



Product Service

## FCC - TEST REPORT

Report Number : **68.950.13.036.01** Date of Issue: 31 May 2013

Model : **EchoLife HG8245H**

Product Type : GPON Terminal

Applicant : Huawei Technologies Co., Ltd.

Address : Administration Building, Headquarters of Huawei Technologies  
Co., Ltd., Bantian, Longgang District, 518129 Shenzhen,  
People's Republic of China

Production Facility : Huawei Technologies Co., Ltd.

Address : Administration Building, Headquarters of Huawei Technologies  
Co., Ltd., Bantian, Longgang District, 518129 Shenzhen,  
People's Republic of China

Test Result :  **Positive**     **Negative**

Total pages including Appendices : 54

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## 1 Table of Content

1	Table of Content.....	2
2	Details about the Test Laboratory .....	3
3	Description of the Equipment Under Test .....	4
4	Summary of Test Standards .....	5
5	Summary of Test Results .....	6
6	General Remarks .....	7
7	Technical Requirement .....	8
7.1	Conducted Emission .....	8
7.2	Conducted peak output power .....	11
7.3	Band edge compliance of RF emissions.....	12
7.4	Spurious RF conducted emissions.....	29
7.5	Spurious radiated emissions for transmitter and receiver.....	39
7.6	6 dB bandwidth.....	44
7.7	Power spectral density .....	53
8	Test Equipment .....	54
9	System Measurement Uncertainty .....	54



Product Service

## 2 Details about the Test Laboratory

### Details about the Test Laboratory

#### Test site1:

Company name: Jiangsu TÜV Product Service Ltd. – Shenzhen Branch  
6th Floor, H Hall,  
Century Craftwork Culture Square,  
No. 4001, Fuqiang Road,  
Futian District 518048,  
Shenzhen,P.R.C.

Telephone: 86 755 8828 6998

Fax: 86 755 8828 5299

#### Test site2:

Company name: Audix Technology (shenzhen) Co.,Ltd  
Block Shenzhen, Science & Industry Park,  
Nantou, Shenzhen,  
Guangdong,  
China

Telephone: 86 755 2663 9496

Fax: 86 755 2663 2877



### 3 Description of the Equipment Under Test

#### Description of the Equipment Under Test

Product: GPON Terminal

Model no.: EchoLife HG8245H

Options and accessories: NIL

Rating: DC 12V  
Powered by external adaptor:  
Adaptor Input: 100-240VAC, 50/60Hz, 0.8A  
Adaptor Output: 12.0VDC, 2.0A

Antenna: Unique Antenna, NOT accessible by end user  
Max. Gain: 2dBi

RF Transmission Frequency: 2412-2462MHz

Description of the EUT: NIL

#### Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenovo	T400	----



#### 4 Summary of Test Standards and Test Method

<b>Test Standards</b>	
FCC Part 15 Subpart C, Intentional Radiators, 10-1-12 Edition	PART 15 – RADIO FREQUENCY DEVICES Subpart C – Intentional Radiators
FCC KDB 558074 D01 DTS Meas Guidance v03r01	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
FCC KDB 662911 D01 Multiple Transmitter Output v02	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

**5 Summary of Test Results**

Technical Requirements					
FCC Part 15 Subpart C 10-1-12 Edition					
Test Condition	Pages	Test Result			Test Location
		Pass	Fail	N/A	
15.207 Conducted Emission AC Power Port	8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test Site2
15.247 (b) (1) Conducted peak output power	11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test Site2
15.247(d) Band edge compliance of RF emissions	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test Site2
15.247(d) Spurious RF conducted emissions	29	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test Site2
15.247(d) & 15.209 Spurious radiated emissions	39	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test Site2
15.247(a)(2) 6dB bandwidth	44	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test Site2
15.247(e) Power spectral density	53	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test Site2



**6 General Remarks**

**Remarks**

This submittal(s) (test report) is intended for FCC ID: QISHG8245H comply with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

**SUMMARY:**

All tests according to the regulations cited on page 5 were

- Performed

- **Not** Performed

The Equipment Under Test

- **Fulfills** the general approval requirements.

- **Does not** fulfill the general approval requirements.

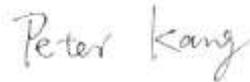
Sample Received Date: 13 March 2013

Testing Start Date: 13 March 2013

Testing End Date: 29 March 2013

- Jiangsu TÜV Product Service Ltd. – Shenzhen Branch -

<b>Tested By</b>	<u>2013-03-13</u>	<u>Sunny Lu</u>	
	<b>EMC Project Engineer</b>	<b>Date</b>	

<b>Prepared By</b>	<u>2013-03-13</u>	<u>Peter Kang</u>	
	<b>EMC Project Engineer</b>	<b>Date</b>	

<b>Approved by</b>	<u>2013-04-01</u>	<u>Ken Li</u>	
	<b>EMC Project Manager</b>	<b>Date</b>	

## 7 Technical Requirement

### 7.1 Conducted Emission

#### Test Method

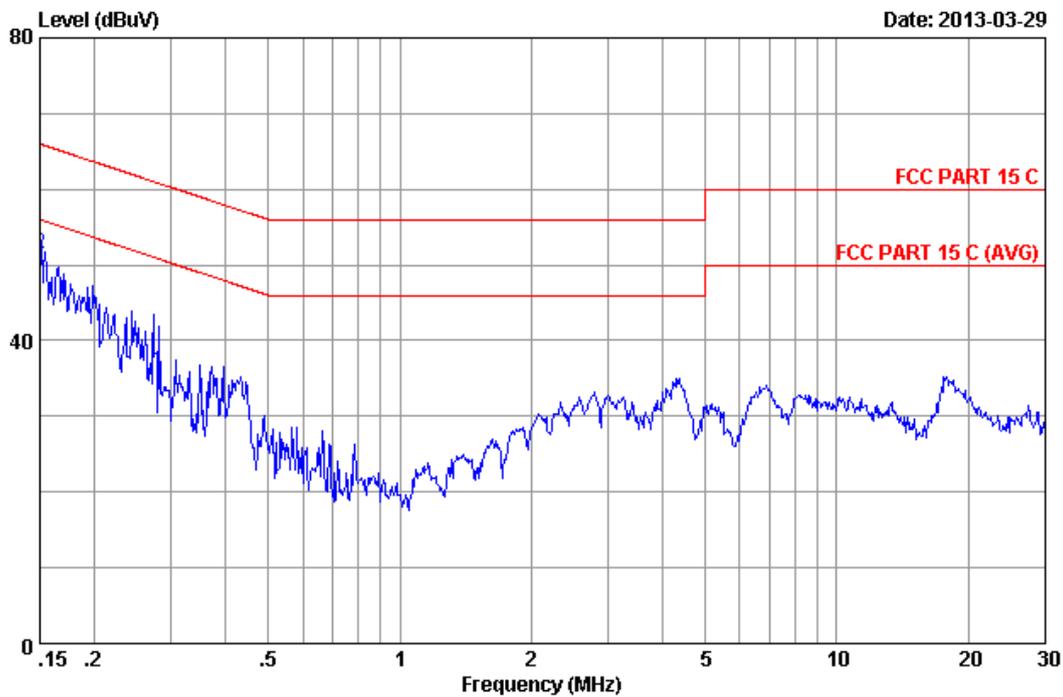
- 1 The EUT was placed on a table, which is 0.8m above ground plane
- 2 The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
- 3 Maximum procedure was performed to ensure EUT compliance
- 4 A EMI test receiver is used to test the emissions from both sides of AC line

#### Limit

Frequency MHz	QP Limit dB $\mu$ V	AV Limit dB $\mu$ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

“\*”Decreasing linearly with logarithm of the frequency

## Conducted Emission

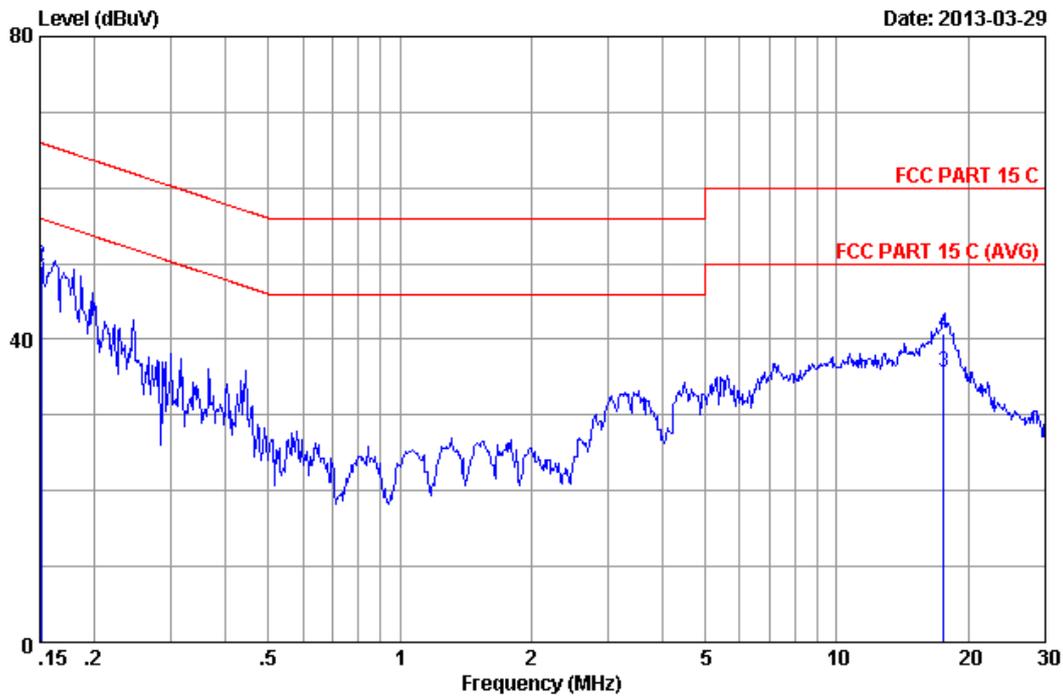


Site no :1#conduction Data No :2  
 Dis./Ant. :\*\* 2012 ESH2-25 LINE  
 Limit :FCC PART 15 C  
 Env./Ins. :Temp:26.6'C Humi:69% Engineer :Nick\_Huang  
 EUT :HG8245H  
 Power Rating :AC 120V/60Hz  
 Test Mode :WIFI ON

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.15000	0.19	0.14	36.51	36.84	56.00	19.16	Average
2	0.15000	0.19	0.14	51.21	51.54	66.00	14.46	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.  
 2.If the average limit is met when using a quasi-peak detector. the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

## Conducted Emission



Site no :1#conduction Data No :1  
 Dis./Ant. :\*\* 2012 ESH2-Z5 NEUTRAL  
 Limit :FCC PART 15 C  
 Env./Ins. :Temp:26.6'C Humi:69% Engineer :Nick\_Huang  
 EUT :HG8245H  
 Power Rating :AC 120V/60Hz  
 Test Mode :WIFI ON

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.15100	0.21	0.14	33.50	33.85	55.94	22.09	Average
2	0.15100	0.21	0.14	49.30	49.65	65.94	16.29	QP
3	17.567	0.83	0.22	34.50	35.55	50.00	14.45	Average
4	17.567	0.83	0.22	39.80	40.85	60.00	19.15	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.  
 2.If the average limit is met when using a quasi-peak detector.  
 the EUT shall be deemed to meet both limits and measurement  
 with average detector is unnecessary.

## 7.2 Conducted peak output power

### Test Method

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

### Limits for conducted peak output power measurements

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

### Conducted peak output power

#### WIFI Mode IEEE 802.11b modulation (1Mbps) Test Result

MHz	dBm			
	Ant0	Ant1	Total	
CH1 2412MHz	22.68	--	22.68	Pass
CH6 2437MHz	22.89	--	22.89	Pass
CH11 2462MHz	23.15	--	23.15	Pass

#### WIFI Mode IEEE 802.11g modulation (6Mbps) Test Result

MHz	dBm			
	Ant0	Ant1	Total	
CH1 2412MHz	24.80	--	24.80	Pass
CH6 2437MHz	24.97	--	24.97	Pass
CH11 2462MHz	25.37	--	25.37	Pass

#### WIFI Mode IEEE 802.11n HT20 modulation (6.5Mbps) Test Result

Frequency	Conducted PeakOutput Power			Result
MHz	dBm			
	Ant0	Ant1	Total	
CH1 2412MHz	22.61	22.01	25.33	Pass
CH6 2437MHz	22.86	22.20	25.55	Pass
CH11 2462MHz	23.43	23.52	26.48	Pass

#### WIFI Mode IEEE 802.11n HT40 modulation (6.5Mbps) Test Result

MHz	dBm			
	Ant0	Ant1	Total	
CH1 2422MHz	22.16	22.22	25.20	Pass
CH6 2437MHz	22.19	22.28	25.24	Pass
CH11 2452MHz	22.38	22.43	25.41	Pass

## 7.3 Band edge compliance of RF emissions

### Test Method

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW and VBW to 1MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.

The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW and VBW to 100kHz, to measure the conducted peak band edge.

### Limits

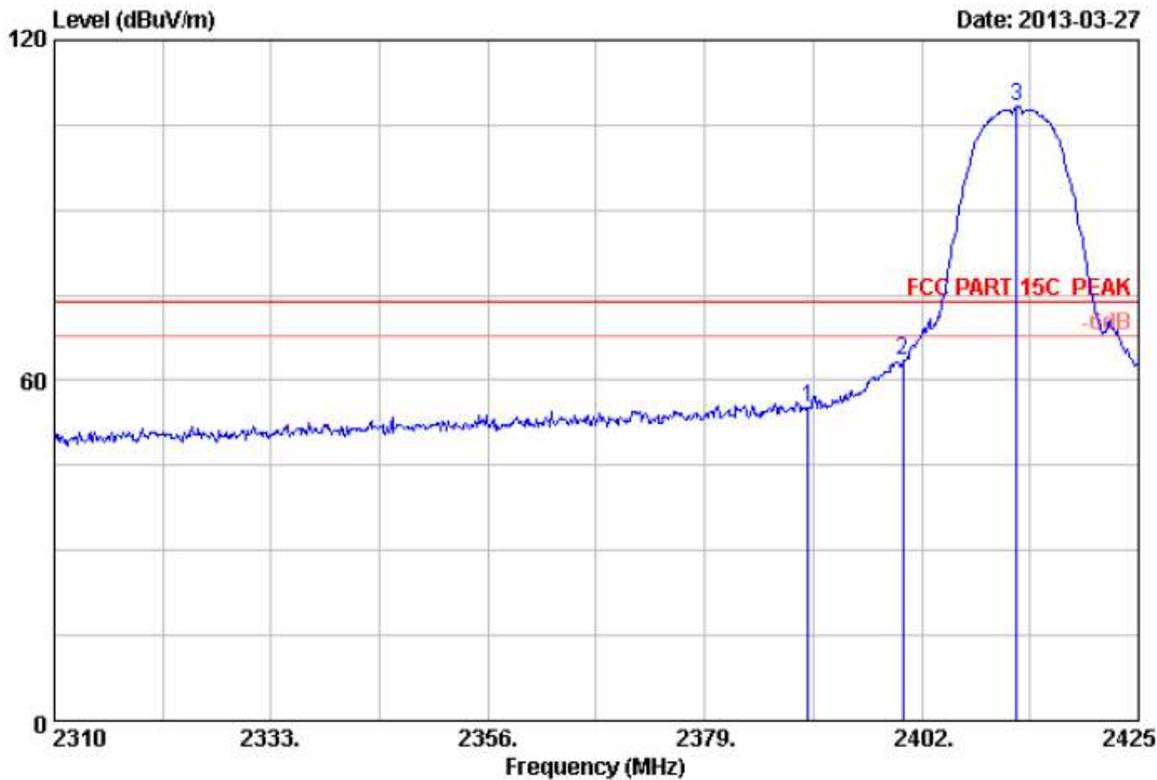
According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains 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. 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 Section 15.205(c)).

