

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT****INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

OF

**Product Name:** TQ5-E01

**FCC ID:** SP2-TQ5-E01

**Report No.:** EH/2009/A0021

**Issue Date:** Oct. 28, 2009

**FCC Rule Part:** §15.247, DTS

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## VERIFICATION OF COMPLIANCE

**Applicant:** Toshiba Information Systems (UK) Ltd, Mobile Communications Division  
Delta House, The crescent Southwood Business Park, Farnborough, GU14 0NL, UK

**Product Name:** TQ5-E01

**FCC ID:** SP2-TQ5-E01

**File Number:** EH/2009/A0021

**Date of test:** Oct. 14, 2009 ~ Oct. 27, 2009

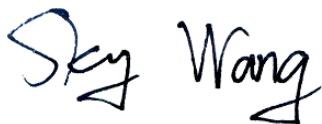
**Date of EUT Received:** Oct. 14, 2009

### 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 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

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

**Test By:**



**Date:**

Oct. 28, 2009

*Sky Wang / Asst. Supervisor*

**Prepared By:**



**Date:**

Oct. 28, 2009

*Eva Kao / Asst. Supervisor*

**Approved By:**



**Date:**

Oct. 28, 2009

*Vincent Su/Manager*

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## Version

Version No.	Date	Description
00	Oct. 28, 2009	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) .....	8
1.3	Test Methodology .....	8
1.4	Test Facility .....	8
1.5	Special Accessories .....	8
1.6	Equipment Modifications .....	8
<b>2</b>	<b>SYSTEM TEST CONFIGURATION .....</b>	<b>9</b>
2.1	EUT Configuration .....	9
2.2	EUT Exercise .....	9
2.3	Test Procedure .....	9
2.4	Configuration of Tested System .....	10
<b>3</b>	<b>SUMMARY OF TEST RESULTS .....</b>	<b>11</b>
<b>4</b>	<b>DESCRIPTION OF TEST MODES .....</b>	<b>11</b>
<b>5</b>	<b>CONDUCTED EMISSION TEST .....</b>	<b>12</b>
5.1	Standard Applicable: .....	12
5.2	Measurement Equipment Used: .....	12
5.3	EUT Setup: .....	12
5.4	Measurement Procedure: .....	13
5.5	Measurement Result: .....	13
<b>6</b>	<b>PEAK OUTPUT POWER MEASUREMENT .....</b>	<b>16</b>
6.1	Standard Applicable: .....	16
6.2	Measurement Equipment Used: .....	17
6.3	Test Set-up: .....	17
6.4	Measurement Procedure: .....	17
6.5	Measurement Result: .....	18
<b>7</b>	<b>6dB Bandwidth .....</b>	<b>23</b>
7.1	Standard Applicable: .....	23
7.2	Measurement Equipment Used: .....	23
7.3	Test Set-up: .....	23
7.4	Measurement Procedure: .....	23
7.5	Measurement Result: .....	24

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. This test report cannot be reproduced, except in full, without prior written permission of the Company. 除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。 This document is issued by the Company subject to its General Conditions of Service ([www.sgs.com/terms\\_and\\_conditions.htm](http://www.sgs.com/terms_and_conditions.htm)) and Terms and Conditions for Electronic Documents ([www.sgs.com/terms\\_e-document.htm](http://www.sgs.com/terms_e-document.htm)). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein. Even if printed this electronic document is to be treated as an original within the meaning of UCP 600 article 20b. The authenticity of this document may be verified at [www.sgsonsite.com/authentication](http://www.sgsonsite.com/authentication). Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

<b>8</b>	<b>100KHz BANDWIDTH OF BAND EDGES MEASUREMENT.....</b>	<b>29</b>
8.1	Standard Applicable: .....	29
8.2	Measurement Equipment Used: .....	29
8.3	Test SET-UP:.....	29
8.4	Measurement Procedure: .....	31
8.5	Field Strength Calculation: .....	31
8.6	Measurement Result: .....	31
<b>9</b>	<b>SPURIOUS RADIATED EMISSION TEST.....</b>	<b>38</b>
9.1	Standard Applicable .....	38
9.2	Measurement Equipment Used: .....	38
9.3	Test SET-UP:.....	38
9.4	Measurement Procedure: .....	38
9.5	Field Strength Calculation .....	39
9.6	Measurement Result: .....	39
<b>10</b>	<b>Peak Power Spectral Density .....</b>	<b>64</b>
10.1	Standard Applicable: .....	64
10.2	Measurement Equipment Used: .....	64
10.3	Test Set-up: .....	64
10.4	Measurement Procedure: .....	64
10.5	Measurement Result: .....	65
<b>11</b>	<b>ANTENNA REQUIREMENT .....</b>	<b>70</b>
11.1	Standard Applicable: .....	70
11.2	Antenna Connected Construction: .....	70

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## 1 GENERAL INFORMATION

### 1.1 Product Description

General:

Product Name	TQ5-E01	
Data Cable (USB)	Two provides, Model: HPC1508-010010, HPC1519-010010, Supplier: Hoshiden	
Simple Hands-free (SHF)	Model: HDH0669-010221(EARPHONE), KRJ0003-010020 (MIC), Supplier: Hoshiden	
Power Supply	3.7 Vdc re-chargeable battery or 5Vdc by AC/DC power adapter	
	Battery:	Model No.: ES032ECJ (TS-BTR008), Supplier: Sanyo GS
	Adapter:	Model: TS-ACC001-EU, TS-ACC001-UK Supplier: BYD Company Limited

