874.87	S	Peak	44.82	-1.50	43.32	46.00	-2.68
4824.00	H	Average	28.53	6.85	35.38	54.00	-18.62
4824.00	H	Peak	38.88	6.85	45.73	74.00	-28.27
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

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Operation Band	:802.11 g	Test Date	:2014-09-29
ARFCN	:CH 01	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:TX LOW	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.28	-14.58	40.70	43.50	-2.80
250.19	S	Peak	56.41	-13.06	43.35	46.00	-2.65
375.32	S	Peak	53.14	-9.57	43.57	46.00	-2.43
500.45	S	Peak	46.01	-7.42	38.59	46.00	-7.41
624.61	S	Peak	44.74	-5.82	38.92	46.00	-7.08
874.87	S	Peak	44.36	-1.50	42.86	46.00	-3.14
4824.00	H	Average	27.29	6.85	34.14	54.00	-19.86
4824.00	H	Peak	40.75	6.85	47.60	74.00	-26.40
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

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Operation Band	:802.11 g	Test Date	:2014-09-29
ARFCN	:CH 06	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2437 MHz	Engineer	:Curry
Operation Mode	:TX MID	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
73.65	S	Peak	51.79	-15.92	35.87	40.00	-4.13
125.06	S	Peak	51.26	-14.58	36.68	43.50	-6.82
250.19	S	Peak	54.47	-13.06	41.41	46.00	-4.59
500.45	S	Peak	43.84	-7.42	36.42	46.00	-9.58
624.61	S	Peak	47.27	-5.82	41.45	46.00	-4.55
874.87	S	Peak	43.53	-1.50	42.03	46.00	-3.97
3247.00	S	Average	46.91	3.46	50.37	54.00	-3.63
3247.00	S	Peak	48.24	3.46	51.70	74.00	-22.30
4874.00	H	Average	27.88	6.93	34.81	54.00	-19.19
4874.00	H	Peak	38.94	6.93	45.87	74.00	-28.13
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

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Operation Band	:802.11 g	Test Date	:2014-09-29
ARFCN	:CH 06	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2437 MHz	Engineer	:Curry
Operation Mode	:TX MID	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.32	-14.58	40.74	43.50	-2.76
250.19	S	Peak	54.38	-13.06	41.32	46.00	-4.68
375.32	S	Peak	53.21	-9.57	43.64	46.00	-2.36
500.45	S	Peak	46.53	-7.42	39.11	46.00	-6.89
624.61	S	Peak	44.24	-5.82	38.42	46.00	-7.58
874.87	S	Peak	43.49	-1.50	41.99	46.00	-4.01
4874.00	H	Average	25.90	6.93	32.83	54.00	-21.17
4874.00	H	Peak	37.44	6.93	44.37	74.00	-29.63
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

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Operation Band	:802.11 g	Test Date	:2014-09-29
ARFCN	:CH 11	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2462 MHz	Engineer	:Curry
Operation Mode	:TX HIGH	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
69.77	S	Peak	52.03	-15.17	36.86	40.00	-3.14
125.06	S	Peak	51.03	-14.58	36.45	43.50	-7.05
250.19	S	Peak	55.66	-13.06	42.60	46.00	-3.40
375.32	S	Peak	47.68	-9.57	38.11	46.00	-7.89
624.61	S	Peak	47.17	-5.82	41.35	46.00	-4.65
874.87	S	Peak	44.70	-1.50	43.20	46.00	-2.80
3282.00	S	Average	44.64	3.49	48.13	54.00	-5.87
3282.00	S	Peak	46.68	3.49	50.17	74.00	-23.83
4924.00	H	Average	28.91	6.99	35.90	54.00	-18.10
4924.00	H	Peak	39.80	6.99	46.79	74.00	-27.21
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

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Operation Band	:802.11 g	Test Date	:2014-09-29
ARFCN	:CH 11	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2462 MHz	Engineer	:Curry
Operation Mode	:TX HIGH	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.30	-14.58	40.72	43.50	-2.78
250.19	S	Peak	55.68	-13.06	42.62	46.00	-3.38
375.32	S	Peak	53.52	-9.57	43.95	46.00	-2.05
500.45	S	Peak	46.09	-7.42	38.67	46.00	-7.33
624.61	S	Peak	44.18	-5.82	38.36	46.00	-7.64
874.87	S	Peak	44.98	-1.50	43.48	46.00	-2.52
4924.00	H	Average	26.61	6.99	33.60	54.00	-20.40
4924.00	H	Peak	37.96	6.99	44.95	74.00	-29.05
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

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**Radiated Spurious Emission Measurement Result (802.11n\_20M)**

Operation Band	:802.11 n20M	Test Date	:2014-09-29
ARFCN	:CH 01	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:TX LOW	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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
69.77	S	Peak	51.04	-15.17	35.87	40.00	-4.13
125.06	S	Peak	51.46	-14.58	36.88	43.50	-6.62
250.19	S	Peak	56.77	-13.06	43.71	46.00	-2.29
375.32	S	Peak	47.61	-9.57	38.04	46.00	-7.96
624.61	S	Peak	47.49	-5.82	41.67	46.00	-4.33
874.87	S	Peak	44.99	-1.50	43.49	46.00	-2.51
3219.00	S	Average	46.69	3.44	50.13	54.00	-3.87
3219.00	S	Peak	48.31	3.44	51.75	74.00	-22.25
4824.00	H	Average	26.38	6.85	33.23	54.00	-20.77
4824.00	H	Peak	38.92	6.85	45.77	74.00	-28.23
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

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Operation Band	:802.11 n20M	Test Date	:2014-09-29
ARFCN	:CH 01	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:TX LOW	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.44	-14.58	40.86	43.50	-2.64
250.19	S	Peak	56.49	-13.06	43.43	46.00	-2.57
375.32	S	Peak	53.25	-9.57	43.68	46.00	-2.32
500.45	S	Peak	46.42	-7.42	39.00	46.00	-7.00
624.61	S	Peak	44.78	-5.82	38.96	46.00	-7.04
874.87	S	Peak	45.53	-1.50	44.03	46.00	-1.97
4824.00	H	Average	25.16	6.85	32.01	54.00	-21.99
4824.00	H	Peak	37.96	6.85	44.81	74.00	-29.19
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

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Operation Band	:802.11 n20M	Test Date	:2014-09-29
ARFCN	:CH 06	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2437 MHz	Engineer	:Curry
Operation Mode	:TX MID	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
72.68	S	Peak	51.81	-15.74	36.07	40.00	-3.93
125.06	S	Peak	51.05	-14.58	36.47	43.50	-7.03
250.19	S	Peak	56.62	-13.06	43.56	46.00	-2.44
375.32	S	Peak	47.44	-9.57	37.87	46.00	-8.13
624.61	S	Peak	47.32	-5.82	41.50	46.00	-4.50
874.87	S	Peak	44.83	-1.50	43.33	46.00	-2.67
3247.00	S	Average	45.45	3.46	48.91	54.00	-5.09
3247.00	S	Peak	47.74	3.46	51.20	74.00	-22.80
4874.00	H	Average	27.10	6.93	34.03	54.00	-19.97
4874.00	H	Peak	37.93	6.93	44.86	74.00	-29.14
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