Frequency MHz	Limit Average dBuV/m	Limit Peak dBuV/m
Below 2390 Above 2483.5	54	74

## Band edge compliance of RF emissions

WIFI Mode IEEE 802.11b modulation (1 Mbps) Test Result

Peak Low Edge plot:



```

Site no.       : 3m Chamber                Data no.   : 63
Dis. / Ant.    : 3m 2012 3115 (4580)       Ant. pol.  : VERTICAL
Limit         : FCC PART 15C PEAK
Env. / Ins.    : 23*C/54%                 Engineer   : Leo-Li
EUT           : HG8245H
Power supply   : AC 120V/60Hz
Test mode     : IEEE802.1b CH 1 2412MHz Tx
M/N           :
:

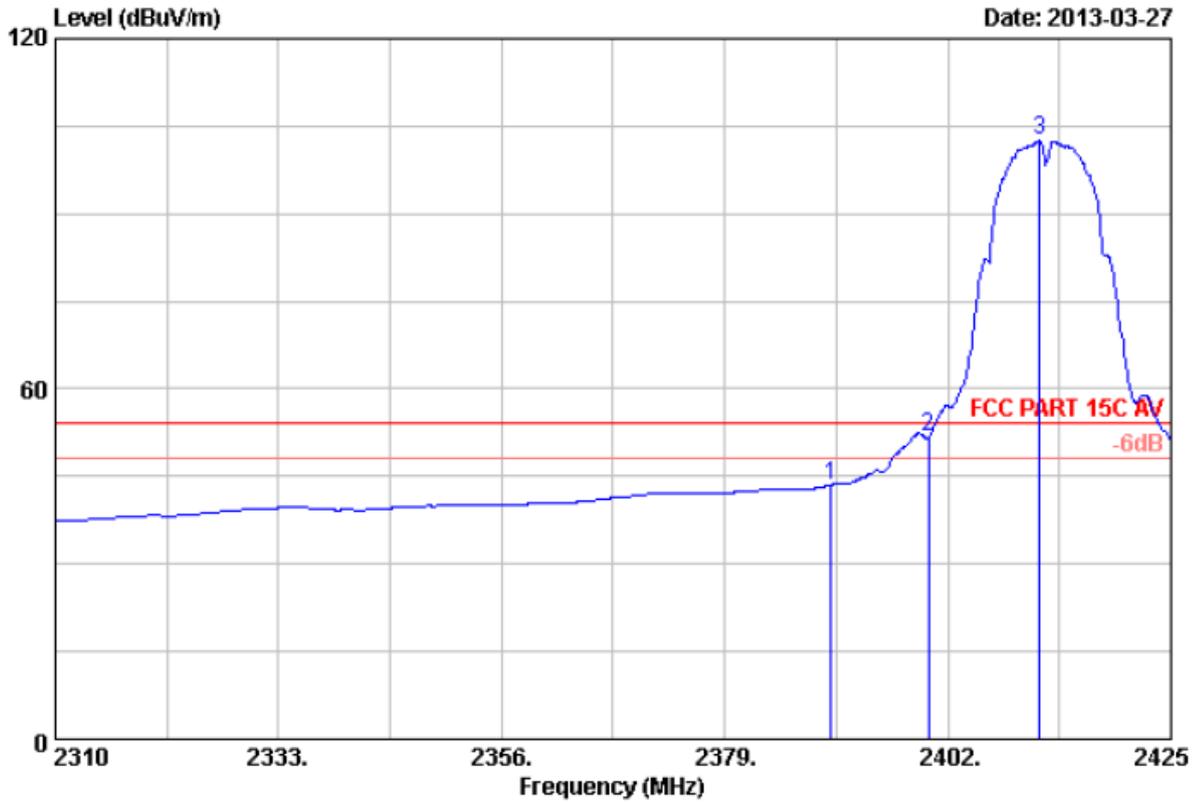
```

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.70	6.00	35.92	58.51	55.29	74.00	18.71	Peak
2	2400.000	26.76	6.02	35.92	66.55	63.41	74.00	10.59	Peak
3	2412.120	26.84	6.04	35.92	111.23	108.19	74.00	-34.19	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Average Low Edge plot:



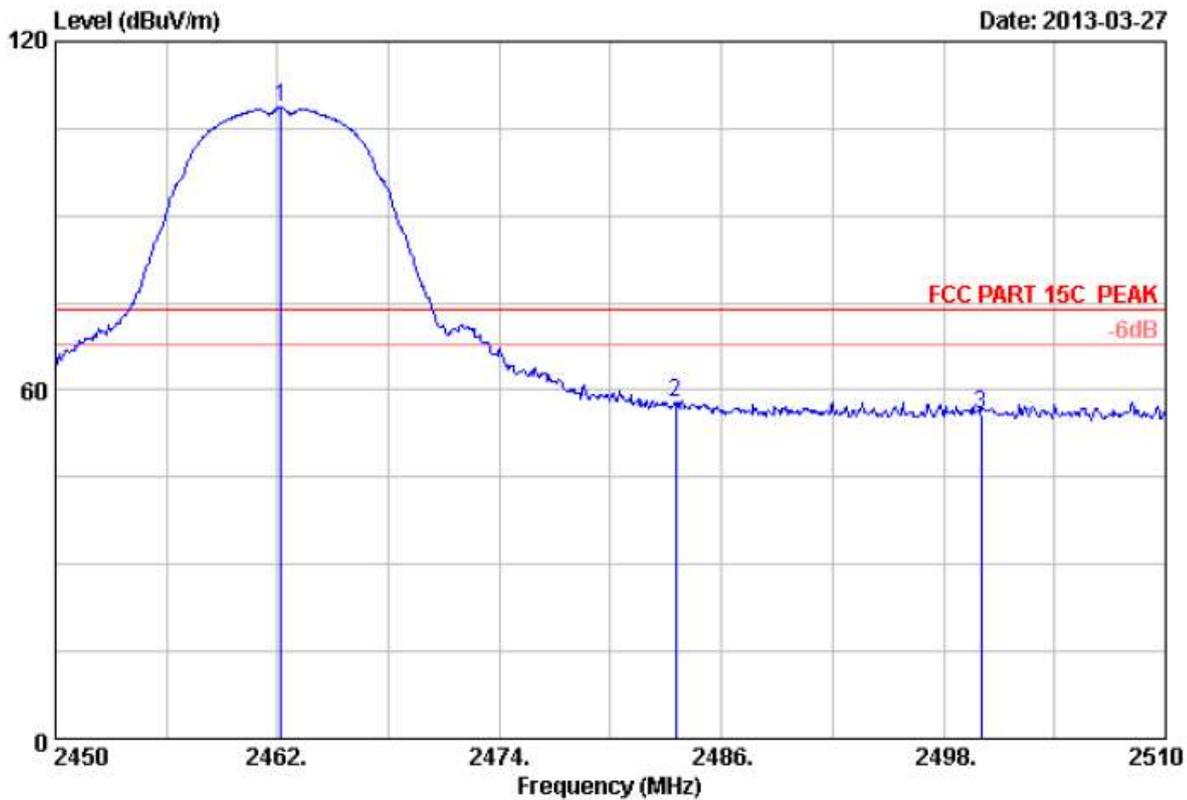
Site no. : 3m Chamber Data no. : 64  
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : VERTICAL  
 Limit : FCC PART 15C AV  
 Env. / Ins. : 23\*C/54% Engineer : Leo-Li  
 EUT : HG8245H  
 Power supply : AC 120V/60Hz  
 Test mode : IEEE802.1b CH 1 2412MHz Tx  
 M/N :  
 :

	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	26.70	6.00	35.92	46.78	43.56	54.00	10.44	Average
2	26.76	6.02	35.92	54.94	51.80	54.00	2.20	Average
3	26.83	6.04	35.92	105.58	102.53	54.00	-48.53	Average

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Peak High Edge plot:



```

Site no.      : 3m Chamber           Data no.   : 61
Dis. / Ant.   : 3m 2012 3115 (4580)  Ant. pol.  : VERTICAL
Limit        : FCC PART 15C PEAK
Env. / Ins.   : 23*C/54%             Engineer   : Leo-Li
EUT          : HG8245H
Power supply  : AC 120V/60Hz
Test mode    : IEEE802.1b CH 11 2462MHz Tx
M/N         :
:

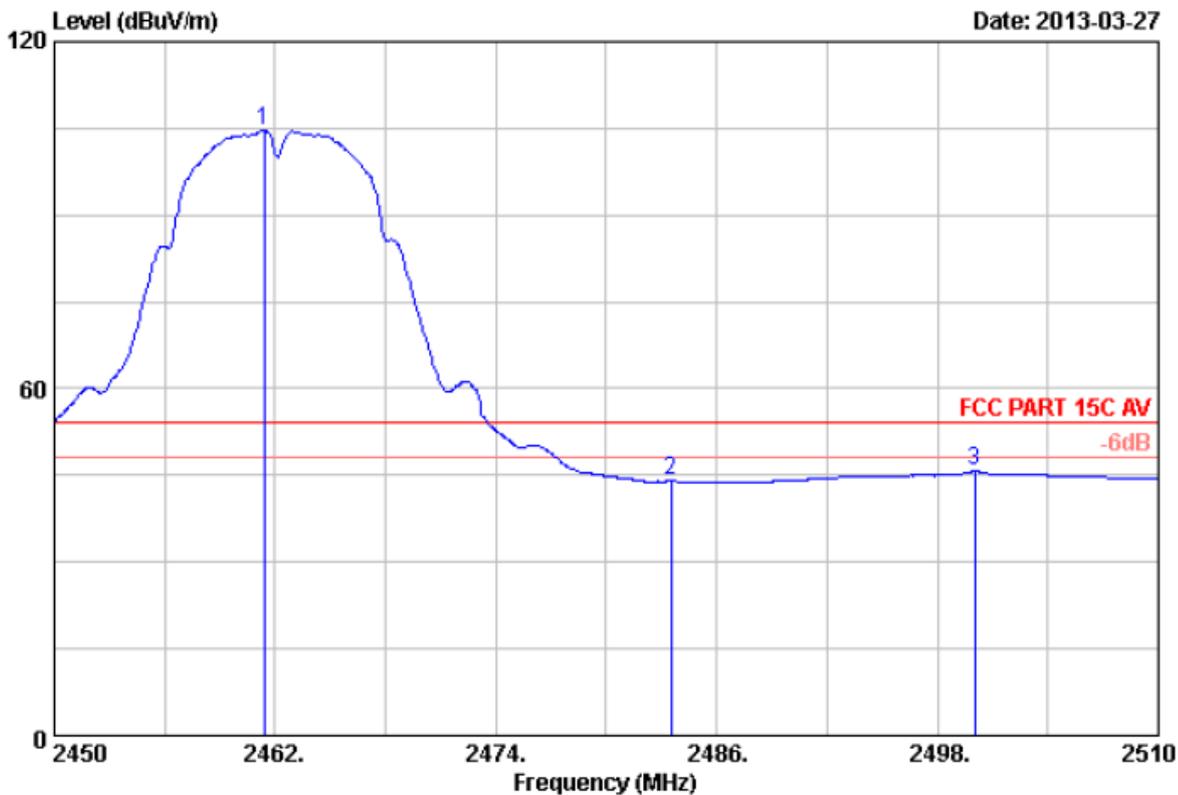
```

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2462.180	27.16	6.12	35.92	111.32	108.68	74.00	-34.68	Peak
2	2483.500	27.29	6.16	35.92	60.44	57.97	74.00	16.03	Peak
3	2500.000	27.40	6.19	35.93	58.14	55.80	74.00	18.20	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Average High Edge plot:



Site no. : 3m Chamber Data no. : 62  
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : VERTICAL  
 Limit : FCC PART 15C AV  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : HG8245H  
 Power supply : AC 120V/60Hz  
 Test mode : IEEE802.1b CH 11 2462MHz Tx  
 M/N :  
 :

	Ant.	Cable	Amp.	Emission				Remark
Freq. (MHz)	Factor (dB/m)	loss (dB)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	
1 2461.400	27.15	6.12	35.92	107.36	104.71	54.00	-50.71	Average
2 2483.500	27.29	6.16	35.92	46.46	43.99	54.00	10.01	Average
3 2500.000	27.40	6.19	35.93	47.98	45.64	54.00	8.36	Average

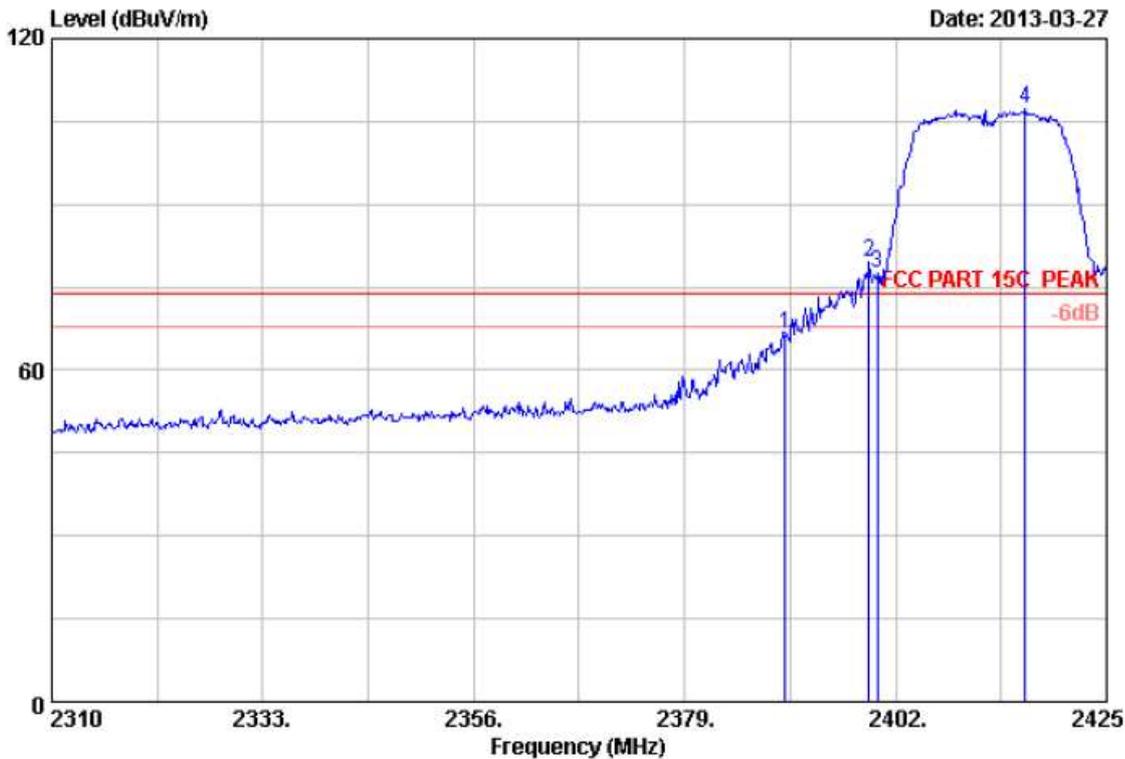
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

## Band edge compliance of RF emissions

WIFI Mode IEEE 802.11g modulation (6 Mbps) Test Result

Peak Low Edge plot:



Site no. : 3m Chamber                      Data no. : 48  
 Dis. / Ant. : 3m 2012 3115 (4580)        Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23°C/54%                      Engineer : Leo-Li  
 EUT : HG8245H  
 Power supply : AC 120V/60Hz  
 Test mode : IEEE802.1g CH 1 2412MHz Tx  
 M/N :  
      :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.70	6.00	35.92	69.86	66.64	74.00	7.36	Peak
2	2399.125	26.75	6.02	35.92	82.70	79.55	74.00	-5.55	Peak
3	2400.000	26.76	6.02	35.92	80.74	77.60	74.00	-3.60	Peak
4	2416.145	26.86	6.04	35.92	110.30	107.28	74.00	-33.28	Peak

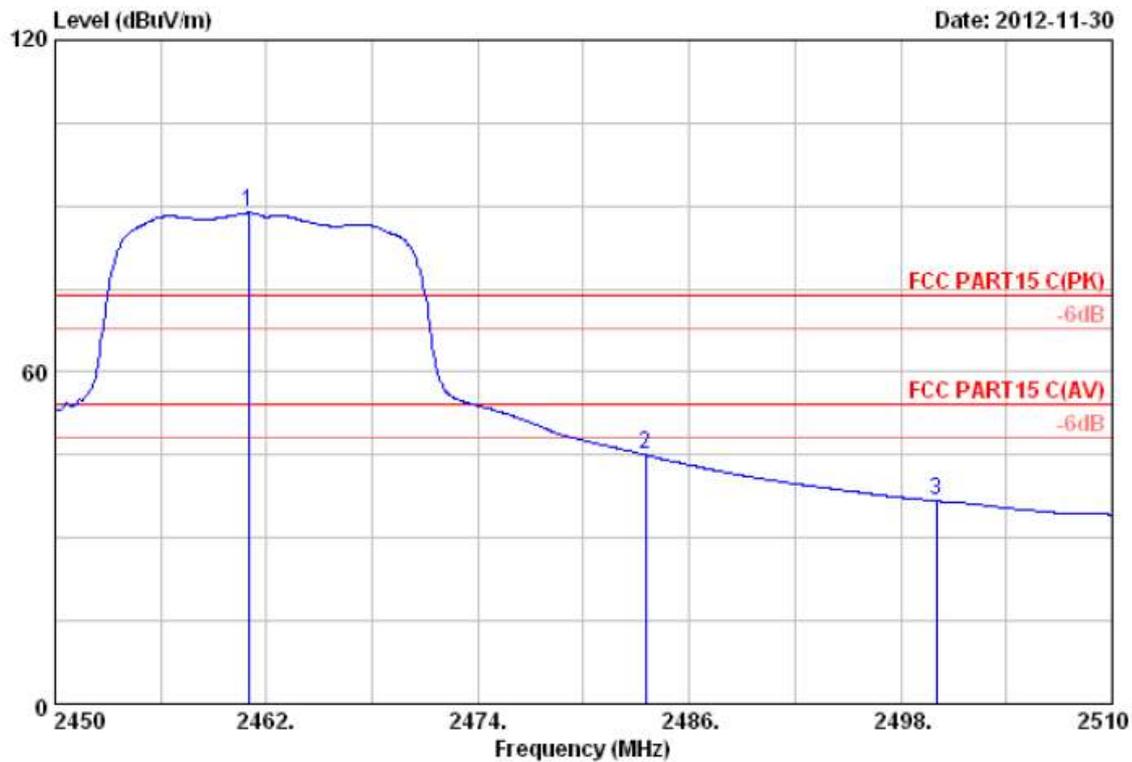
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.





Average High Edge plot:



Site no. : 3m Chamber Data no. : 47  
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL  
 Limit : FCC PART15 C (PK)  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : 339918  
 Power supply : DC 12V From Adapter  
 Test mode : Tx Mode 802.11g 2462MHz  
 M/N :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2460.980	27.15	6.12	35.92	91.43	88.78	54.00	-34.78	Average
2	2483.500	27.29	6.16	35.92	47.49	45.02	54.00	8.98	Average
3	2500.000	27.40	6.19	35.93	39.03	36.69	54.00	17.31	Average

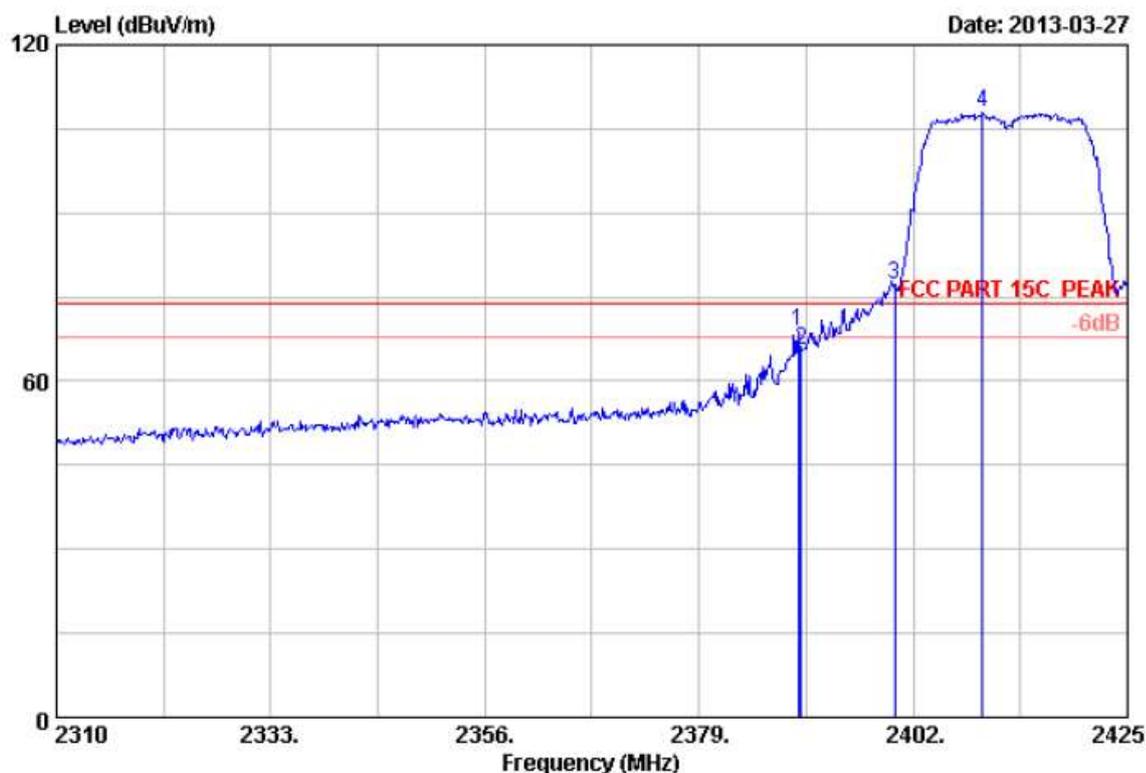
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

## Band edge compliance of RF emissions

WIFI Mode IEEE 802.11n HT20 modulation (6.5Mbps) Test Result

Peak Low Edge plot:



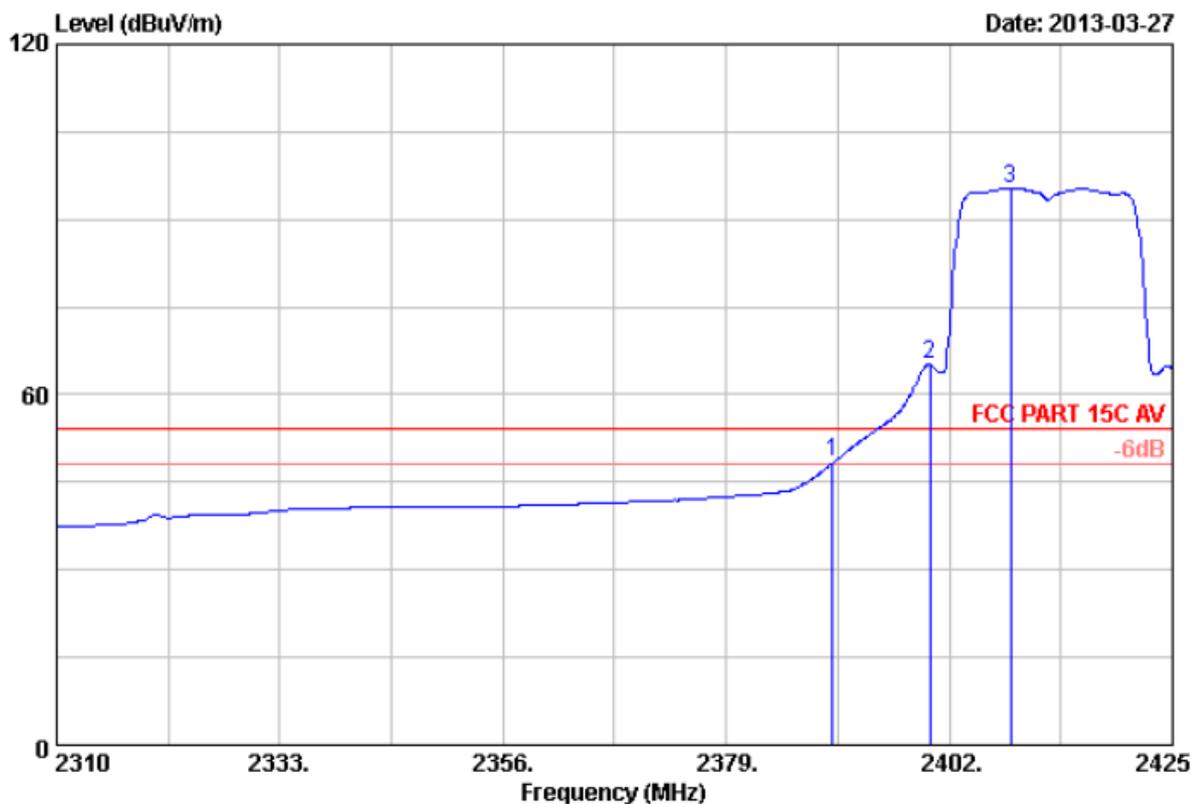
Site no. : 3m Chamber Data no. : 55  
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : HG8245H  
 Power supply : AC 120V/60Hz  
 Test mode : IEEE802.11nHT20 CH 1 2412MHz Tx  
 M/N :  
 :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2389.695	26.69	6.00	35.92	72.08	68.85	74.00	5.15	Peak
2	2390.000	26.70	6.00	35.92	68.76	65.54	74.00	8.46	Peak
3	2400.000	26.76	6.02	35.92	80.21	77.07	74.00	-3.07	Peak
4	2409.475	26.82	6.03	35.92	111.03	107.96	74.00	-33.96	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Average Low Edge plot:



Site no. : 3m Chamber Data no. : 56  
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : VERTICAL  
 Limit : FCC PART 15C AV  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : HG8245H  
 Power supply : AC 120V/60Hz  
 Test mode : IEEE802.1nHT20 CH 1 2412MHz Tx  
 M/N :  
 :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.70	6.00	35.92	51.57	48.35	54.00	5.65	Average
2	2400.000	26.76	6.02	35.92	68.19	65.05	54.00	-11.05	Average
3	2408.325	26.81	6.03	35.92	98.45	95.37	54.00	-41.37	Average

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

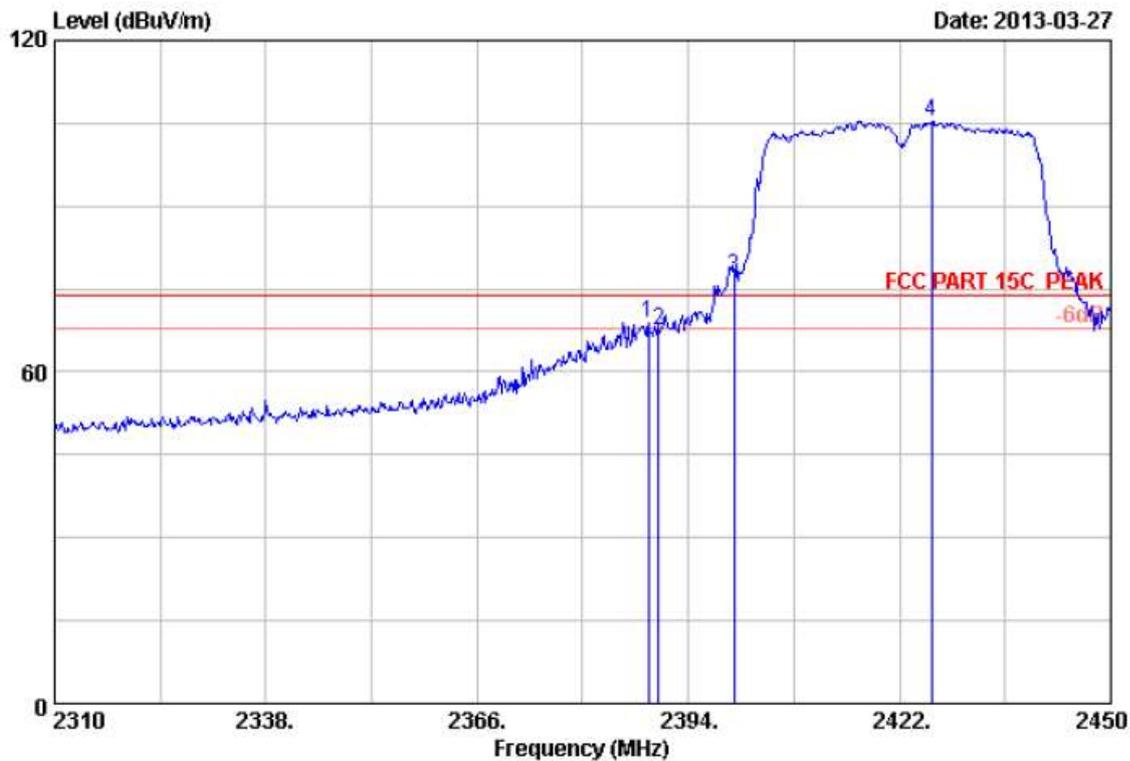




## Band edge compliance of RF emissions

WIFI Mode IEEE 802.11n HT40 modulation (6.5Mbps) Test Result

Peak Low Edge plot:



```

Site no.      : 3m Chamber           Data no.   : 57
Dis. / Ant.  : 3m 2012 3115 (4580)  Ant. pol.  : VERTICAL
Limit        : FCC PART 15C PEAK
Env. / Ins.  : 23°C/54%             Engineer   : Leo-Li
EUT          : HG8245H
Power supply : AC 120V/60Hz
Test mode    : IEEE802.1nHT40 CH 1
M/N         :
            :
    
```