GSM and WCDMA:

Cellular Phone Standards Frequency Range and Power:	Operating Frequency		Rated Power
	GSM/GPRS/EDGE 850, Class 12	824.2 MHz– 848.8 MHz	33 dBm
	GSM/GPRS/EDGE 900, Class 12	880.2MHz – 914.8MHz	33 dBm
	GSM/GPRS/EDGE 1800, Class 12	1710.2MHz – 1784.8MHz	30 dBm
	GSM/GPRS/EDGE 1900, Class 12	1850.2MHz – 1909.8MHz	30 dBm
	WCDMA/HSUPA/HSDPA Band I	1922.4MHz –1977.6MHz	24 dBm
	WCDMA/HSUPA/HSDPA Band VIII	882.4MHz –912.6MHz	24 dBm
Hardware Version:	CS1		
Software Version:	N/A		
IMEI:	004401127000901		

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## WLAN: 802.11 b/g:

Frequency Range:	2412 – 2462 MHz
Channel number:	11 channels
Transmit Power:	<input checked="" type="checkbox"/> 802.11 b: 17.33dBm (Peak) <input checked="" type="checkbox"/> 802.11 g: 15.87dBm (Peak)
Modulation Technology:	<input checked="" type="checkbox"/> DSSS, <input checked="" type="checkbox"/> OFDM
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
Antenna Designation:	PIFA Antenna, 0.7dBi.

## Bluetooth:

Bluetooth Version:	V2.0 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK)
Channel number:	79 channels
Modulation type:	Frequency Hopping Spread Spectrum
Transmit Power:	-0.12 dBm (Peak)
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	$\leq 0.4s$
Operating Mode:	Point-to-Point
Antenna Designation:	PIFA Antenna, 0.7dBi.

## GPS:

Receiver Frequency	L1 Band, 1575.42MHz
Frequency Conversion oscillator	19.2MHz
Antenna Designation	mono pole

This test report applies for 802.11b/g.

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

This submittal(s) (test report) is intended for **FCC ID: SP2-TQ5-E01** filing to comply with Section 15.247 of the FCC Part 15, Subpart E Rules.

## 1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

## 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: 2003. FCC Registration Number is: 990257 and 236194, Canada Registration Number: 4620A-1.

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

## 1.5 Special Accessories

Not available for this EUT intended for grant.

## 1.6 Equipment Modifications

Not available for this EUT intended for grant.



## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

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

### 2.2 EUT Exercise

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

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

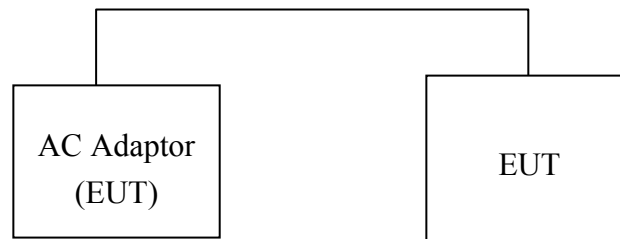
The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003, conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and Average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

## 2.4 Configuration of Tested System

**Fig. 2-1 AC Power line and Radiated Emission Configuration**



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

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	N/A					

### 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b)	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)	TX Spurious Emission	Compliant
§15.247 (e)	Peak Power Density	Compliant
§15.203	Antenna Requirement	Compliant

### 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 is programmed.

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

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

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

## 5 CONDUCTED EMISSION TEST

### 5.1 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.		

### 5.2 Measurement Equipment Used:

AC Power Line Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	828985/004	09/16/2009	09/15/2010
LISN	Rolf-Heine	NNB-2/16Z	99012	02/02/2009	02/01/2010
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	02/02/2009	02/01/2010
Coaxial Cables	N/A	WK CE Cable	N/A	10/30/2008	10/29/2009

### 5.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.
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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#### 5.4 Measurement Procedure:

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

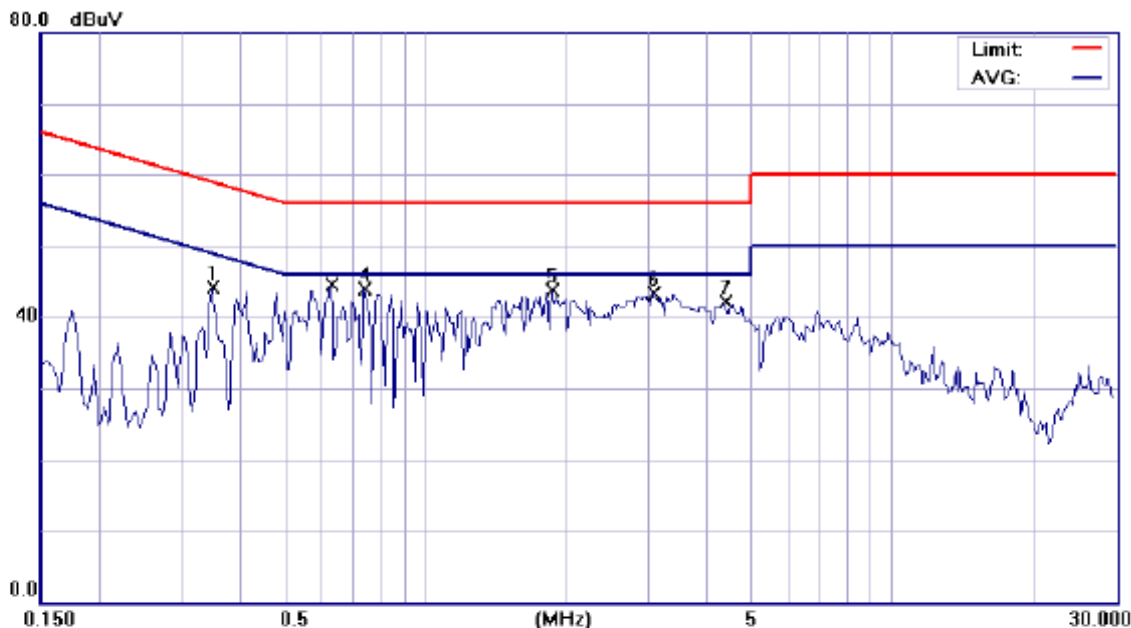
#### 5.5 Measurement Result:

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

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

## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Normal mode	Test Date:	Oct. 24, 2009
		Test By:	Jason



Site SGS CONDUCTED #1

Phase: L1

Temperature: 25 °C

Limit: CISPR22/11/EN55022 Class B

Power: AC 120V/60Hz

Humidity: 61 %

EUT: Mobile phone

Distance:

Air Pressure: hpa

M/N: TG0200

Note: BT+WLAN MODE

No.	Mk.	Freq. MHz	Reading Level dBuV	Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.3500	44.04	0.09	44.13	58.96	-14.83	peak	
2	*	0.6300	44.17	0.08	44.25	56.00	-11.75	QP	
3		0.6300	31.29	0.08	31.37	46.00	-14.63	AVG	
4		0.7400	43.83	0.08	43.91	56.00	-12.09	peak	
5		1.8700	43.49	0.12	43.61	56.00	-12.39	peak	
6		3.0900	43.13	0.14	43.27	56.00	-12.73	peak	
7		4.3900	41.98	0.16	42.14	56.00	-13.86	peak	

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SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

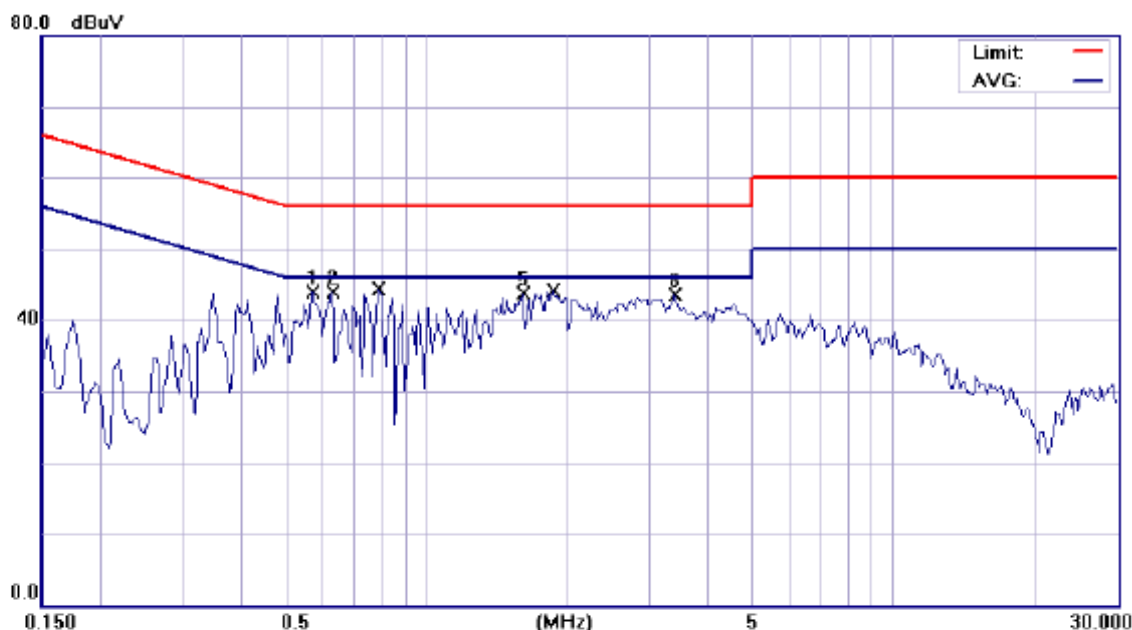
No.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan / 台北縣五股工業區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

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Site SGS CONDUCTED #1

Phase: **N**

Temperature: 25 °C

Limit: CISPR22/11/EN55022 Class B

Power: AC 120V/60Hz

Humidity: 61 %

EUT: Mobile phone

Distance:

Air Pressure: hpa

M/N: TG0200

Note: BT+WLAN MODE

No.	Mk.	Freq. MHz	Reading Level dBuV	Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.5700	43.93	0.07	44.00	56.00	-12.00	peak	
2		0.6300	43.84	0.08	43.92	56.00	-12.08	peak	
3		0.7900	42.17	0.08	42.25	56.00	-13.75	QP	
4		0.7900	32.88	0.08	32.96	46.00	-13.04	AVG	
5		1.6100	43.53	0.11	43.64	56.00	-12.36	peak	
6		1.8700	12.92	0.12	13.04	56.00	-42.96	QP	
7		1.8700	32.55	0.12	32.67	46.00	-13.33	AVG	
8		3.4100	43.28	0.14	43.42	56.00	-12.58	peak	

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## 6 PEAK OUTPUT POWER MEASUREMENT

### 6.1 Standard Applicable:

According to §15.247(b)

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 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.