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Operation Band	:802.11 n20M	Test Date	:2014-09-29
ARFCN	:CH 06	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2437 MHz	Engineer	:Curry
Operation Mode	:TX MID	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.30	-14.58	40.72	43.50	-2.78
250.19	S	Peak	56.34	-13.06	43.28	46.00	-2.72
375.32	S	Peak	53.63	-9.57	44.06	46.00	-1.94
500.45	S	Peak	46.71	-7.42	39.29	46.00	-6.71
624.61	S	Peak	45.39	-5.82	39.57	46.00	-6.43
874.87	S	Peak	45.11	-1.50	43.61	46.00	-2.39
4874.00	H	Average	25.56	6.93	32.49	54.00	-21.51
4874.00	H	Peak	38.65	6.93	45.58	74.00	-28.42
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

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Operation Band	:802.11 n20M	Test Date	:2014-09-29
ARFCN	:CH 11	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2462 MHz	Engineer	:Curry
Operation Mode	:TX HIGH	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
68.80	S	Peak	50.58	-15.00	35.58	40.00	-4.42
125.06	S	Peak	50.94	-14.58	36.36	43.50	-7.14
250.19	S	Peak	56.53	-13.06	43.47	46.00	-2.53
375.32	S	Peak	47.96	-9.57	38.39	46.00	-7.61
624.61	S	Peak	47.18	-5.82	41.36	46.00	-4.64
874.87	S	Peak	44.93	-1.50	43.43	46.00	-2.57
3282.00	S	Average	45.99	3.49	49.48	54.00	-4.52
3282.00	S	Peak	47.07	3.49	50.56	74.00	-23.44
4924.00	H	Average	26.70	6.99	33.69	54.00	-20.31
4924.00	H	Peak	37.73	6.99	44.72	74.00	-29.28
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

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Operation Band	:802.11 n20M	Test Date	:2014-09-29
ARFCN	:CH 11	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2462 MHz	Engineer	:Curry
Operation Mode	:TX HIGH	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.09	-14.58	40.51	43.50	-2.99
250.19	S	Peak	56.52	-13.06	43.46	46.00	-2.54
375.32	S	Peak	53.70	-9.57	44.13	46.00	-1.87
500.45	S	Peak	46.41	-7.42	38.99	46.00	-7.01
624.61	S	Peak	44.82	-5.82	39.00	46.00	-7.00
874.87	S	Peak	45.05	-1.50	43.55	46.00	-2.45
4924.00	H	Average	25.09	6.99	32.08	54.00	-21.92
4924.00	H	Peak	37.98	6.99	44.97	74.00	-29.03
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

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**Radiated Spurious Emission Measurement Result (802.11n\_40M)**

Operation Band	:802.11 n40M	Test Date	:2014-09-29
ARFCN	:CH 03	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:TX LOW	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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
73.65	S	Peak	51.90	-15.92	35.98	40.00	-4.02
125.06	S	Peak	51.33	-14.58	36.75	43.50	-6.75
250.19	S	Peak	56.01	-13.06	42.95	46.00	-3.05
375.32	S	Peak	47.83	-9.57	38.26	46.00	-7.74
624.61	S	Peak	47.22	-5.82	41.40	46.00	-4.60
874.87	S	Peak	44.55	-1.50	43.05	46.00	-2.95
3219.00	S	Average	46.22	3.44	49.66	54.00	-4.34
3219.00	S	Peak	48.73	3.44	52.17	74.00	-21.83
4844.00	H	Average	25.13	6.92	32.05	54.00	-21.95
4844.00	H	Peak	38.97	6.92	45.89	74.00	-28.11
7266.00	H	---					
9688.00	H	---					
12110.00	H	---					
14532.00	H	---					
16954.00	H	---					
19376.00	H	---					
21798.00	H	---					
24220.00	H	---					

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Operation Band	:802.11 n40M	Test Date	:2014-09-29
ARFCN	:CH 03	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2412 MHz	Engineer	:Curry
Operation Mode	:TX LOW	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.75	-14.58	41.17	43.50	-2.33
250.19	S	Peak	55.99	-13.06	42.93	46.00	-3.07
375.32	S	Peak	53.18	-9.57	43.61	46.00	-2.39
500.45	S	Peak	46.33	-7.42	38.91	46.00	-7.09
624.61	S	Peak	44.04	-5.82	38.22	46.00	-7.78
874.87	S	Peak	44.31	-1.50	42.81	46.00	-3.19
4844.00	H	Average	24.84	6.92	31.76	54.00	-22.24
4844.00	H	Peak	38.45	6.92	45.37	74.00	-28.63
7266.00	H	---					
9688.00	H	---					
12110.00	H	---					
14532.00	H	---					
16954.00	H	---					
19376.00	H	---					
21798.00	H	---					
24220.00	H	---					

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Operation Band	:802.11 n40M	Test Date	:2014-09-29
ARFCN	:CH 06	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2437 MHz	Engineer	:Curry
Operation Mode	:TX MID	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
72.68	S	Peak	51.68	-15.74	35.94	40.00	-4.06
125.06	S	Peak	50.86	-14.58	36.28	43.50	-7.22
250.19	S	Peak	56.52	-13.06	43.46	46.00	-2.54
375.32	S	Peak	48.04	-9.57	38.47	46.00	-7.53
624.61	S	Peak	47.16	-5.82	41.34	46.00	-4.66
874.87	S	Peak	44.58	-1.50	43.08	46.00	-2.92
3247.00	S	Average	45.27	3.46	48.73	54.00	-5.27
3247.00	S	Peak	47.25	3.46	50.71	74.00	-23.29
4874.00	H	Average	26.38	6.93	33.31	54.00	-20.69
4874.00	H	Peak	37.76	6.93	44.69	74.00	-29.31
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

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Operation Band	:802.11 n40M	Test Date	:2014-09-29
ARFCN	:CH 06	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2437 MHz	Engineer	:Curry
Operation Mode	:TX MID	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	55.16	-14.58	40.58	43.50	-2.92
250.19	S	Peak	56.53	-13.06	43.47	46.00	-2.53
375.32	S	Peak	53.68	-9.57	44.11	46.00	-1.89
500.45	S	Peak	46.43	-7.42	39.01	46.00	-6.99
624.61	S	Peak	44.91	-5.82	39.09	46.00	-6.91
874.87	S	Peak	43.89	-1.50	42.39	46.00	-3.61
4874.00	H	Average	25.19	6.93	32.12	54.00	-21.88
4874.00	H	Peak	36.83	6.93	43.76	74.00	-30.24
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