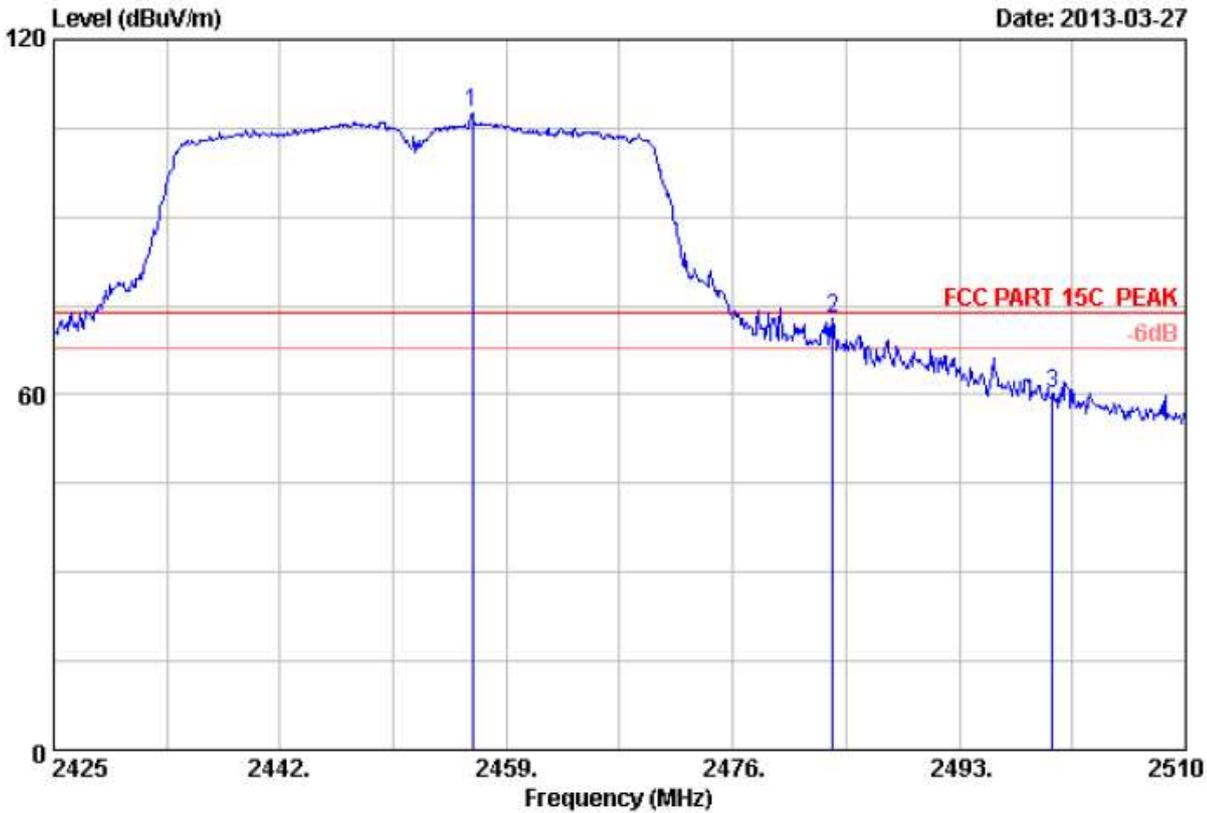
	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2388.680	26.69	6.00	35.92	72.08	68.85	74.00	5.15	Peak
2	2390.000	26.70	6.00	35.92	70.83	67.61	74.00	6.39	Peak
3	2400.000	26.76	6.02	35.92	80.39	77.25	74.00	-3.25	Peak
4	2426.200	26.93	6.06	35.92	108.21	105.28	74.00	-31.28	Peak

**Remarks:**

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



Peak High Edge plot:



Site no. : 3m Chamber  
 Dis. / Ant. : 3m 2012 3115 (4580)  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23°C/54%  
 EUT : HG8245H  
 Power supply : AC 120V/60Hz  
 Test mode : IEEE802.1nHT40 CH 9  
 M/N :  
 :  
 Data no. : 59  
 Ant. pol. : VERTICAL  
 Engineer : Leo-Li

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2456.450	27.12	6.11	35.92	110.42	107.73	74.00	-33.73	Peak
2	2483.500	27.29	6.16	35.92	75.51	73.04	74.00	0.96	Peak
3	2500.000	27.40	6.19	35.93	62.46	60.12	74.00	13.88	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



## 7.4 Spurious RF conducted emissions

### Test Method

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyzer were respectively set to 100 kHz and 100 kHz.

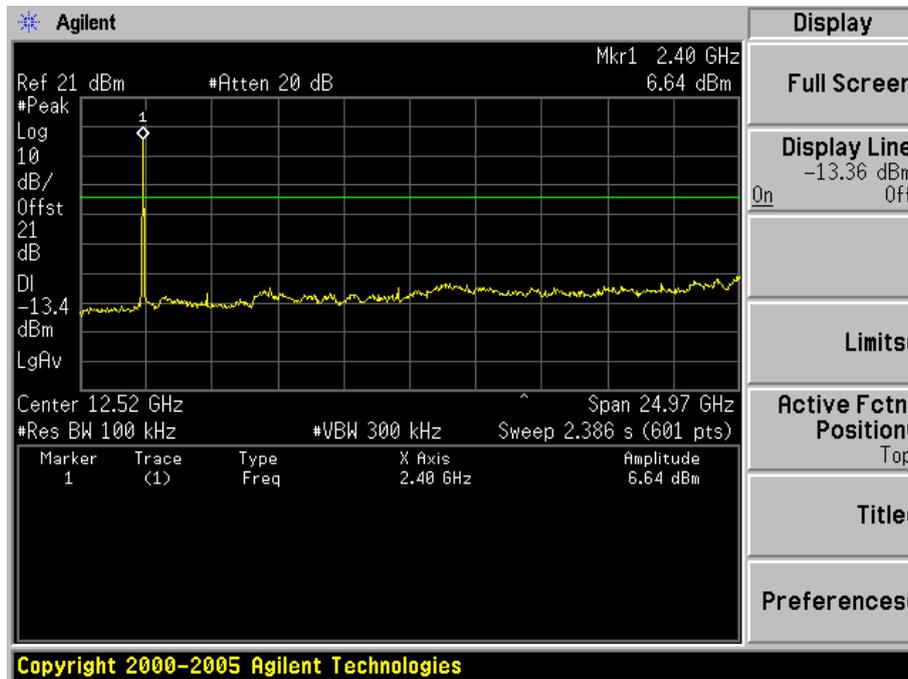
### Limit

Frequency Range MHz	Limit (dBc)
1000-25000	-20

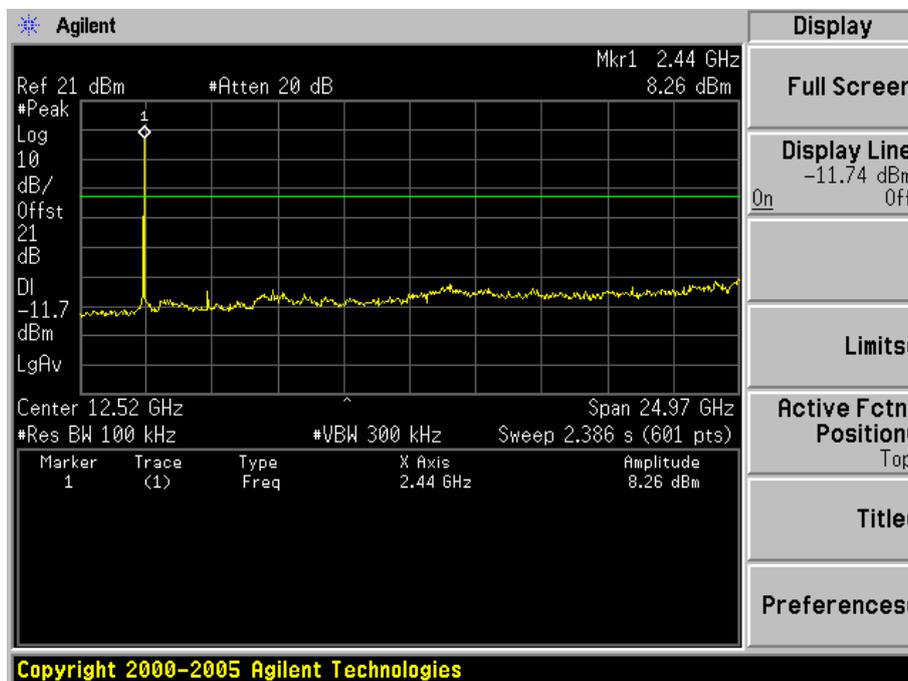
## Spurious RF conducted emissions

For antenna port 0:

WIFI Mode IEEE 802.11b modulation (1 Mbps) Test Result  
2412MHz

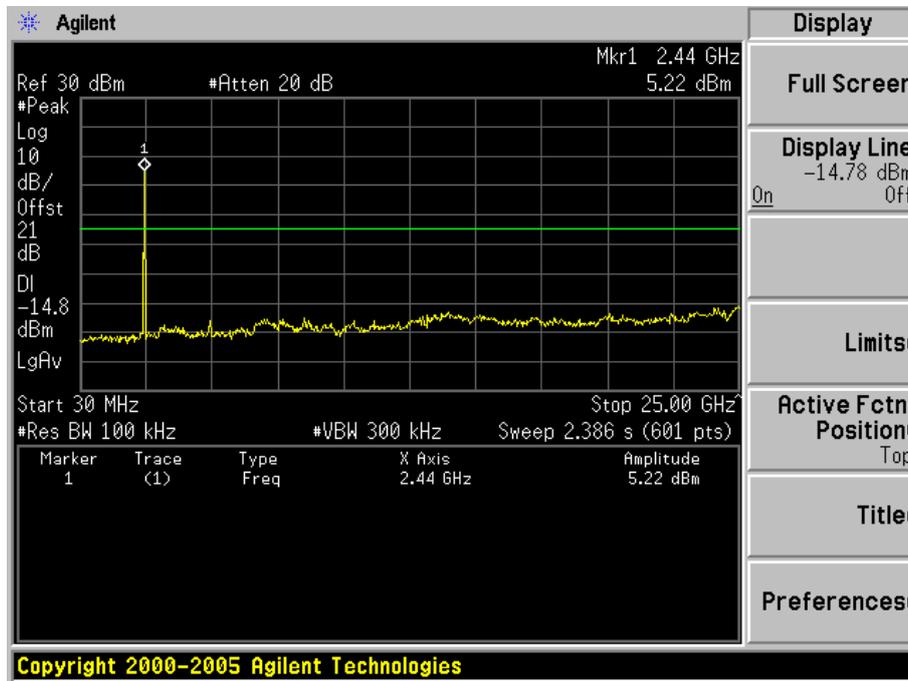


2437MHz

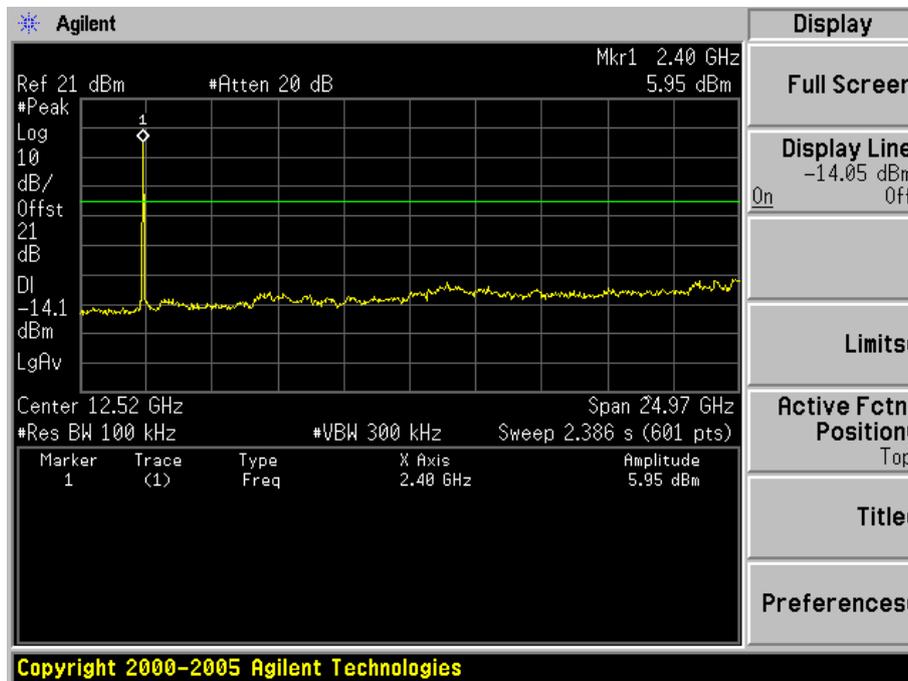


## Spurious RF conducted emissions

2462MHz

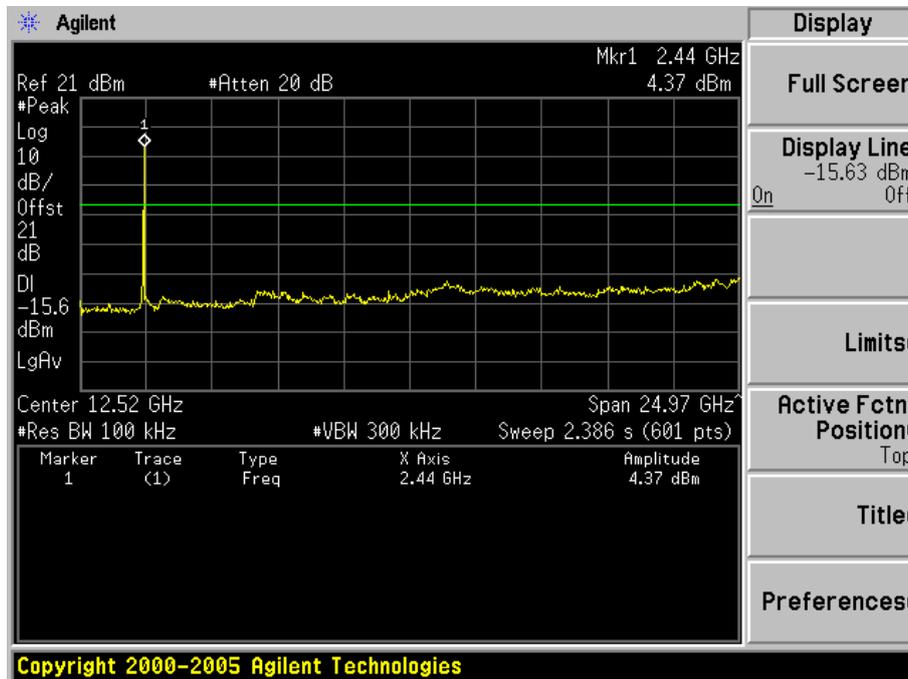


WIFI Mode IEEE 802.11g modulation (6 Mbps) Test Result  
2412MHz

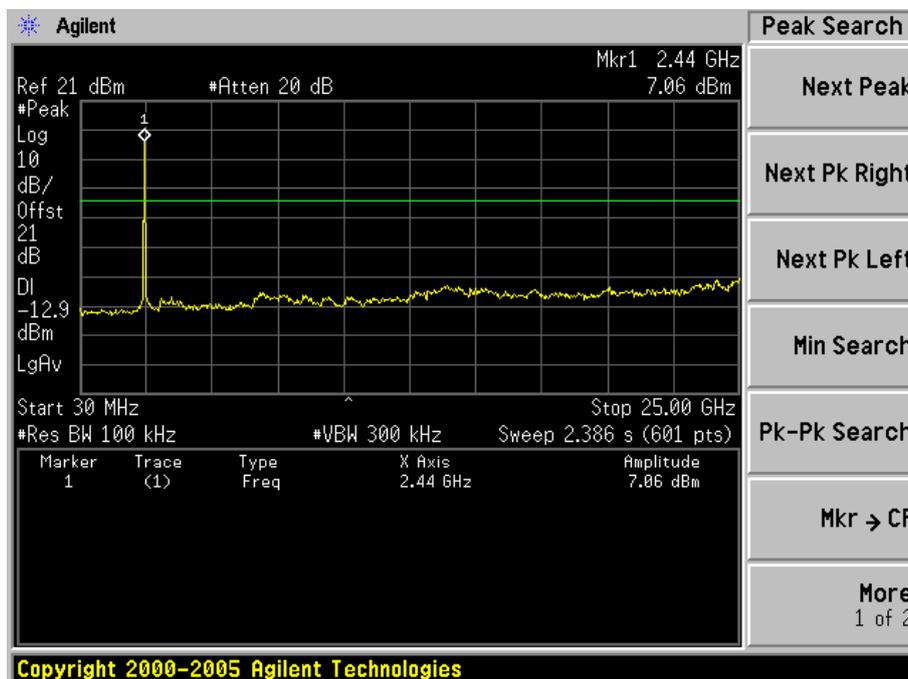


## Spurious RF conducted emissions

2437MHz

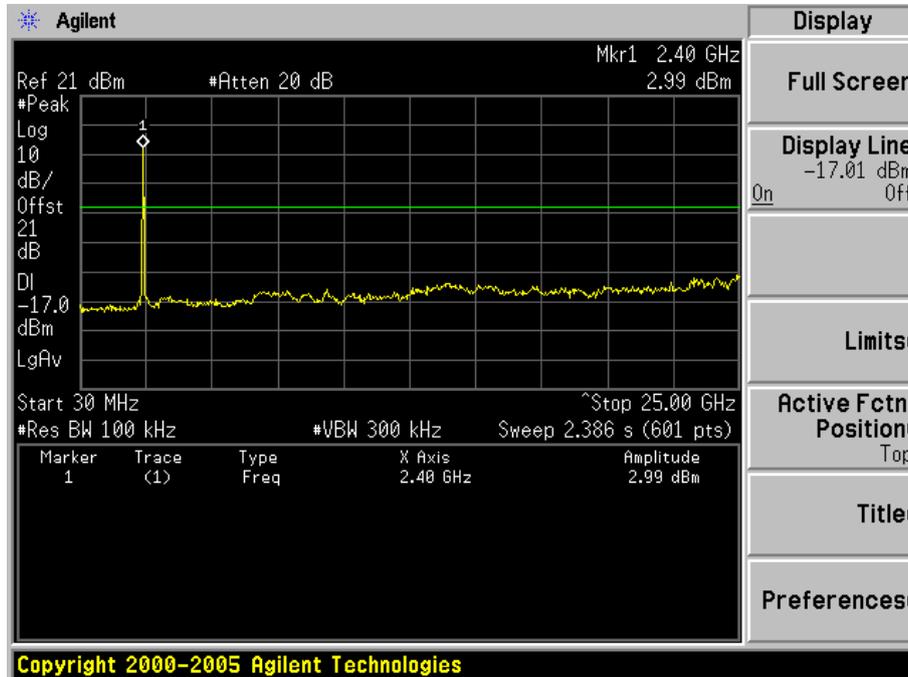


2462MHz

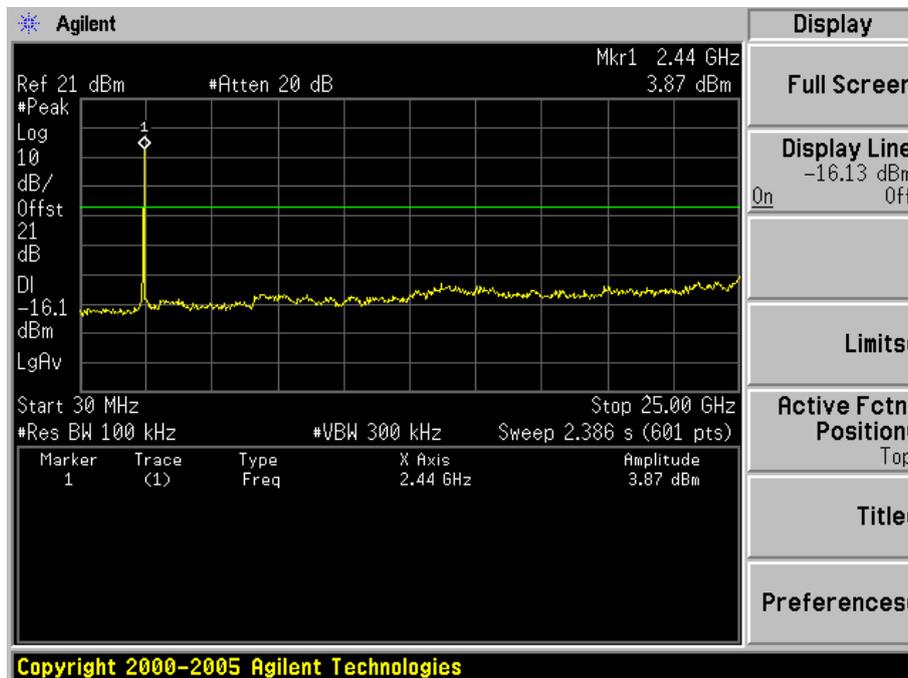


## Spurious RF conducted emissions

WIFI Mode IEEE 802.11n HT20 modulation (6.5 Mbps) Test Result  
2412MHz

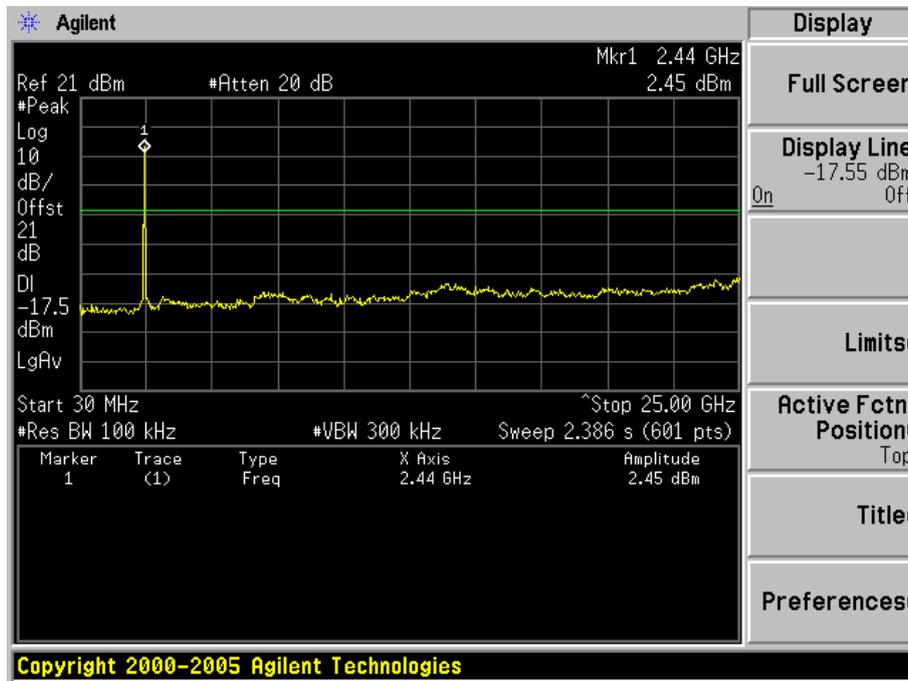


2437MHz

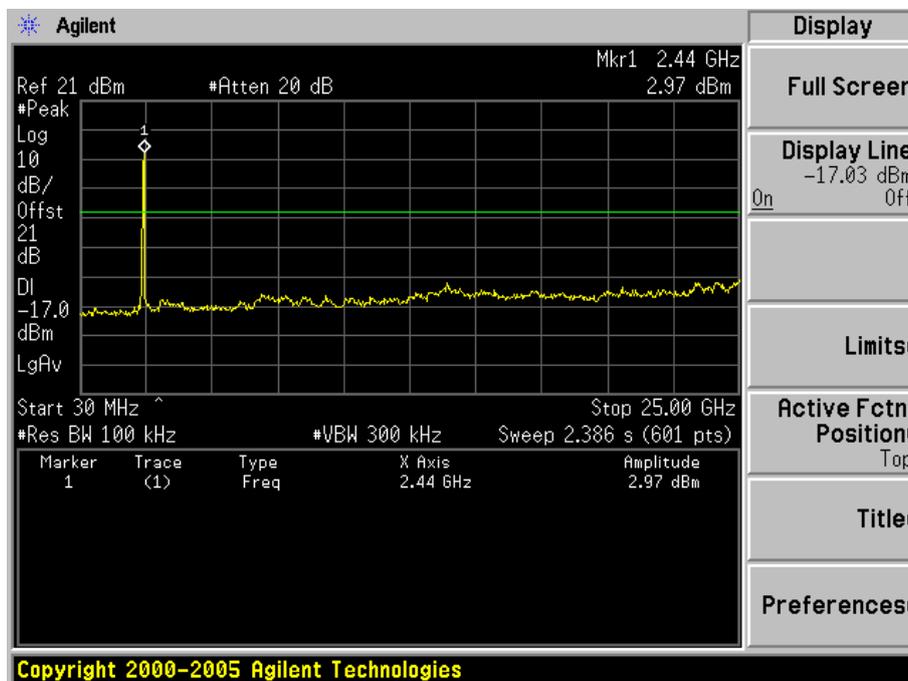


## Spurious RF conducted emissions

2462MHz

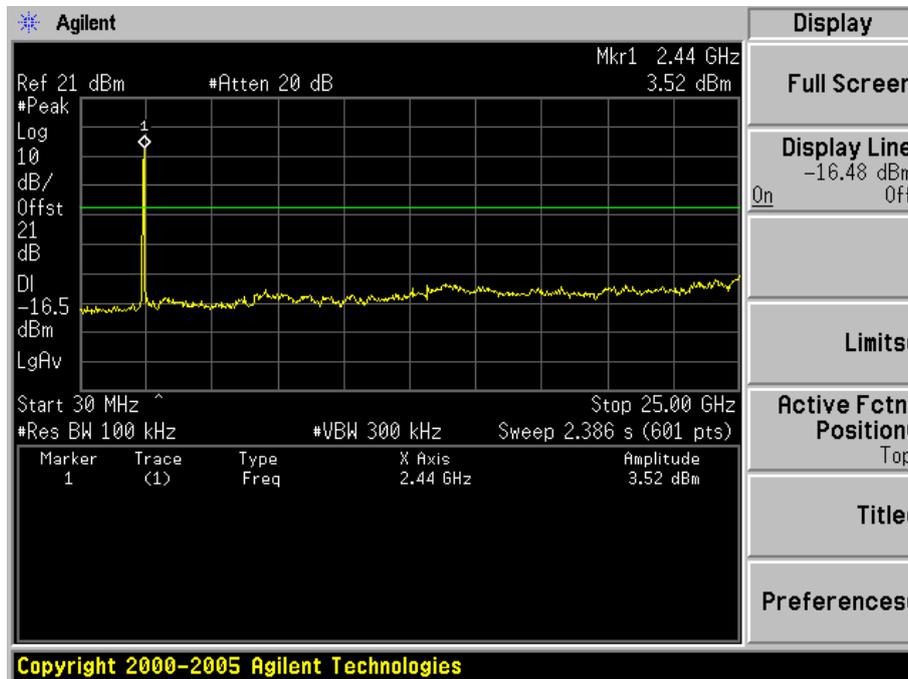


WIFI Mode IEEE 802.11n HT40 modulation (6.5 Mbps) Test Result  
2422MHz

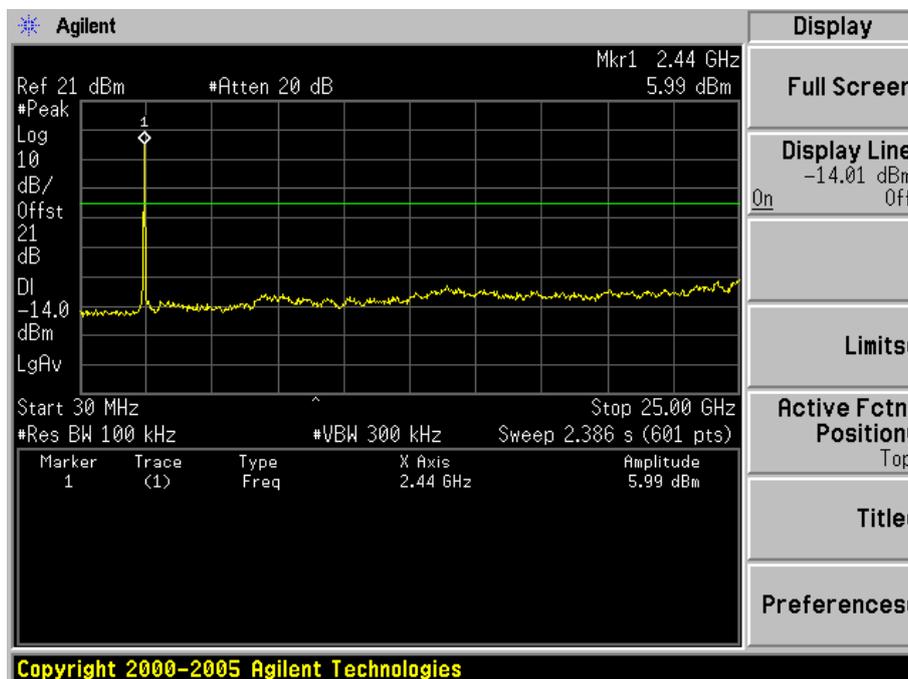


## Spurious RF conducted emissions

2437MHz

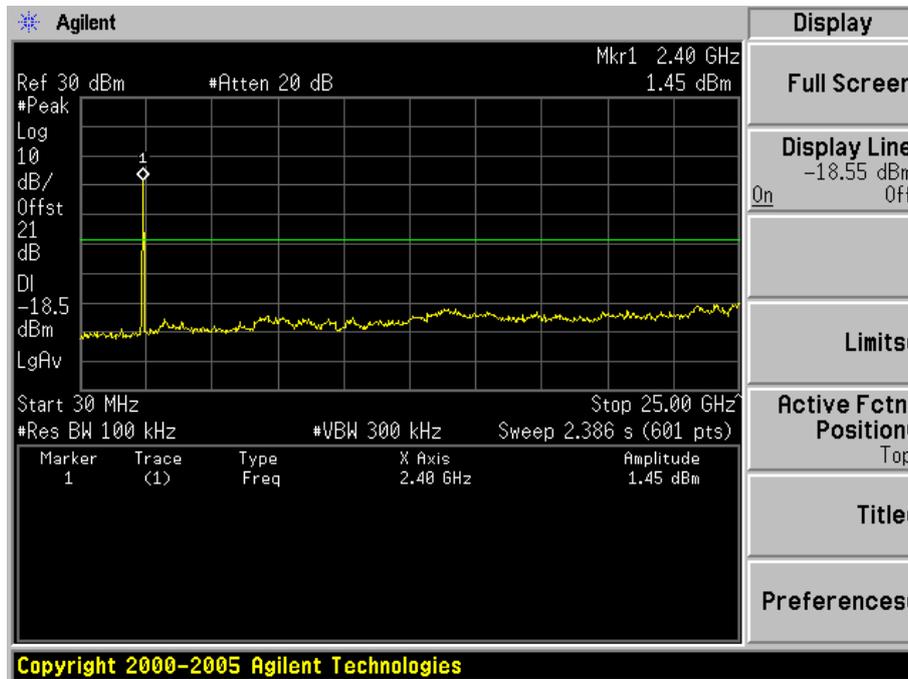


2452MHz

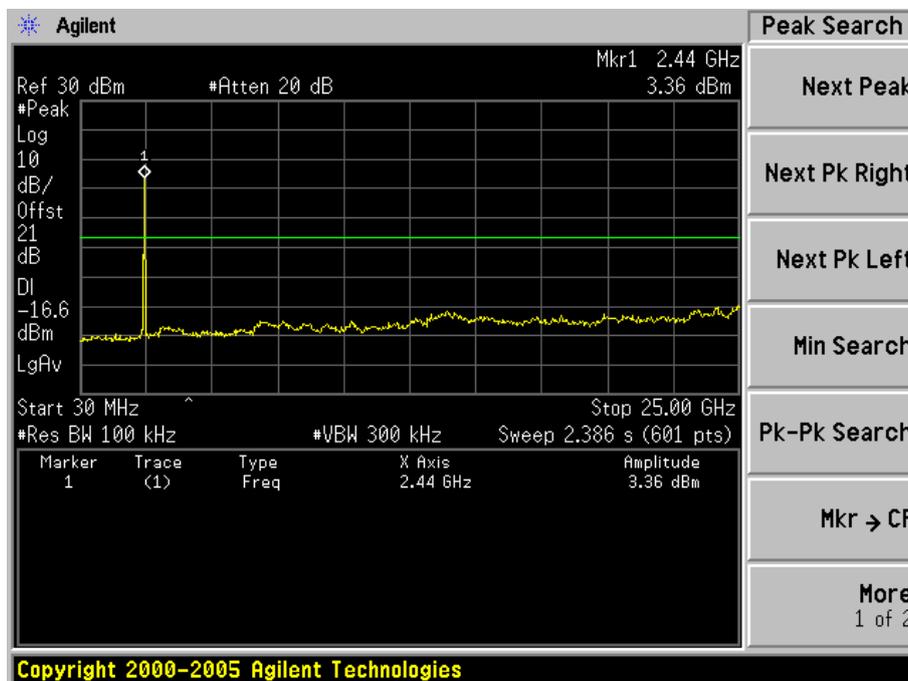


## Spurious RF conducted emissions

For antenna port 1:  
 WIFI Mode IEEE 802.11n HT20 modulation (6.5 Mbps) Test Result  
 2412MHz