(c) Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

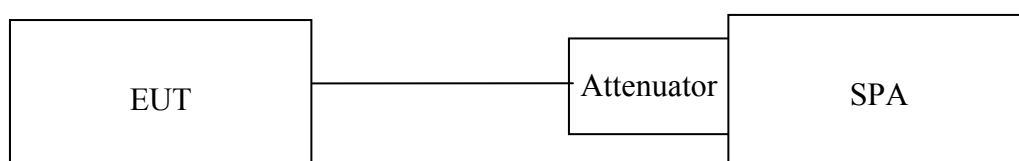
(ii) Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.



## 6.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Spectrum Analyzer	Agilent	E4440A	MY45304525	01/23/2008	01/22/2010
DC Block	Agilent	BLK-18	155452	07/05/2009	07/04/2010
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2009	01/04/2010
Attenuator	Mini-Circuit	BW-S6W5	001	07/05/2009	07/04/2010
Attenuator	Mini-Circuit	BW-S10W5	001	07/05/2009	07/04/2010
Attenuator	Mini-Circuit	BW-S20W5	001	07/05/2009	07/04/2010
Splitter	Agilent	11636B	N/A	07/05/2009	07/04/2010

## 6.3 .Test Set-up:



## 6.4 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. (Channel power function, RBW, VBW = 1MHz,Bandwidth=26dB occupied Bandwidth)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

## 6.5 Measurement Result:

### 802.11b Mode

Cable loss = 0	Peak Power Output				
Frequency (MHz)	Data Rate				Limit
	1	2	5.5	11	
2412	17.33	17.28	17.19	17.16	30 dBm
2437	17.14	17.1	17.06	17.02	30 dBm
2462	17.09	17.05	17.01	16.97	30 dBm

### 802.11g Mode

Cable loss = 0	Peak Power Output								
Frequency (MHz)	Data Rate								Limit
	6	9	12	18	24	36	48	54	
2412	15.49	15.41	15.38	15.29	15.21	15.14	15.02	14.94	30 dBm
2437	15.87	15.85	15.77	15.67	15.6	15.44	15.31	15.23	30 dBm
2462	15.2	15.13	15.09	15	14.94	14.82	14.75	14.62	30 dBm

*offset: 1dB*

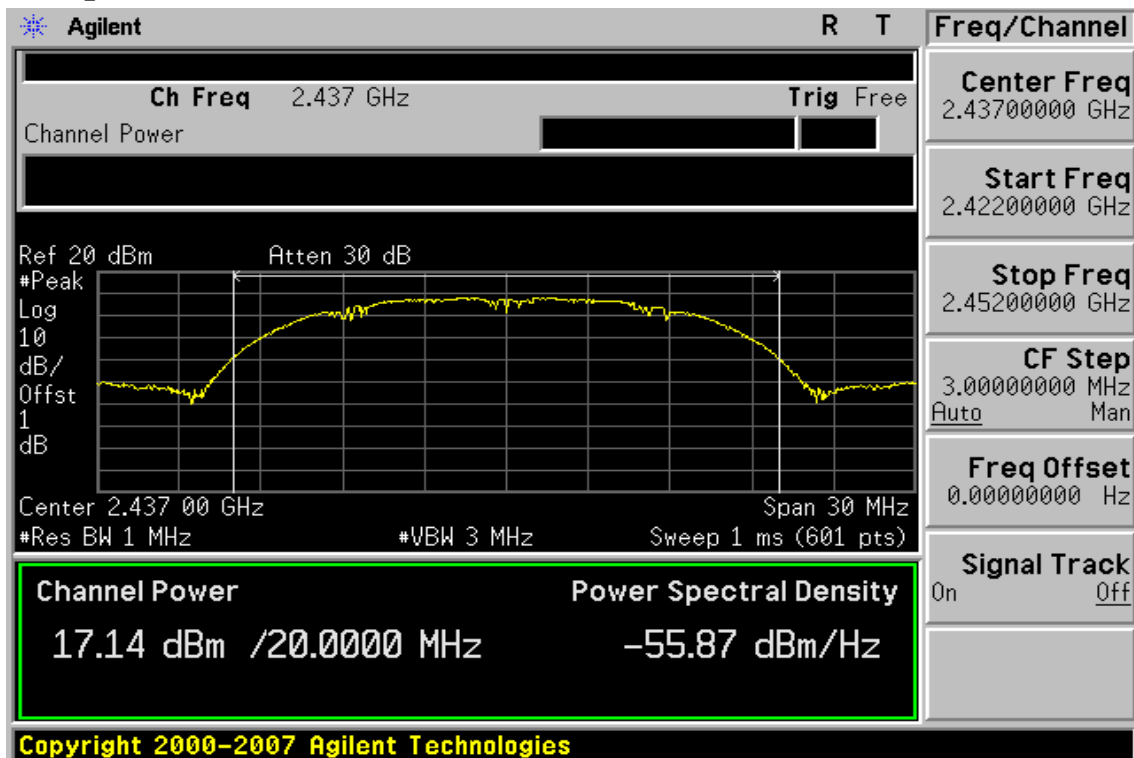
Note: Refer to next page for plots.