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Operation Band	:802.11 n40M	Test Date	:2014-09-29
ARFCN	:CH 09	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2452 MHz	Engineer	:Curry
Operation Mode	:TX HIGH	Measurement Antenna Pol.	:VERTICAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
69.77	S	Peak	51.43	-15.17	36.26	40.00	-3.74
125.06	S	Peak	50.77	-14.58	36.19	43.50	-7.31
250.19	S	Peak	56.68	-13.06	43.62	46.00	-2.38
375.32	S	Peak	49.55	-9.57	39.98	46.00	-6.02
624.61	S	Peak	47.57	-5.82	41.75	46.00	-4.25
874.87	S	Peak	44.34	-1.50	42.84	46.00	-3.16
3268.00	S	Average	45.83	3.45	49.28	54.00	-4.72
3268.00	S	Peak	47.91	3.45	51.36	74.00	-22.64
4904.00	H	Average	25.73	6.94	32.67	54.00	-21.33
4904.00	H	Peak	38.24	6.94	45.18	74.00	-28.82
7356.00	H	---					
9808.00	H	---					
12260.00	H	---					
14712.00	H	---					
17164.00	H	---					
19616.00	H	---					
22068.00	H	---					
24520.00	H	---					

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ARFCN	:CH 09	Temp./Humi.	:23 deg_C/62 RH
Fundamental Frequency	:2452 MHz	Engineer	:Curry
Operation Mode	:TX HIGH	Measurement Antenna Pol.	:HORIZONTAL
EUT Pol.	:E2 Plane		

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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we’ve employed is peak detector.

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
125.06	S	Peak	56.62	-14.58	42.04	43.50	-1.46
250.19	S	Peak	56.69	-13.06	43.63	46.00	-2.37
375.32	S	Peak	50.31	-9.57	40.74	46.00	-5.26
500.45	S	Peak	46.44	-7.42	39.02	46.00	-6.98
624.61	S	Peak	46.97	-5.82	41.15	46.00	-4.85
874.87	S	Peak	44.86	-1.50	43.36	46.00	-2.64
4904.00	H	Average	24.96	6.94	31.90	54.00	-22.10
4904.00	H	Peak	37.67	6.94	44.61	74.00	-29.39
7356.00	H	---					
9808.00	H	---					
12260.00	H	---					
14712.00	H	---					
17164.00	H	---					
19616.00	H	---					
22068.00	H	---					
24520.00	H	---					

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## 11 PEAK POWER SPECTRAL DENSITY

### 11.1 Standard Applicable:

According to §15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 11.2 Measurement Equipment Used:

Refer to section 7.2 for details.

### 11.3 Test Set-up:

Refer to section 7.3 for details. (Spectrum Option)

### 11.4 Measurement Procedure (following the measurement procedure 10.2 of KDB558074):

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW  $\geq 3$  kHz.
4. Set the VBW  $\geq 3 \times$  RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

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## 11.5 Measurement Result:

## 802.11b

Frequency MHz	RF Power Density	Maximum Limit
	Reading (dBm)	(dBm)
2412	-10.610	8
2437	-11.400	8
2462	-12.080	8

## 802.11g

Frequency MHz	RF Power Density	Maximum Limit
	Reading (dBm)	(dBm)
2412	-13.890	8
2437	-14.430	8
2462	-13.480	8

## 802.11n\_20M

Frequency MHz	RF Power Density	Maximum Limit
	Reading (dBm)	(dBm)
2412	-14.430	8
2437	-13.640	8
2462	-13.690	8

## 802.11n\_40M

Frequency MHz	RF Power Density	Maximum Limit
	Reading (dBm)	(dBm)
2422	-19.140	8
2437	-18.810	8
2452	-20.400	8

\* Note: Offset = 10dB for 2.4G 802.11b/g/ n20/n40

\*Refer to next page for plots

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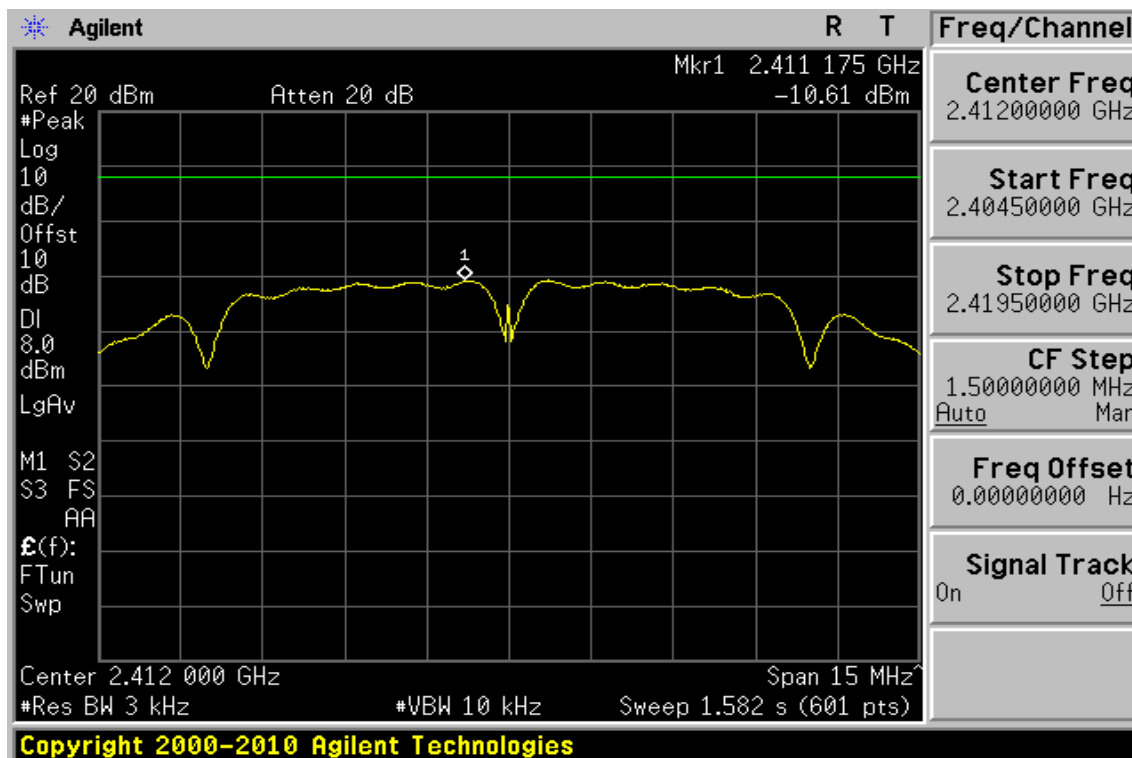
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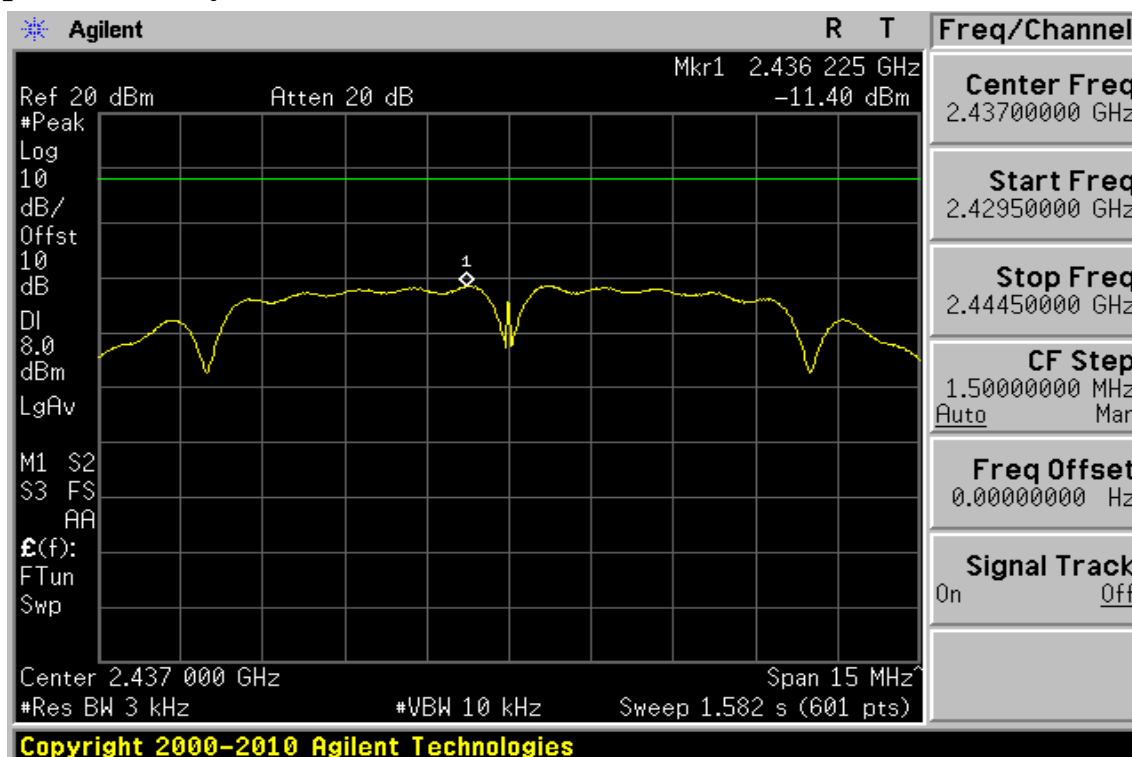
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802.11b