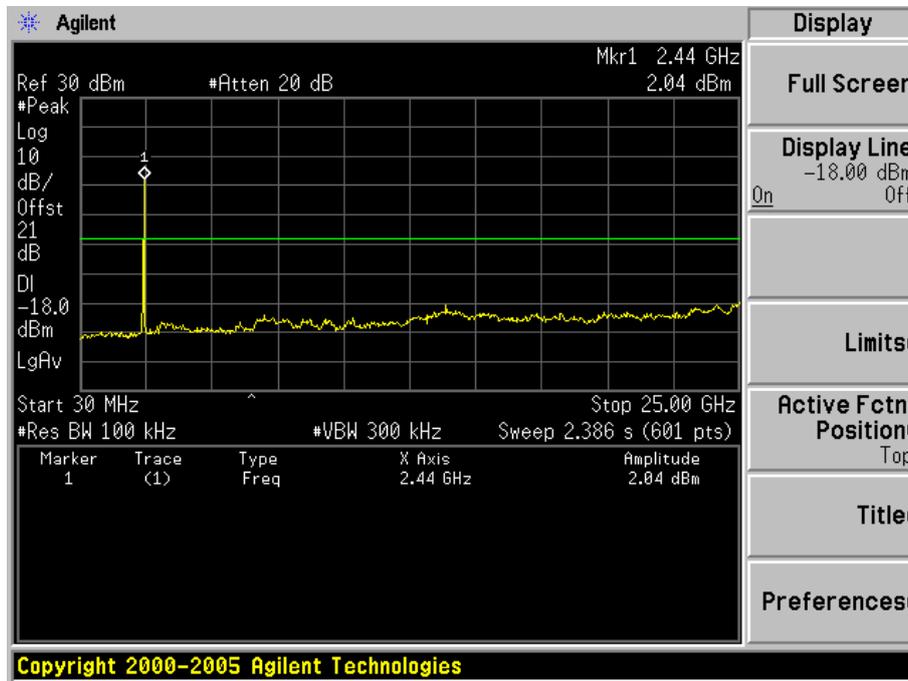


2437MHz

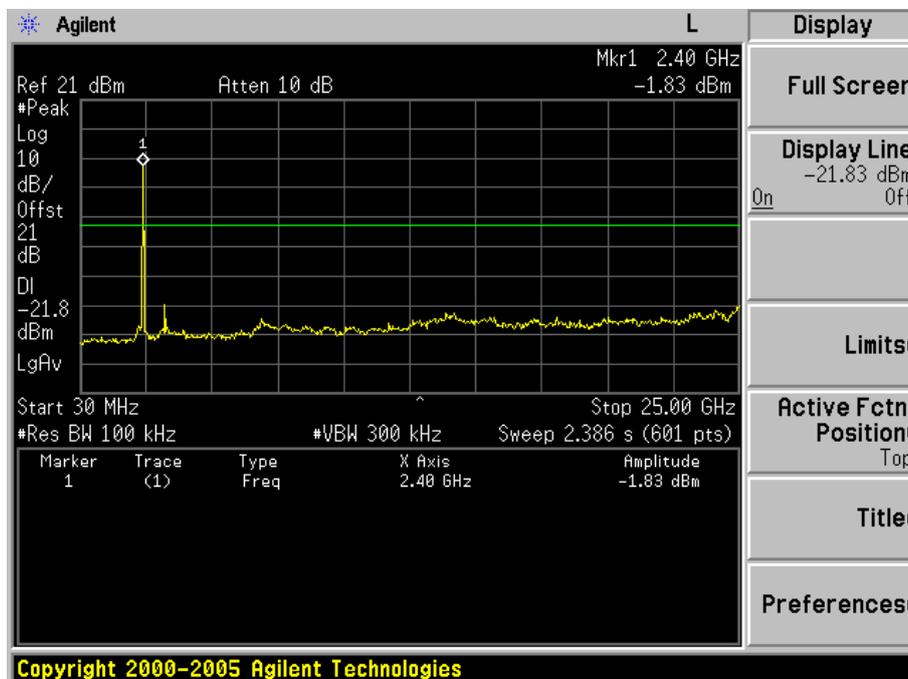


## Spurious RF conducted emissions

2462MHz

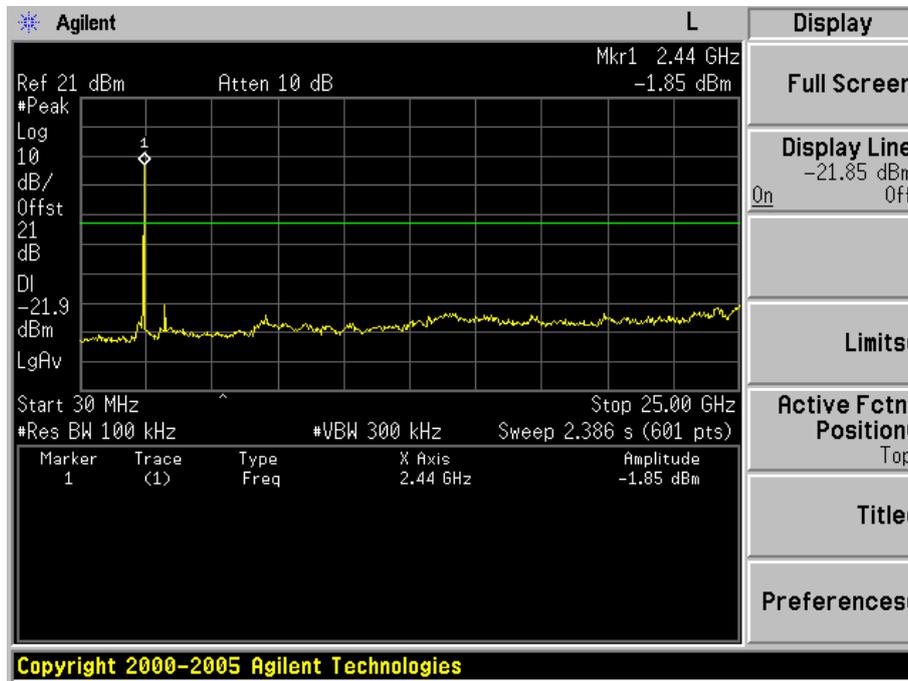


WIFI Mode IEEE 802.11n HT40 modulation (6.5 Mbps) Test Result  
2422MHz

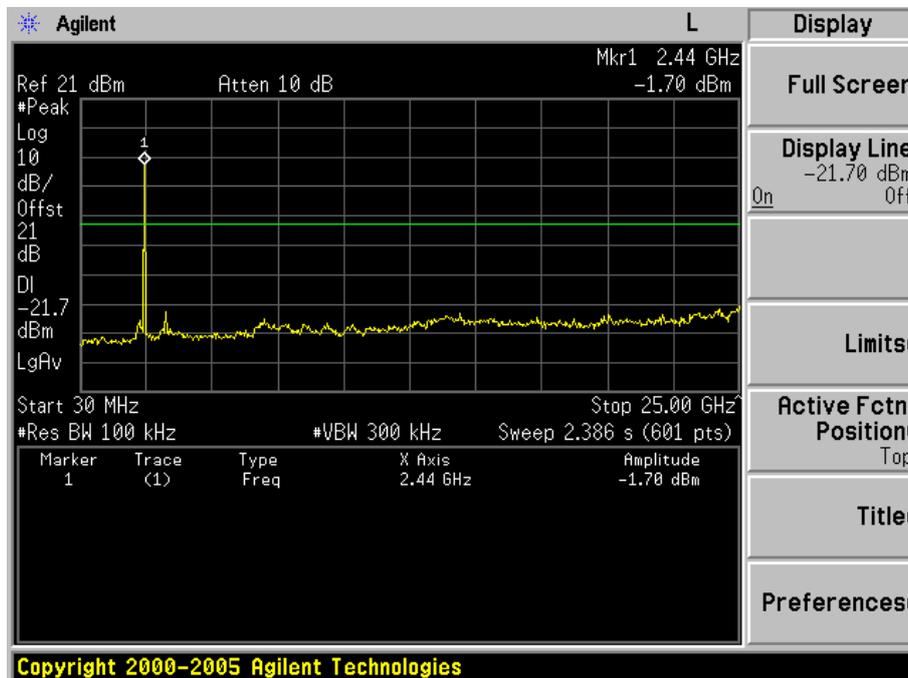


## Spurious RF conducted emissions

2437MHz



2452MHz





## 7.5 Spurious radiated emissions for transmitter and receiver

### Test Method

- 1 The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2 The turntable shall be rotated for 360 degrees to determine the position of maximum emission level
- 3 EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 4 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5 Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

### Limit

Frequency MHz	Field Strength uV/m	Field Strength dB $\mu$ V/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

**Transmitter Spurious radiated emissions**

## WIFI Mode IEEE 802.11b modulation (1 Mbps) CH1 2412MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dB $\mu$ V	Emission Level dB $\mu$ V/m	Polarization	Limit dB $\mu$ V/m	Detector	Result
35.27	13.43	0.51	0	17.40	31.34	Vertical	40	QP	Pass
87.56	9.40	0.79	0	18.40	28.59	Vertical	40	QP	Pass
4824.000	32.51	8.69	35.71	44.46	49.95	Horizontal	74	PK	Pass
4824.000	32.51	8.69	35.71	40.37	45.86	Horizontal	54	AV	Pass
4824.000	32.51	8.69	35.71	50.28	55.77	Vertical	74	PK	Pass
4824.000	32.51	8.69	35.71	46.04	51.53	Vertical	54	AV	Pass
7236.000	-	-	-	-	-	-	-	-	-
7236.000	-	-	-	-	-	-	-	-	-

## WIFI Mode IEEE 802.11b modulation (1 Mbps) CH6 2437MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dB $\mu$ V	Emission Level dB $\mu$ V/m	Polarization	Limit dB $\mu$ V/m	Detector	Result
35.00	13.39	0.51	0	17.30	31.20	Vertical	40	QP	Pass
4874.000	32.62	8.73	35.69	45.04	50.70	Horizontal	74	PK	Pass
4874.000	32.62	8.73	35.69	38.13	43.79	Horizontal	54	AV	Pass
4874.000	32.62	8.73	35.69	49.65	55.31	Vertical	74	PK	Pass
4874.000	32.62	8.73	35.69	44.32	49.98	Vertical	54	AV	Pass
7311.000	-	-	-	-	-	-	-	-	-
7311.000	-	-	-	-	-	-	-	-	-

## WIFI Mode IEEE 802.11b modulation (1 Mbps) CH11 2462MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dB $\mu$ V	Emission Level dB $\mu$ V/m	Polarization	Limit dB $\mu$ V/m	Detector	Result
34.79	13.38	0.51	0	17.00	30.89	Vertical	40	QP	Pass
4924.000	32.73	8.78	35.68	45.89	51.72	Horizontal	74	PK	Pass
4924.000	32.73	8.78	35.68	34.57	40.40	Horizontal	54	AV	Pass
4924.000	32.73	8.78	35.68	48.56	54.39	Vertical	74	PK	Pass
4924.000	32.73	8.78	35.68	43.57	49.40	Vertical	54	AV	Pass
7386.000	-	-	-	-	-	-	-	-	-
7386.000	-	-	-	-	-	-	-	-	-

## Remark:

- (1) Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
- (2) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

### Transmitter Spurious radiated emissions

#### WIFI Mode IEEE 802.11g modulation (6 Mbps) CH1 2412MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBμV	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Result
4824.000	32.51	8.69	35.71	45.04	50.53	Vertical	74	PK	Pass
4824.000	32.51	8.69	35.71	32.35	37.84	Vertical	54	AV	Pass
7236.000	-	-	-	-	-	-	-	-	-
7236.000	-	-	-	-	-	-	-	-	-

#### WIFI Mode IEEE 802.11g modulation (6 Mbps) CH6 2437MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBμV	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Result
4874.000	32.62	8.73	35.69	45.51	51.16	Vertical	74	PK	Pass
4874.000	32.62	8.73	35.69	33.37	39.03	Vertical	54	AV	Pass
7311.000	-	-	-	-	-	-	-	-	-
7311.000	-	-	-	-	-	-	-	-	-

#### WIFI Mode IEEE 802.11g modulation (6 Mbps) CH11 2462MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBμV	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Result
4924.000	32.73	8.78	35.68	45.12	50.78	Vertical I	74	PK	Pass
4924.000	32.73	8.78	35.68	33.68	39.34	Vertical	54	AV	Pass
7386.000	-	-	-	-	-	-	-	-	-
7386.000	-	-	-	-	-	-	-	-	-

Remark:

- (1) Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

**Transmitter Spurious radiated emissions**

## WIFI Mode IEEE 802.11n HT20 modulation (6.5 Mbps) CH1 2412MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dB $\mu$ V	Emission Level dB $\mu$ V/m	Polarization	Limit dB $\mu$ V/m	Detector	Result
4824.000	32.51	8.69	35.71	46.46	51.95	Vertical	74	PK	Pass
4824.000	32.51	8.69	35.71	33.61	39.10	Vertical I	54	AV	Pass
7236.000	-	-	-	-	-	-	-	-	-
7236.000	-	-	-	-	-	-	-	-	-

## WIFI Mode IEEE 802.11n HT20 modulation (6.5 Mbps) CH6 2437MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dB $\mu$ V	Emission Level dB $\mu$ V/m	Polarization	Limit dB $\mu$ V/m	Detector	Result
4874.000	32.62	8.73	35.69	44.47	50.13	Vertical I	74	PK	Pass
4874.000	32.62	8.73	35.69	30.96	36.62	Vertical	54	AV	Pass
7311.000	-	-	-	-	-	-	-	-	-
7311.000	-	-	-	-	-	-	-	-	-

## WIFI Mode IEEE 802.11n HT20 modulation (6.5 Mbps) CH11 2462MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dB $\mu$ V	Emission Level dB $\mu$ V/m	Polarization	Limit dB $\mu$ V/m	Detector	Result
4924.000	32.73	8.78	35.68	44.78	50.61	Vertical	74	PK	Pass
4924.000	32.73	8.78	35.68	31.02	36.85	Vertical	54	AV	Pass
7386.000	-	-	-	-	-	-	-	-	-
7386.000	-	-	-	-	-	-	-	-	-

## Remark:

- (1) Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

**Transmitter Spurious radiated emissions**

## WIFI Mode IEEE 802.11n HT40 modulation (6.5 Mbps) CH3 2422MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dB $\mu$ V	Emission Level dB $\mu$ V/m	Polarization	Limit dB $\mu$ V/m	Detector	Result
4844.000	32.56	8.70	35.70	44.68	50.24	Vertical	74	PK	Pass
4844.000	32.56	8.70	35.70	30.65	36.21	Vertical	54	AV	Pass
7266.000	-	-	-	-	-	-	-	-	-
7266.000	-	-	-	-	-	-	-	-	-

## WIFI Mode IEEE 802.11n HT40 modulation (6.5 Mbps) CH6 2437MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dB $\mu$ V	Emission Level dB $\mu$ V/m	Polarization	Limit dB $\mu$ V/m	Detector	Result
4874.000	-	-	-	-	-	-	-	-	-
4874.000	-	-	-	-	-	-	-	-	-
7311.000	-	-	-	-	-	-	-	-	-
7311.000	-	-	-	-	-	-	-	-	-

## WIFI Mode IEEE 802.11n HT40 modulation (6.5 Mbps) CH9 2452MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dB $\mu$ V	Emission Level dB $\mu$ V/m	Polarization	Limit dB $\mu$ V/m	Detector	Result
4904.000	-	-	-	-	-	-	-	-	-
4904.000	-	-	-	-	-	-	-	-	-
7356.000	-	-	-	-	-	-	-	-	-
7356.000	-	-	-	-	-	-	-	-	-

## Remark:

- (1) Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

## 7.6 6 dB bandwidth

### Test Method

- 1 Place the EUT on the table and set it in the 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 Mark the peak frequency and  $-6\text{dB}$  (upper and lower) frequency.