## 802.11b, 1Mbps

### Power Output Plot (CH Low)

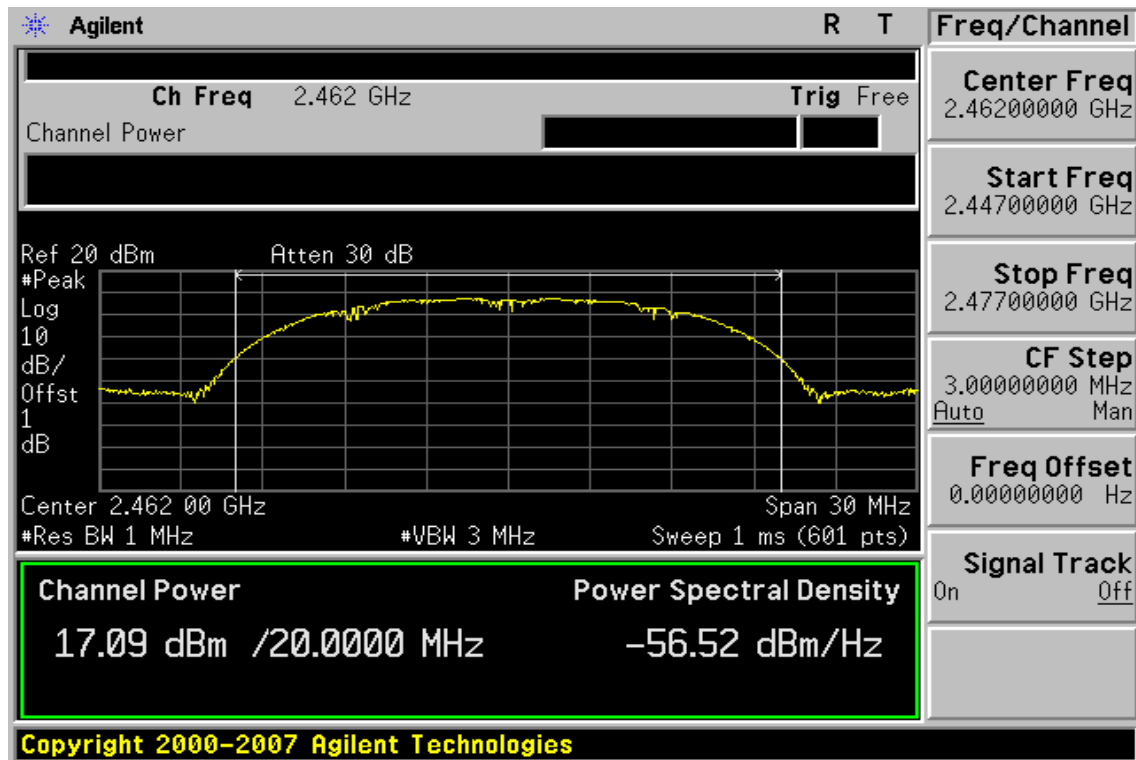


### Power Output Plot (CH Mid)



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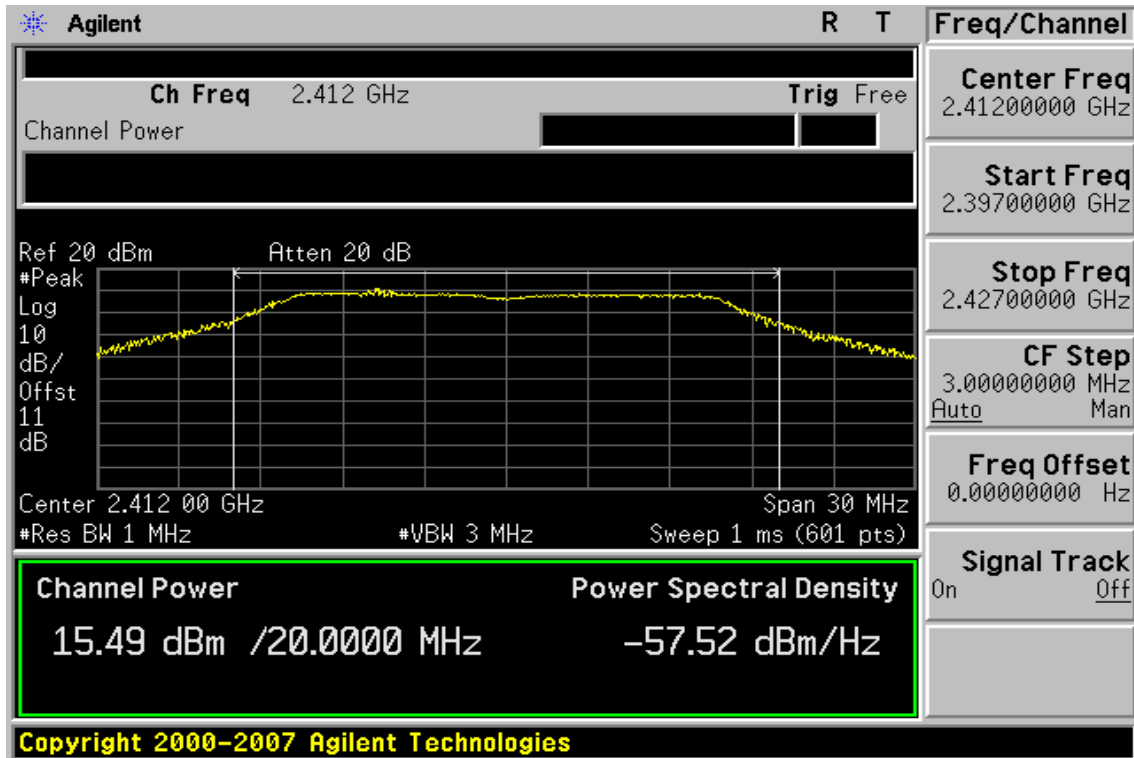
## Power Output Plot (CH High)