## Power Spectral Density Test Plot (CH-Low)



## Power Spectral Density Test Plot (CH-Mid)



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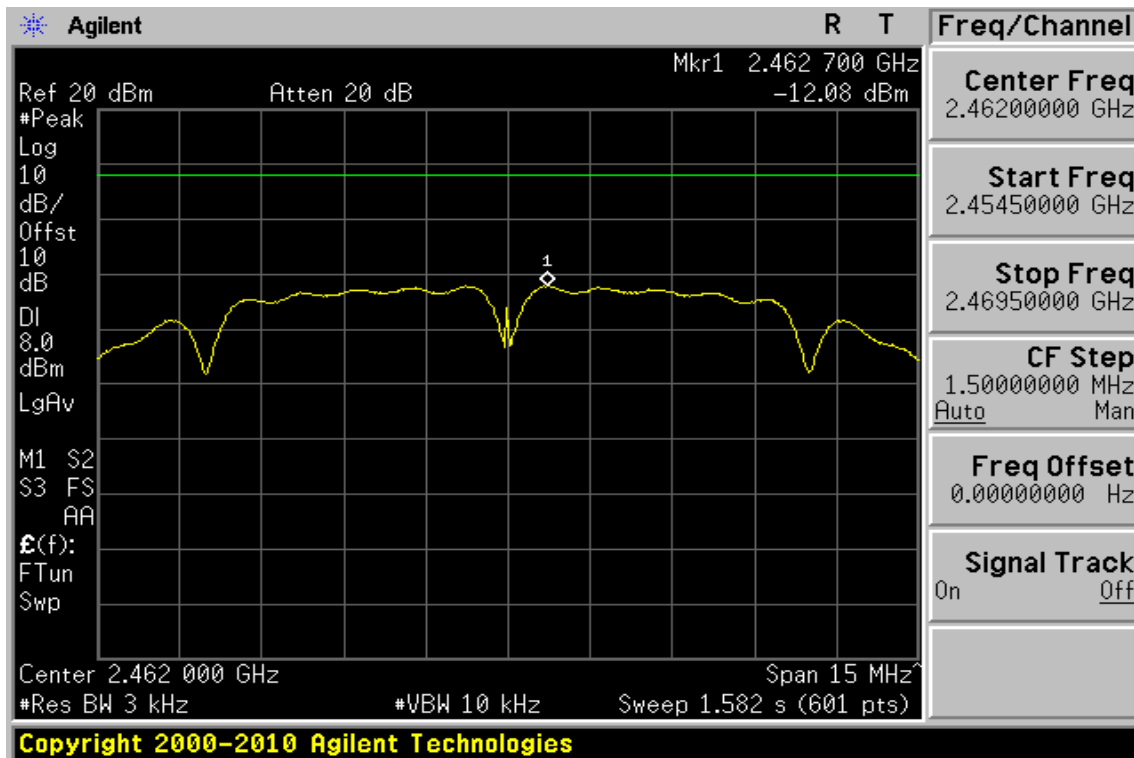
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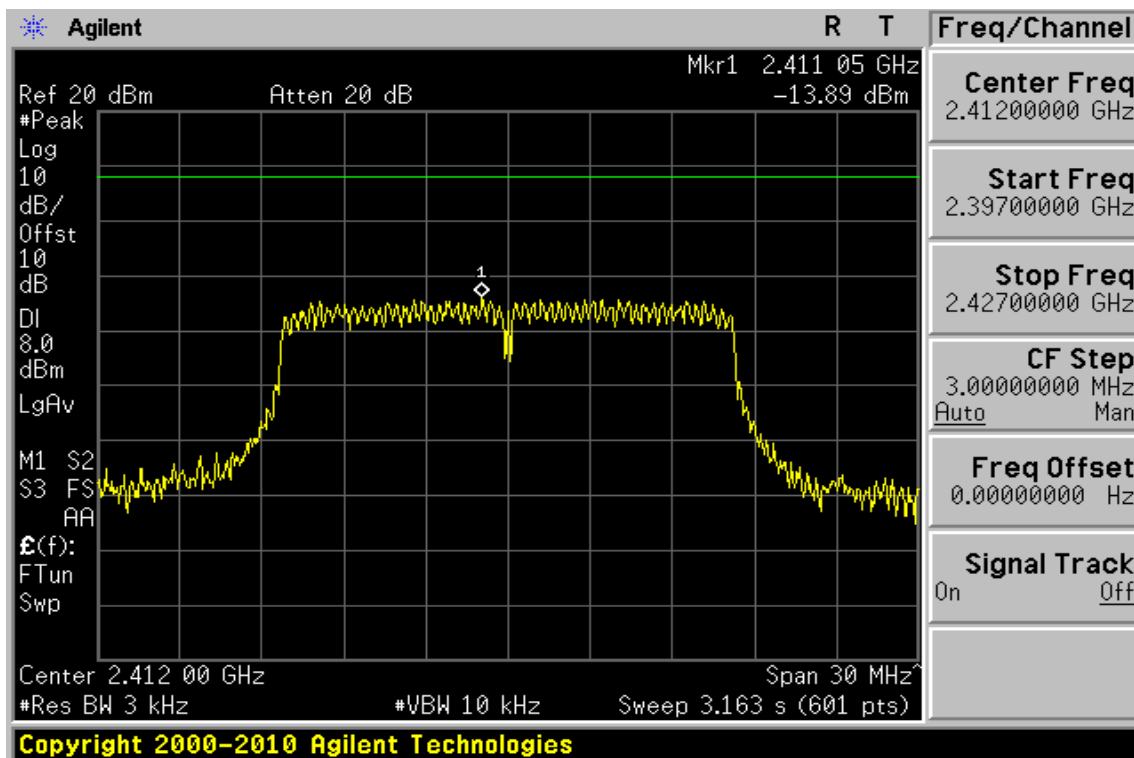
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## Power Spectral Density Test Plot (CH-High)