### Limit

Limit [kHz]

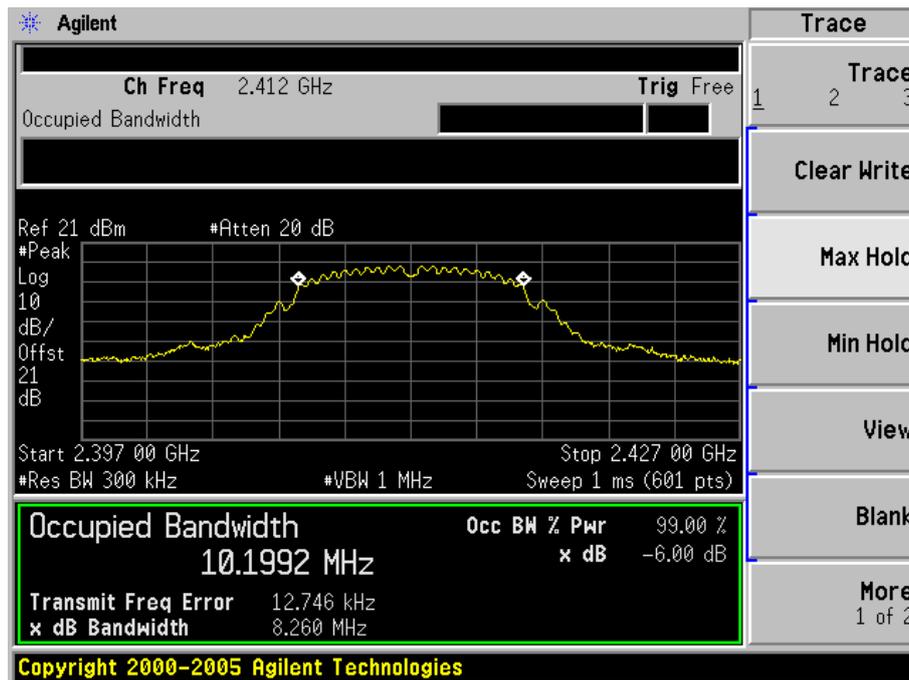
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$\geq 500$

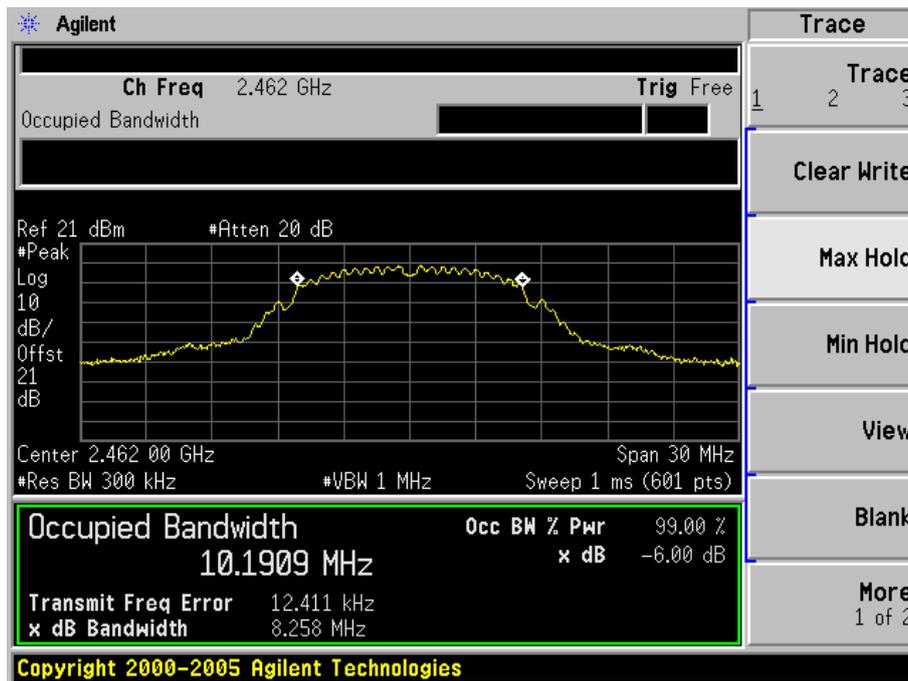
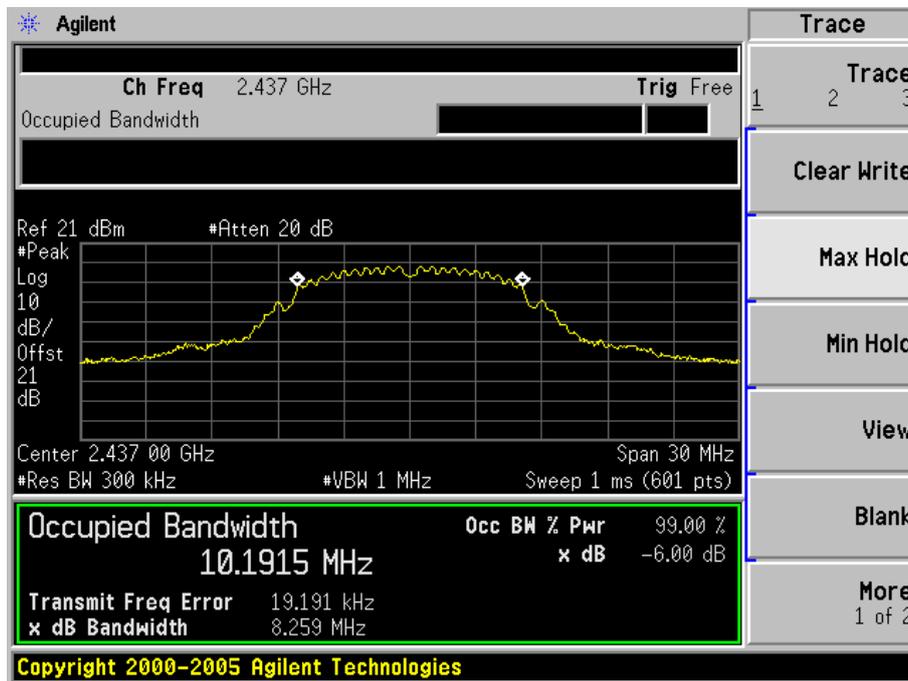
## 6 dB bandwidth

### WIFI Mode IEEE 802.11b modulation (1Mbps) Test Result

Frequency MHz	6 dB Bandwidth kHz	Limit kHz	Result
2412	8260	≥ 500	Pass
2437	8259	≥ 500	Pass
2462	8258	≥ 500	Pass



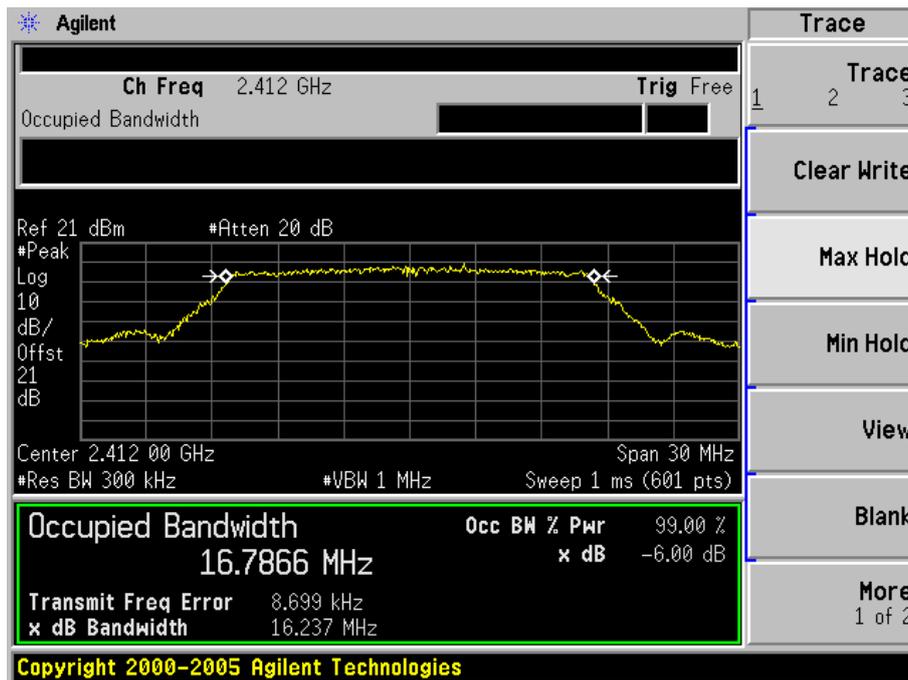
## 6 dB bandwidth



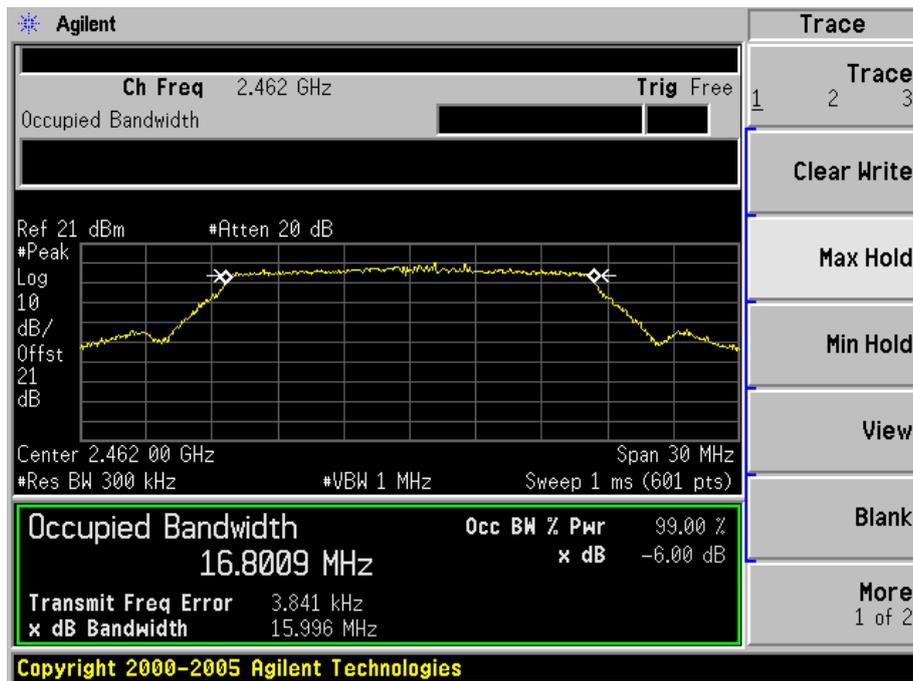
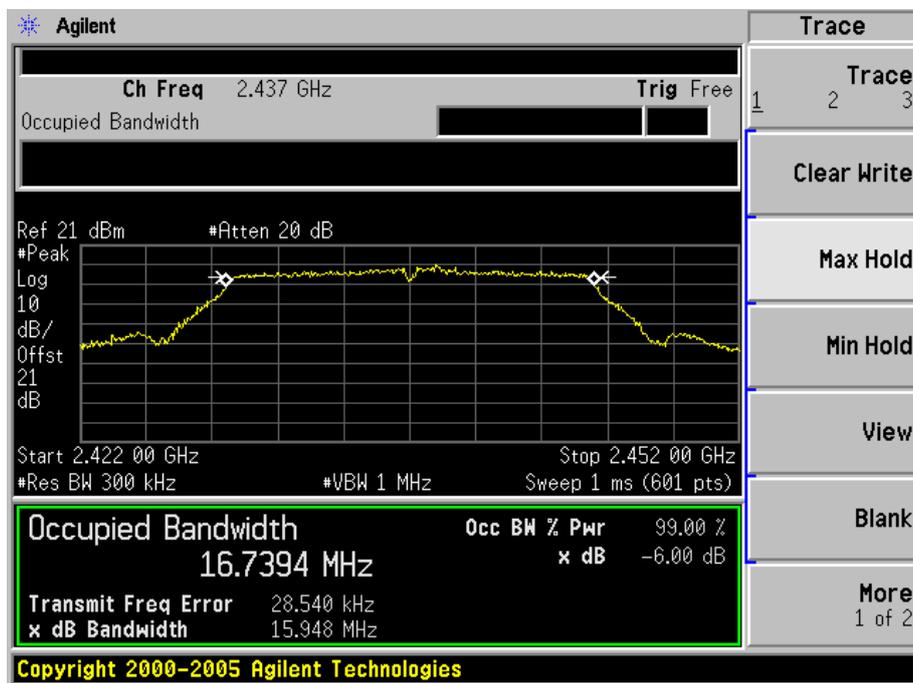
## 6 dB bandwidth

### WIFI Mode IEEE 802.11g modulation (6Mbps) Test Result

Frequency MHz	6 dB Bandwidth kHz	Limit kHz	Result
2412	16237	≥ 500	Pass
2437	15948	≥ 500	Pass
2462	15996	≥ 500	Pass