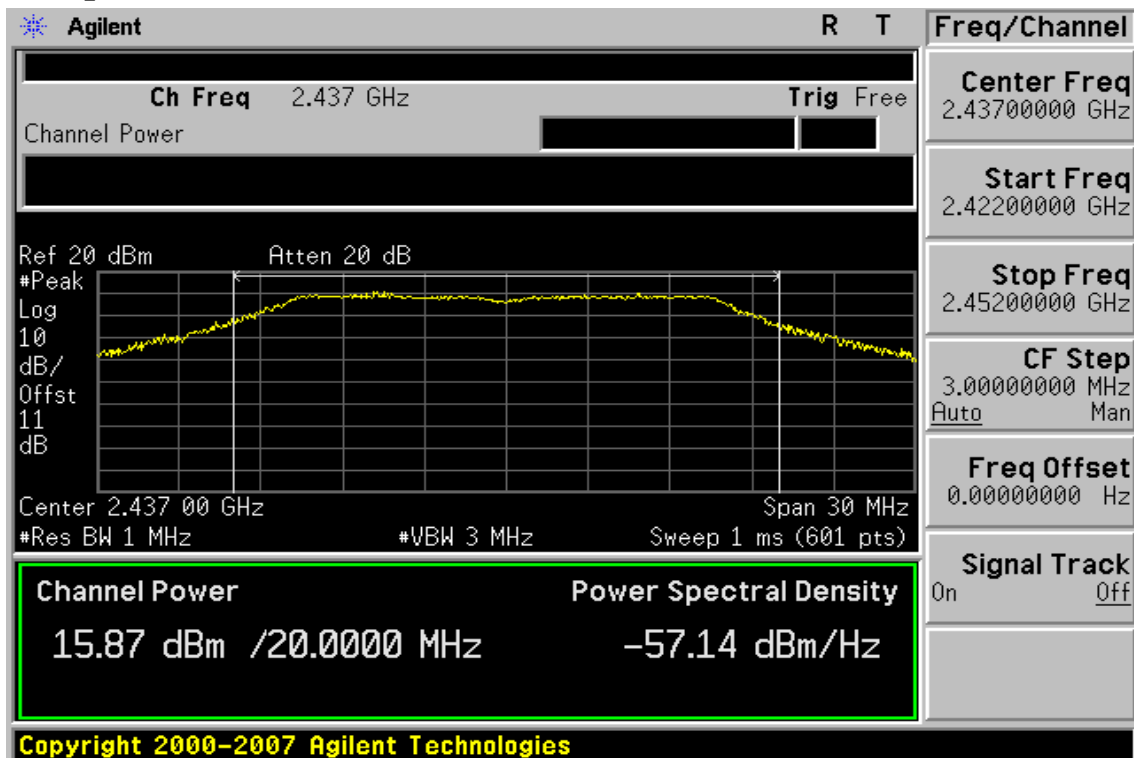
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## 802.11g, 6Mbps