802.11g

## Power Spectral Density Test Plot (CH-Low)



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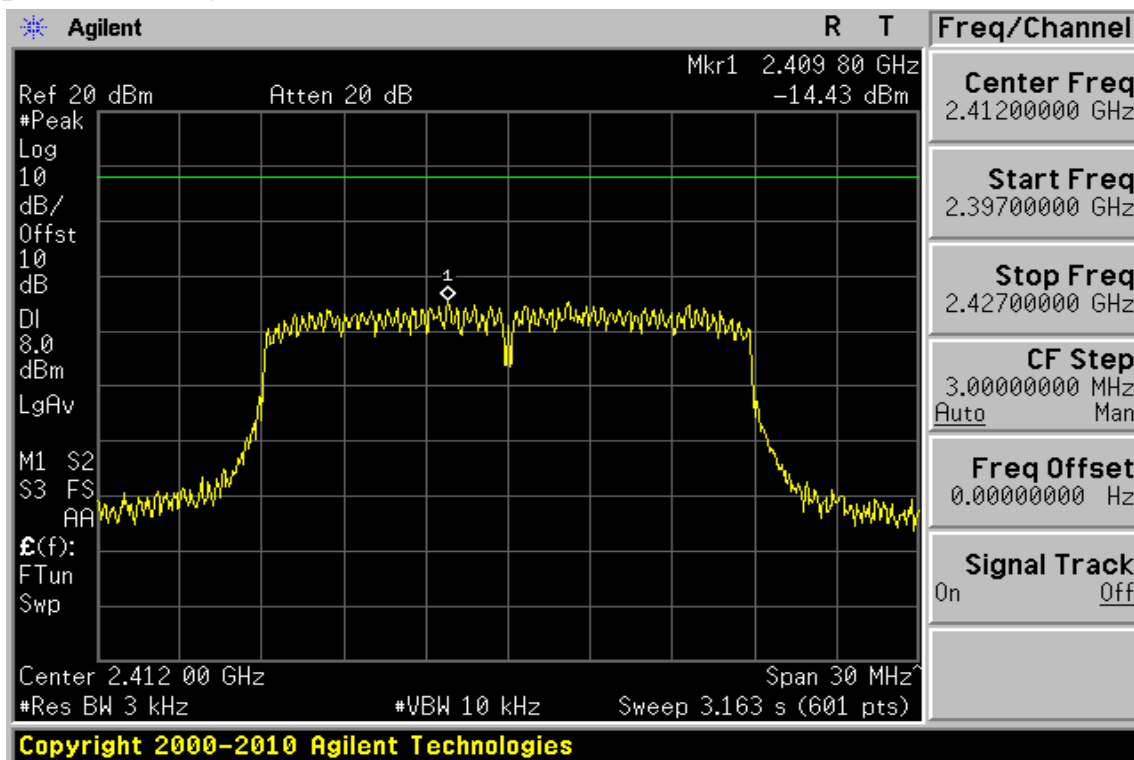
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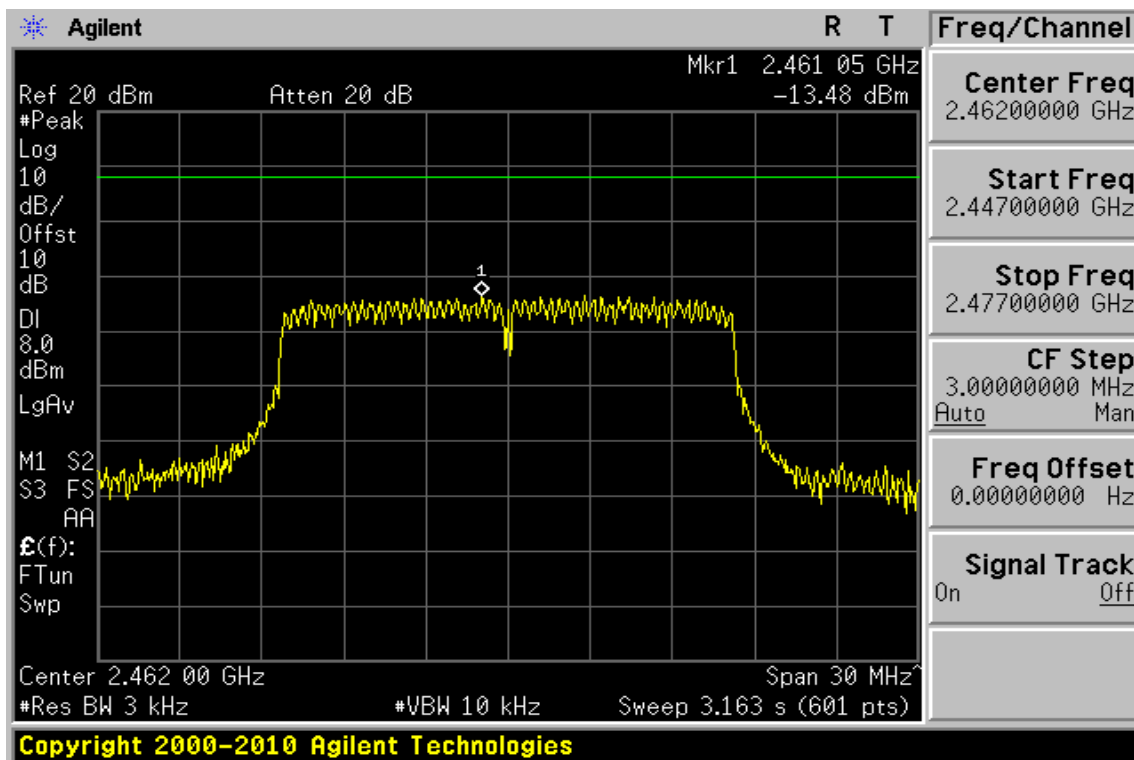
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## Power Spectral Density Test Plot (CH-Mid)