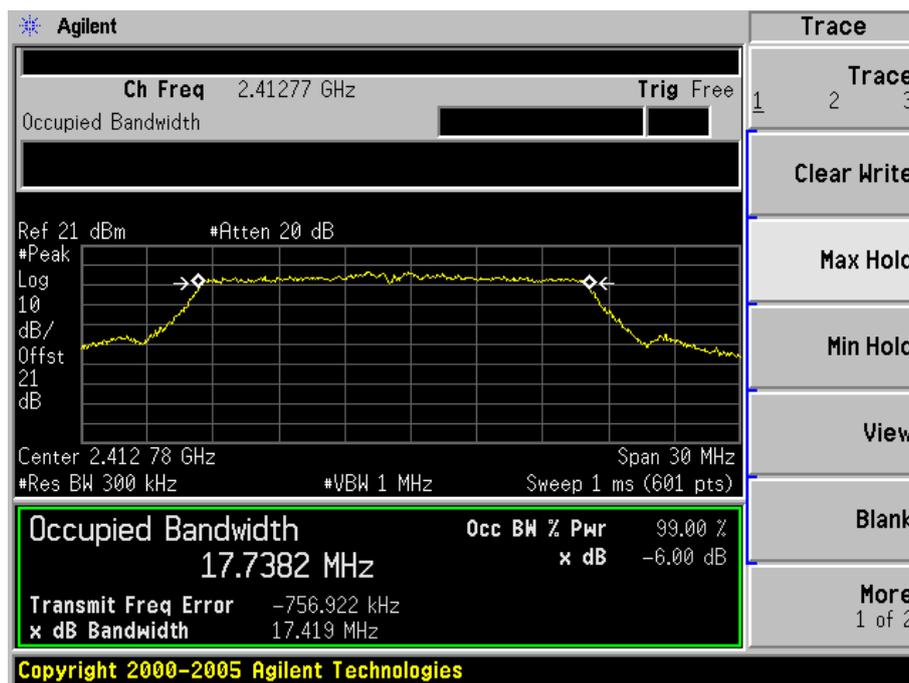
## 6 dB dB bandwidth



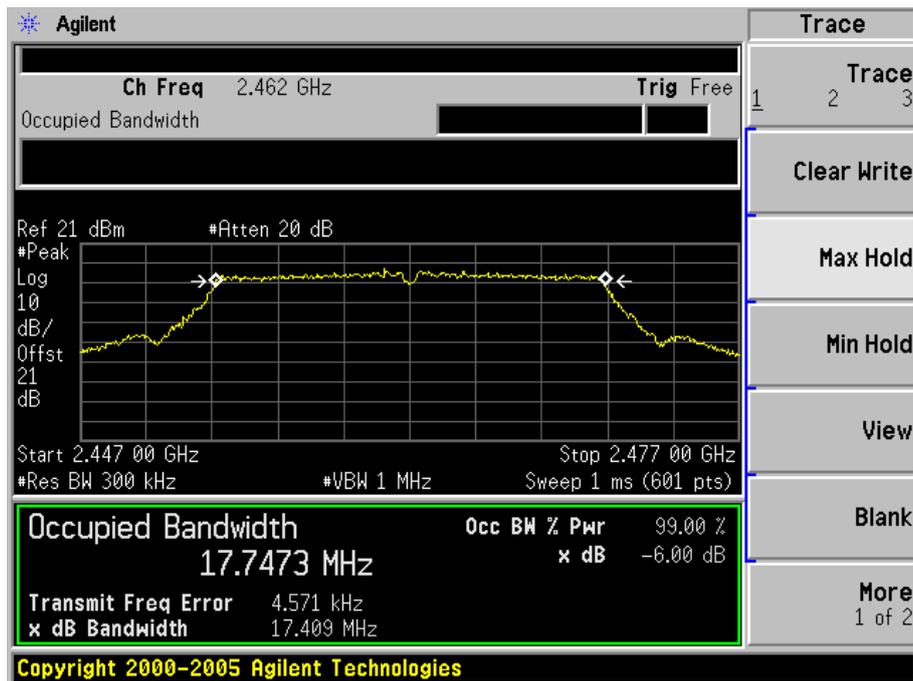
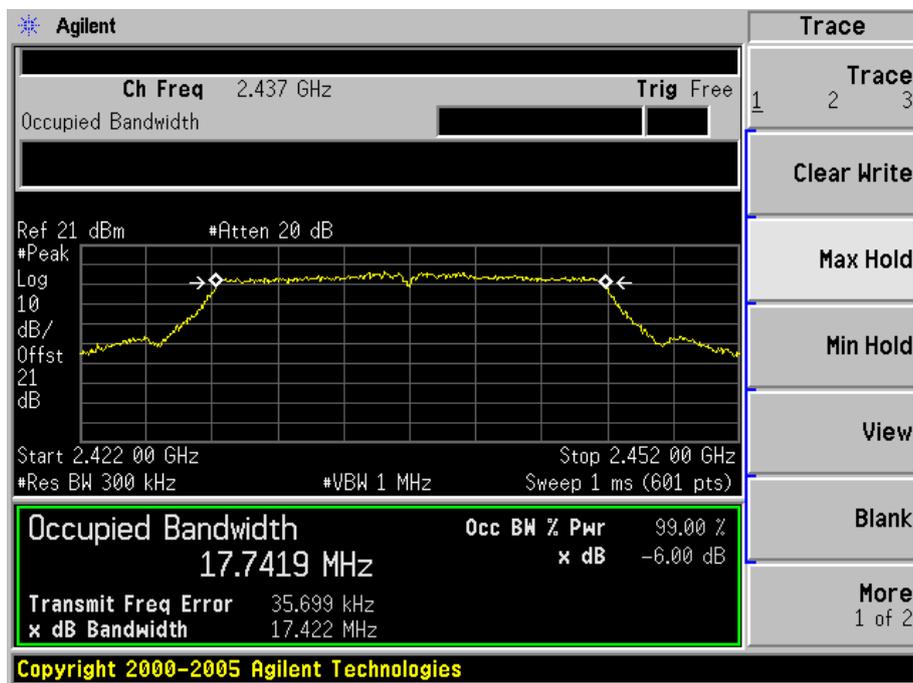
## 6 dB bandwidth

### WIFI Mode IEEE 802.11n HT20 modulation (6.5Mbps) Test Result

Frequency MHz	6 dB Bandwidth kHz	Limit kHz	Result
2412	17419	≥ 500	Pass
2437	17422	≥ 500	Pass
2462	17409	≥ 500	Pass



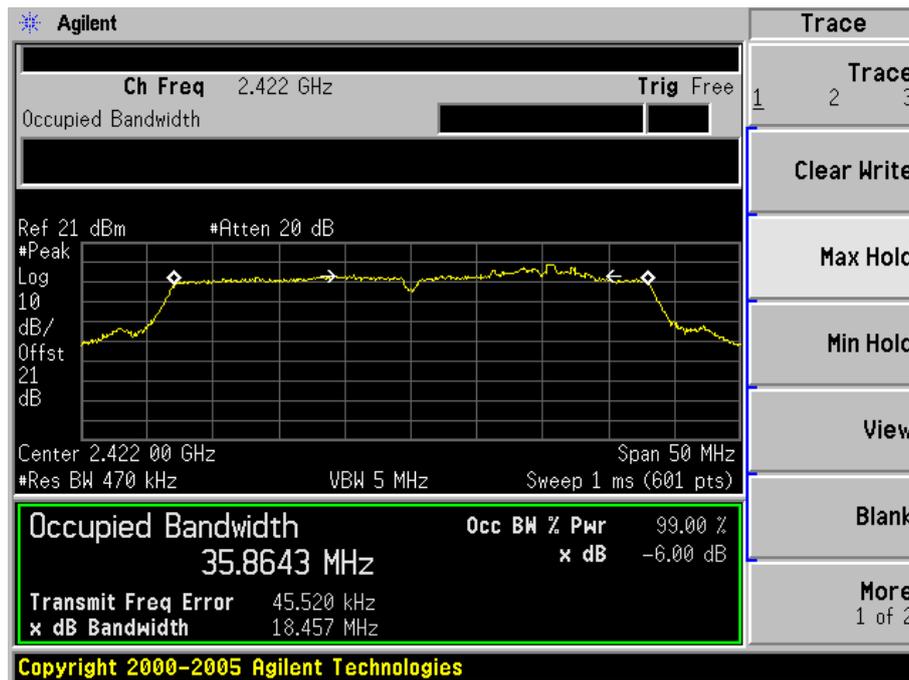
## 6 dB bandwidth



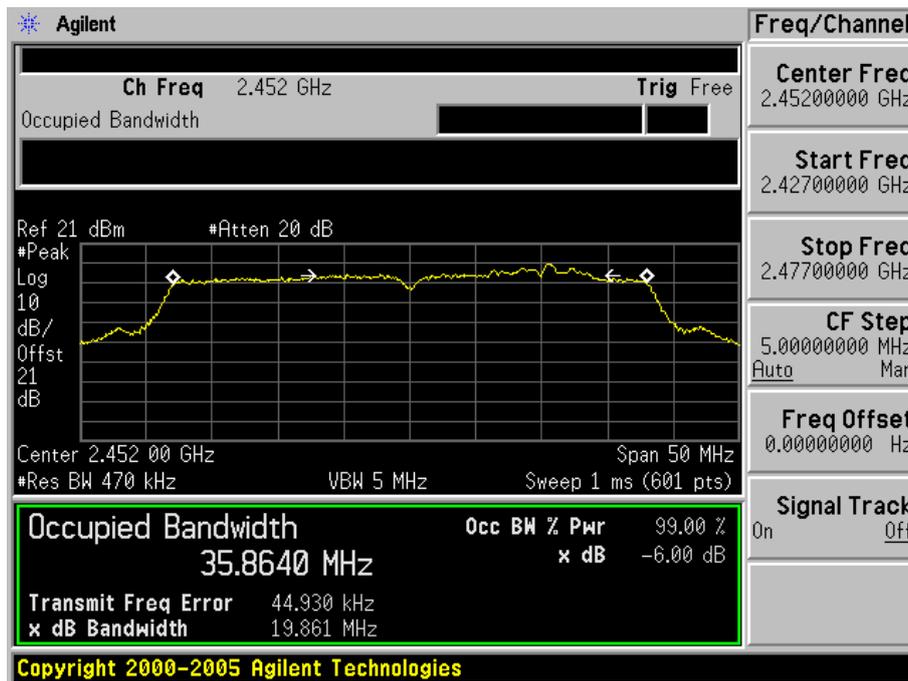
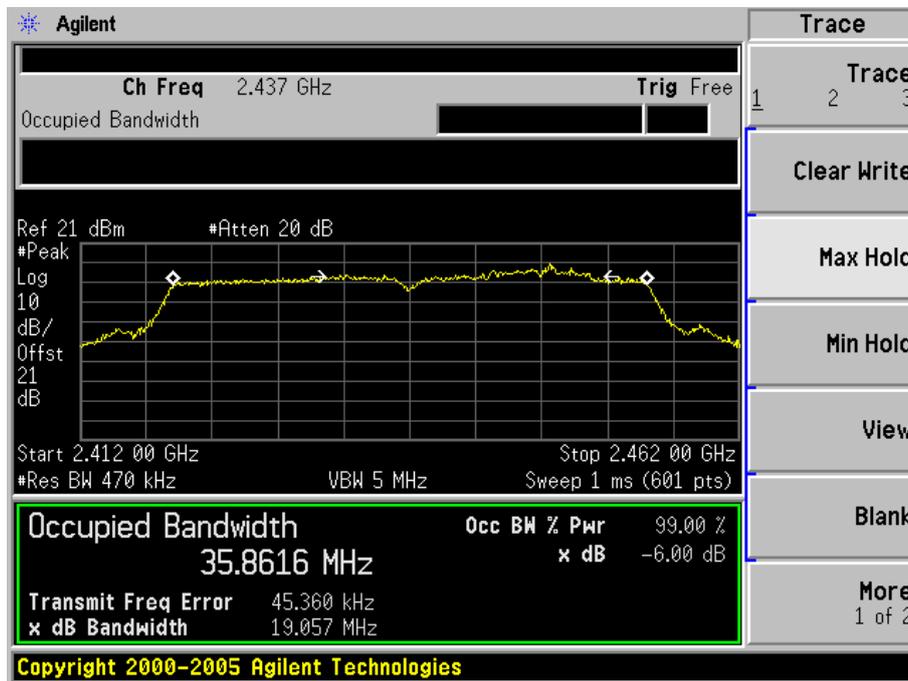
## 6 dB bandwidth

### WIFI Mode IEEE 802.11n HT40 modulation (6.5Mbps) Test Result

Frequency MHz	6 dB Bandwidth kHz	Limit kHz	Result
2422	18457	≥ 500	Pass
2437	19057	≥ 500	Pass
2452	19861	≥ 500	Pass



## 6 dB bandwidth



## 7.7 Power spectral density

### Test Method

- 1 Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2 Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 1.5 times channel bandwidth, Sweep = auto couple.
- 3 Record the max reading.

### Limit

**Limit**  
**dBm / 3 kHz**

8

## Power spectral density

### WIFI Mode IEEE 802.11b modulation (1Mbps) Test Result

Frequency MHz	Conducted PeakOutput Power dBm			Result
	Ant0	Ant1	Total	
2412	1.95	--	1.95	Pass
2437	1.72	--	1.72	Pass
2462	1.07	--	1.07	Pass

### WIFI Mode IEEE 802.11g modulation (6Mbps) Test Result

Frequency MHz	Conducted PeakOutput Power dBm			Result
	Ant0	Ant1	Total	
2412	-6.53	--	-6.53	Pass
2437	-5.83	--	-5.83	Pass
2462	-5.15	--	-5.15	Pass

### WIFI Mode IEEE 802.11n HT20 modulation (6.5Mbps) Test Result

Frequency MHz	Conducted PeakOutput Power dBm			Result
	Ant0	Ant1	Total	
2412	-9.38	-9.78	-6.56	Pass
2437	-9.69	-10.21	-6.93	Pass
2462	-9.69	-9.93	-6.79	Pass

### WIFI Mode IEEE 802.11n HT40 modulation (6.5Mbps) Test Result

Frequency MHz	Conducted PeakOutput Power dBm			Result
	Ant0	Ant1	Total	
2422	-12.25	-12.91	-9.56	Pass
2437	-12.17	-12.49	-9.31	Pass
2452	-11.21	-11.63	-8.40	Pass

## 8 Test Equipment

TEST ITME	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DAT E
CE	Test Receiver	Rohde & Schwarz	ESHS10	838693/001	2013-12-17
	L.I.S.N.#1	Rohde & Schwarz	ESH2-Z5	834066/011	2013-05-08
	L.I.S.N.#3	Kyoritsu	KNW-242C	8-1920-1	2013-05-08
	Terminator	Hubersuhner	50Ω	No. 1	2013-05-08
	Terminator	Hubersuhner	50Ω	No. 2	2013-05-08
	RF Cable	Fujikura	3D-2W	LISN Cable 1#	2013-05-08
	Coaxial Switch	Anritsu	MP59B	M55367	2013-05-08
	Passive Probe	Rohde & Schwarz	ESH2-Z3	299.7810.52	2013-05-08
	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100341	2013-05-08
Peak Power	Spectrum Analyzer	Agilent	E4446A	US44300459	2013-05-08
Band Edge	Spectrum	Agilent	E4446A	US44300459	2013-05-08
	Amp	HP	8449B	3008A02495	2013-05-08
	Antenna	EMCO	3115	9607-4877	2013-05-17
	Bilog Antenna	Schaffner	CBL6111C	2598	2013-12-13
	HF Cable	Hubersuhne	Sucoflex104	---	2013-05-08
Conducted RF Emissions	Spectrum Analyzer	Agilent	E4446A	US44300459	2013-05-08
RSE	Spectrum	Agilent	E4446A	US44300459	2013-05-08
	Amp	HP	8449B	3008A02495	2013-05-08
	Antenna	EMCO	3115	9607-4877	2013-05-17
	Bilog Antenna	Schaffner	CBL6111C	2598	2013-12-14
	HF Cable	Hubersuhne	Sucoflex104	---	2013-05-08
Bandwidth	Spectrum Analyzer	Agilent	E4446A	MY41440292	2013-05-08
PSD	Spectrum Analyzer	Agilent	E4446A	MY41440292	2013-05-08

## 9 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

### System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dBμV/m)	U=4.32dB (30MHz-25GHz)
CE	Disturbance Voltage (dBμV)	U=2.40dB(150KHz-30MHz)