### Power Output Plot (CH Low)

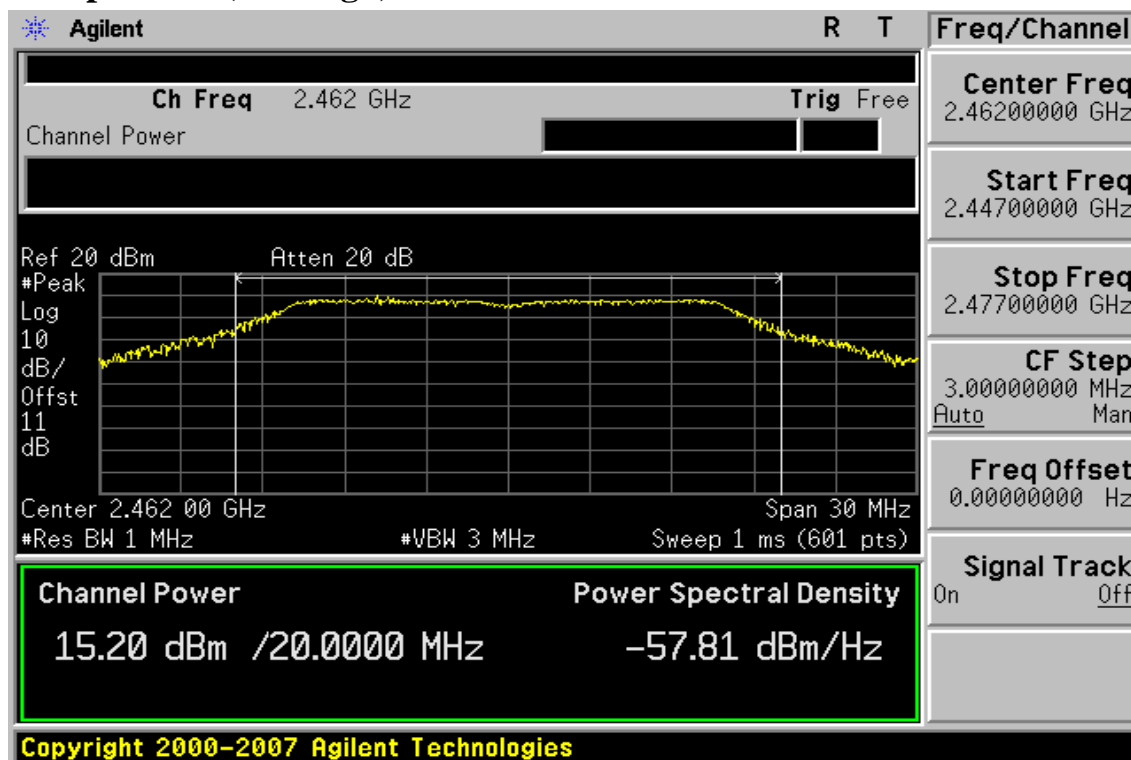


### Power Output Plot (CH Mid)



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## Power Output Plot (CH High)



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## 7 6dB Bandwidth

### 7.1 Standard Applicable:

According to §15.247(a)(2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

### 7.2 Measurement Equipment Used:

Refer to section 6.2 for details.

### 7.3 Test Set-up:

Refer to section 6.3 for details.

### 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 3. antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=100KHz, VBW = 3\*RBW, Span= 30MHz, Sweep=auto
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

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## 7.5 Measurement Result:

### 802.11b

Frequency (MHz)	Bandwidth (MHz)	Bandwidth (KHz)	Result
2412	12.179	> 500	PASS
2437	12.890	> 500	PASS
2462	12.708	> 500	PASS

### 802.11b

Frequency (MHz)	Bandwidth (MHz)	Bandwidth (KHz)	Result
2412	16.484	> 500	PASS
2437	16.499	> 500	PASS
2462	16.479	> 500	PASS

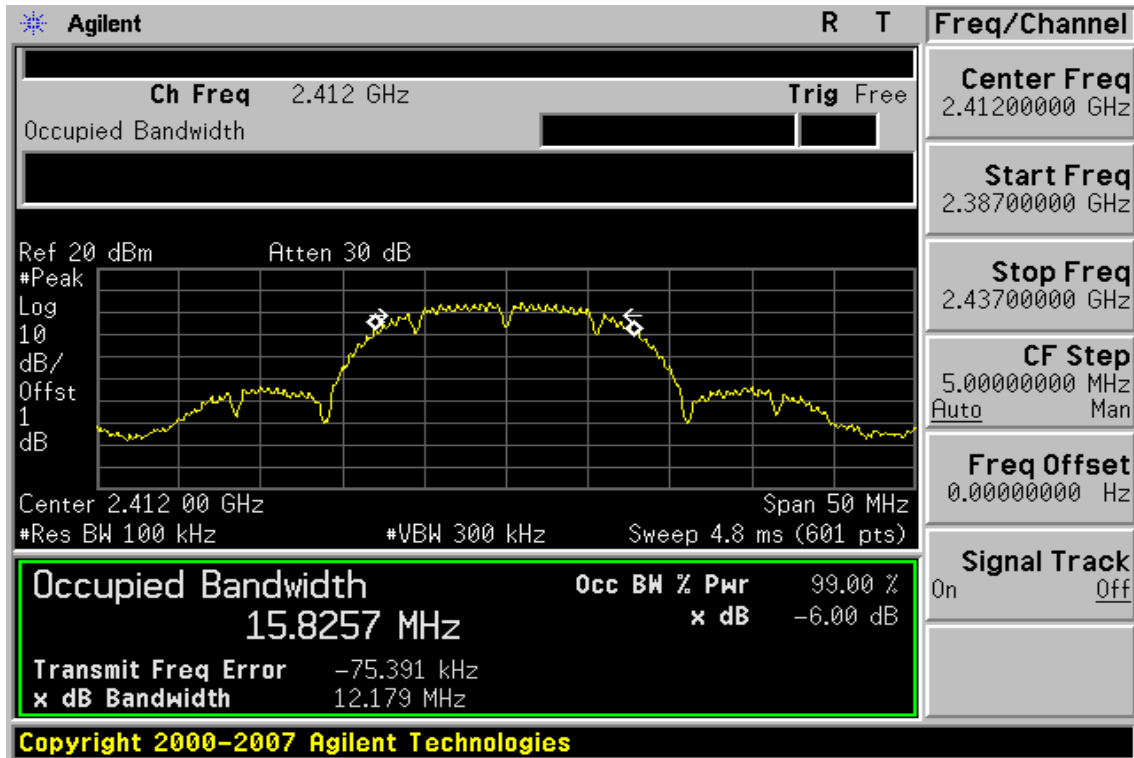
### *offset 1dB*

Note: Refer to next page for plots.