## Power Spectral Density Test Plot (CH-High)



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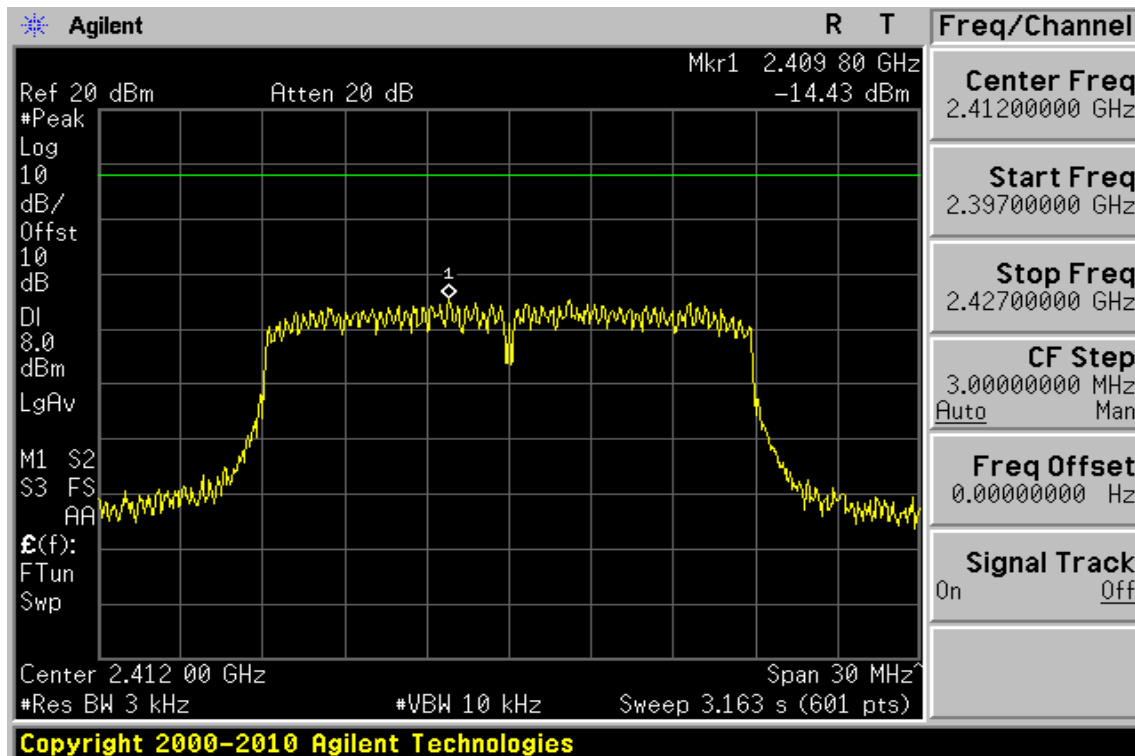
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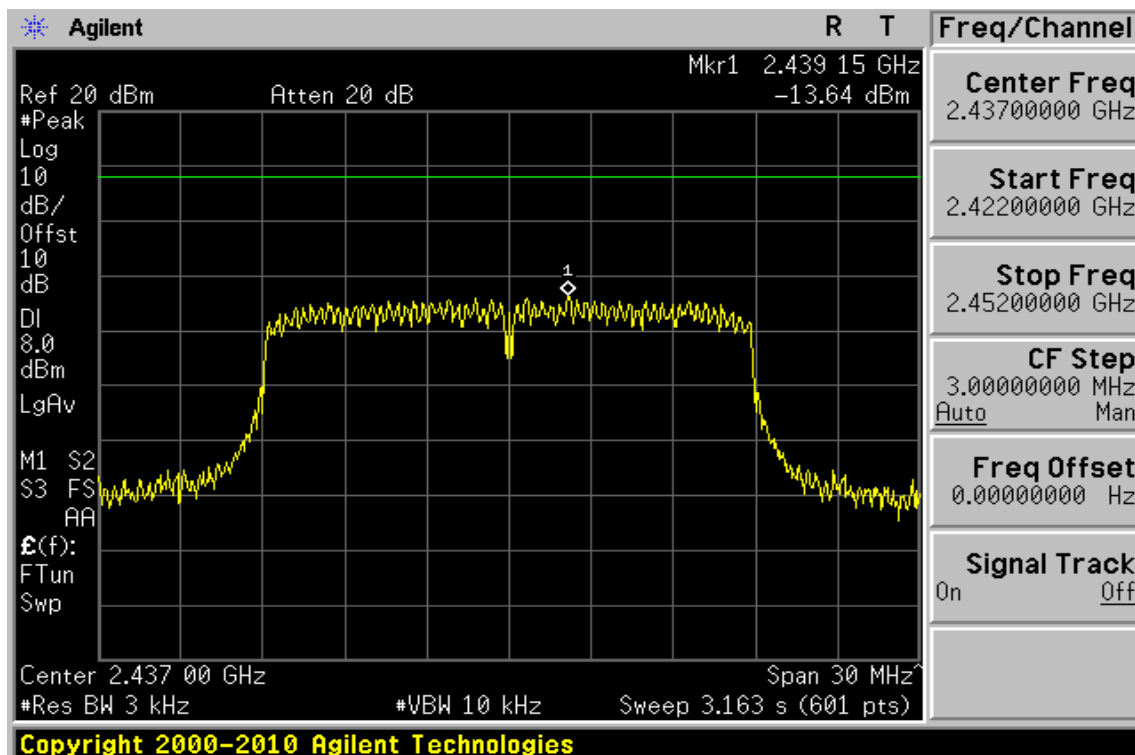


## 802.11n\_20M

### Power Spectral Density Test Plot (CH-Low)



### Power Spectral Density Test Plot (CH-Mid)



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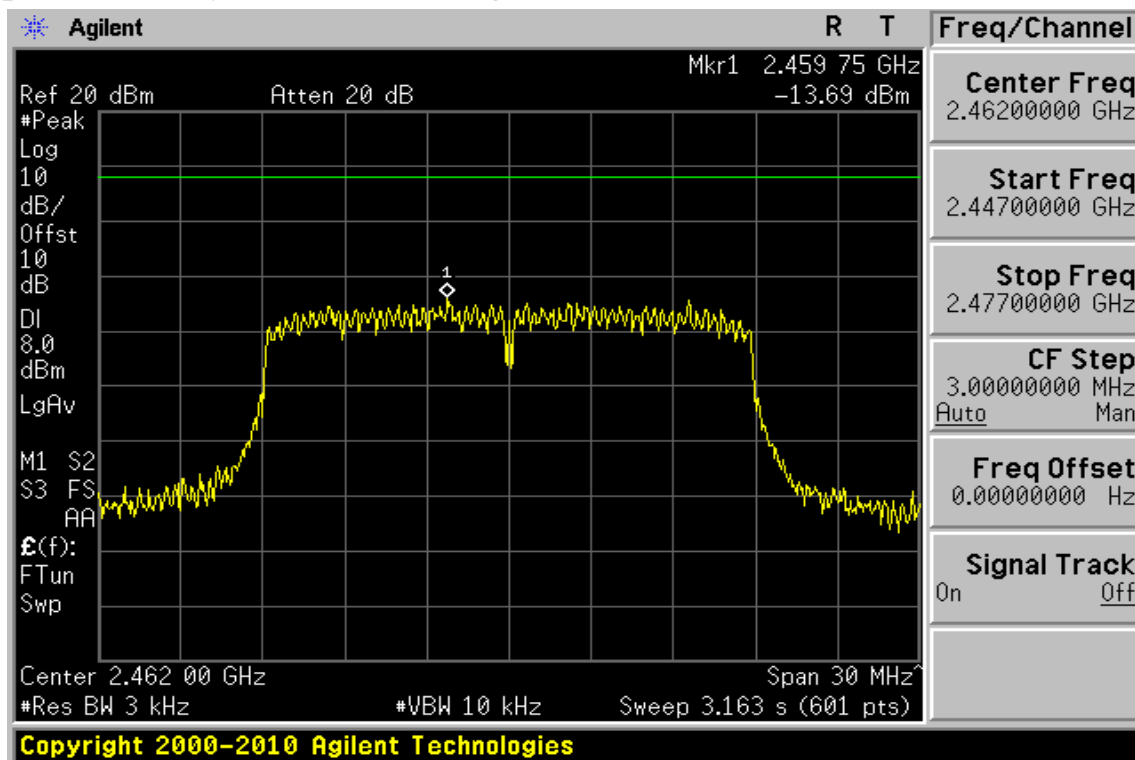
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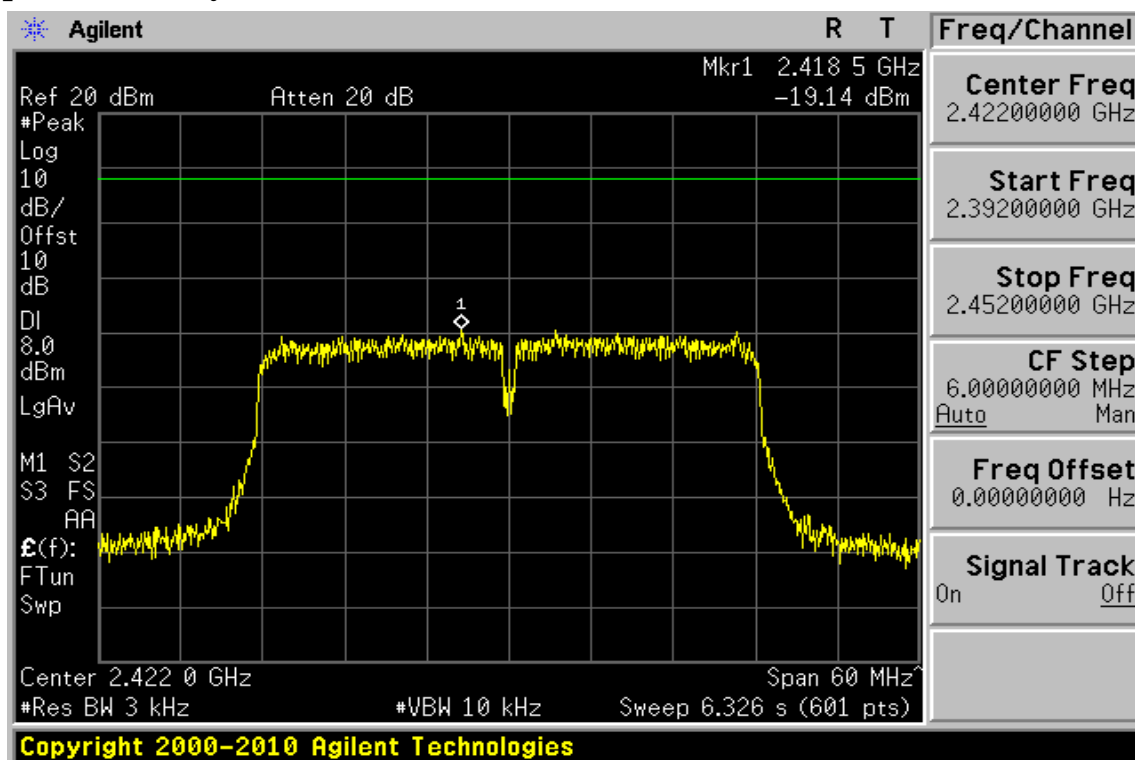
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## Power Spectral Density Test Plot (CH-High)



802.11n\_40M

## Power Spectral Density Test Plot (CH-Low)



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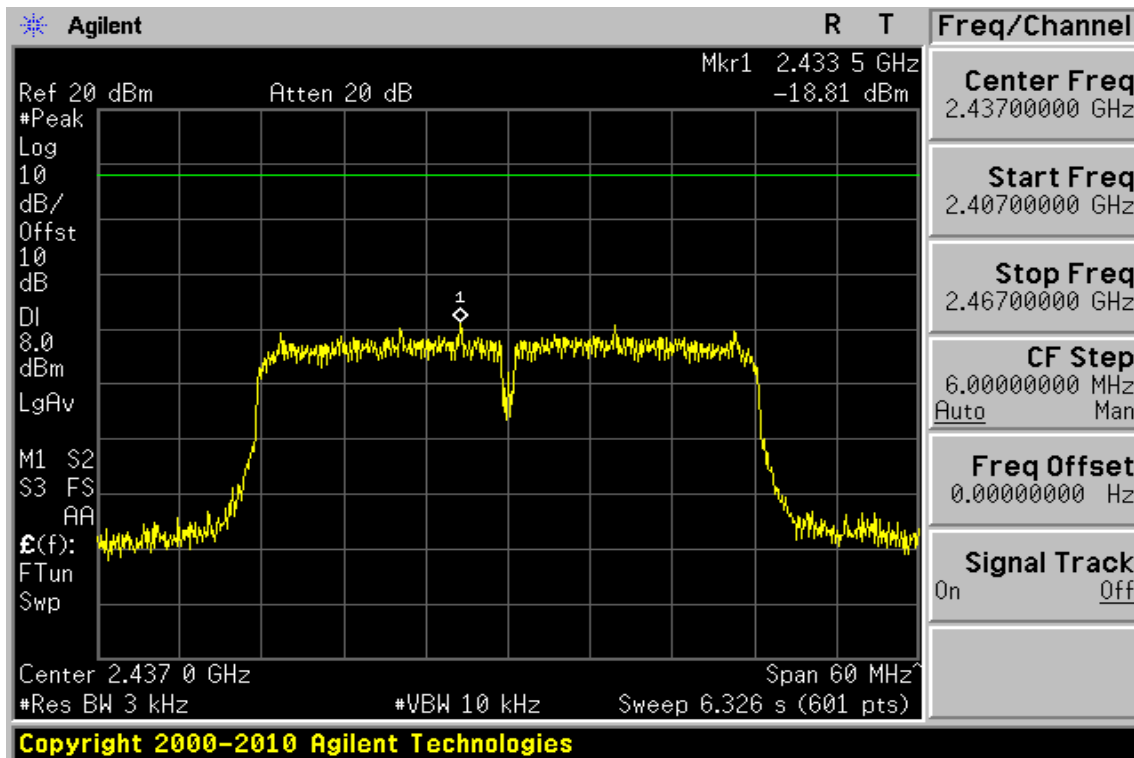
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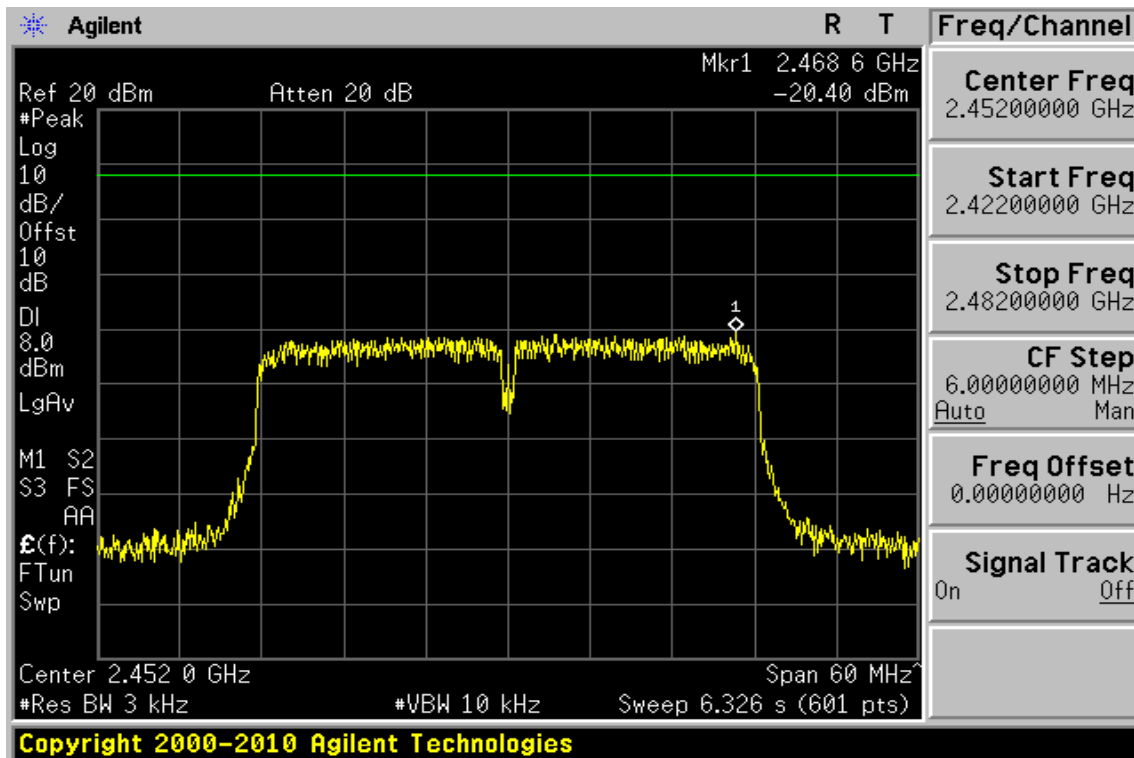
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## Power Spectral Density Test Plot (CH-Mid)



## Power Spectral Density Test Plot (CH-High)



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## 12 ANTENNA REQUIREMENT

### 12.1 Standard Applicable:

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

### 12.2 Antenna Connected Construction:

The directional gains of antenna used for transmitting is 2.0dBi 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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## 13 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 13.1 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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## 13.2 Maximum Permissible Exposure (MPE) Evaluation

### 802.11b

		Average Power Output (dBm)				
CH	Frequency (MHz)	Data Rate				Required Limit
		1	2	5.5	11	
1	2412	19.69	19.44	19.39	19.18	1 Watt = 30 dBm
6	2437	18.30	18.08	17.85	17.67	1 Watt = 30 dBm
11	2462	18.21	17.89	17.68	17.68	1 Watt = 30 dBm

### MPE Prediction (802.11b)

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 average output power at antenna input	19.69	(dBm)
Maximum average output power at antenna input	93.11078755	(mW)
Duty cycle:	100	(%)
Maximum Pav :	93.11078755	(mW)
Antenna gain (typical):	2	(dBi)
Maximum antenna gain:	1.584893192	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2412	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.029373	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.029373mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 2412MHz.

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**802.11g**

		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
1	2412	15.32	15.13	15.11	15.02	14.73	14.68	14.40	14.35	1 Watt = 30 dBm
6	2437	15.70	15.41	15.17	15.07	15.05	14.84	14.81	14.52	1 Watt = 30 dBm
11	2462	15.90	15.81	15.57	15.44	15.23	15.14	15.09	14.94	1 Watt = 30 dBm

**MPE Prediction (802.11g)**

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 average output power at antenna input	15.9	(dBm)
Maximum average output power at antenna input	38.9045145	(mW)
Duty cycle:	100	(%)
Maximum Pav :	38.9045145	(mW)
Antenna gain (typical):	2	(dBi)
Maximum antenna gain:	1.584893192	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.012273	(mW/cm <sup>2</sup> )

**Measurement Result**

The predicted power density level at 20 cm is 0.012273mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 2462MHz.

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## 802.11n\_20M

		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2412	13.48	13.25	12.99	12.73	12.73	12.69	12.56	12.29	1 Watt = 30 dBm
6	2437	14.22	14.08	13.94	13.84	13.52	13.22	12.97	12.64	1 Watt = 30 dBm
11	2462	14.23	14.15	13.82	13.62	13.51	13.31	13.31	13.04	1 Watt = 30 dBm

### MPE Prediction (802.11 n\_20M)

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 average output power at antenna input	14.23	(dBm)
Maximum average output power at antenna input	26.48500139	(mW)
Duty cycle:	100	(%)
Maximum Pav :	26.48500139	(mW)
Antenna gain (typical):	2	(dBi)
Maximum antenna gain:	1.584893192	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.008355	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.008355mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 2462MHz.

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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## 802.11n\_40M

		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2422	11.42	11.13	11.06	11.01	11.00	10.97	10.91	10.85	1 Watt = 30 dBm
6	2437	10.61	10.30	10.05	9.85	9.72	9.59	9.31	9.19	1 Watt = 30 dBm
11	2452	10.47	10.45	10.44	10.24	9.96	9.79	9.56	9.30	1 Watt = 30 dBm

## MPE Prediction (802.11 n\_40M)

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 average output power at antenna input	11.42	(dBm)
Maximum average output power at antenna input	13.86755829	(mW)
Duty cycle:	100	(%)
Maximum Pav :	13.86755829	(mW)
Antenna gain (typical):	2	(dBi)
Maximum antenna gain:	1.584893192	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2422	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.004375	(mW/cm <sup>2</sup> )

## Measurement Result

The predicted power density level at 20 cm is 0.004375mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 2422MHz.

~ End of Report ~

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