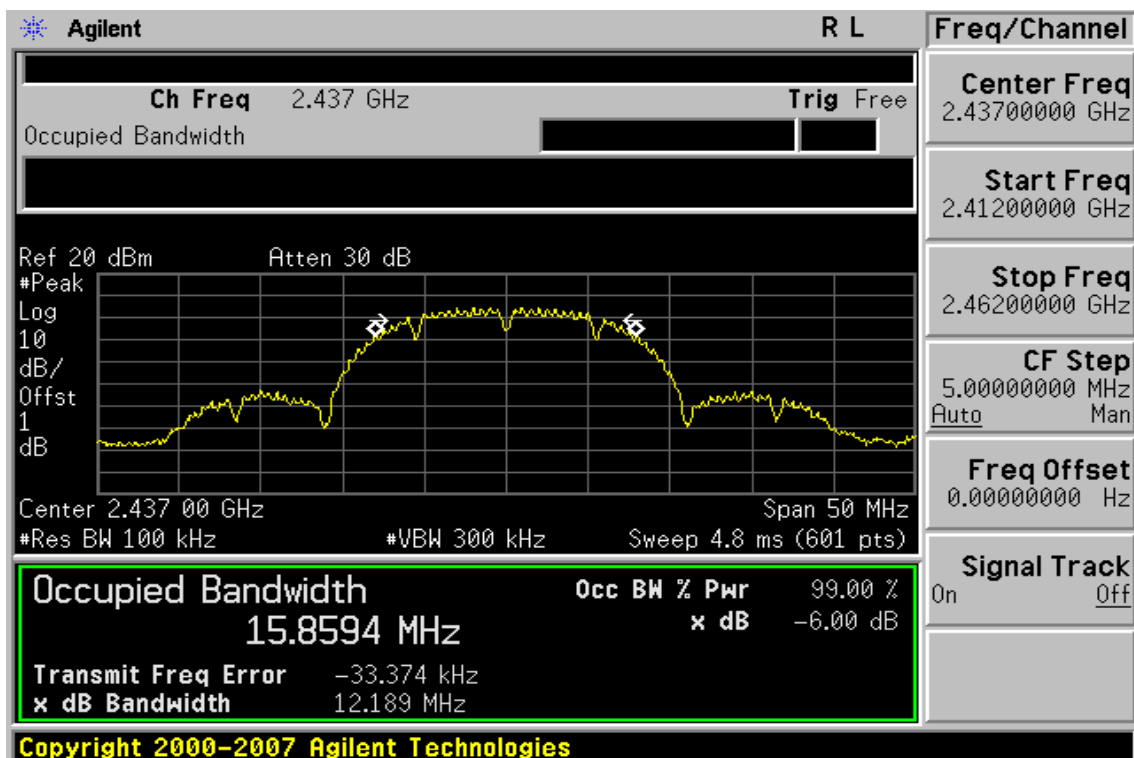


## 802.11b

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

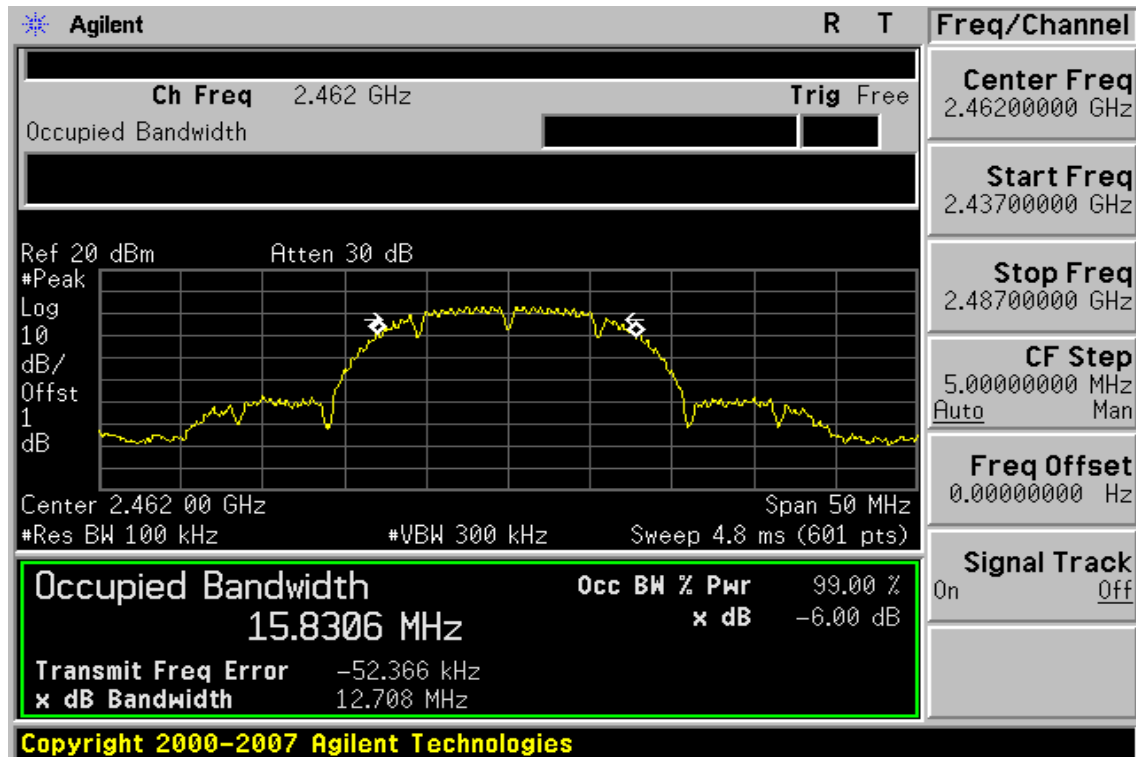


### 6dB Band Width Test Data CH-Mid



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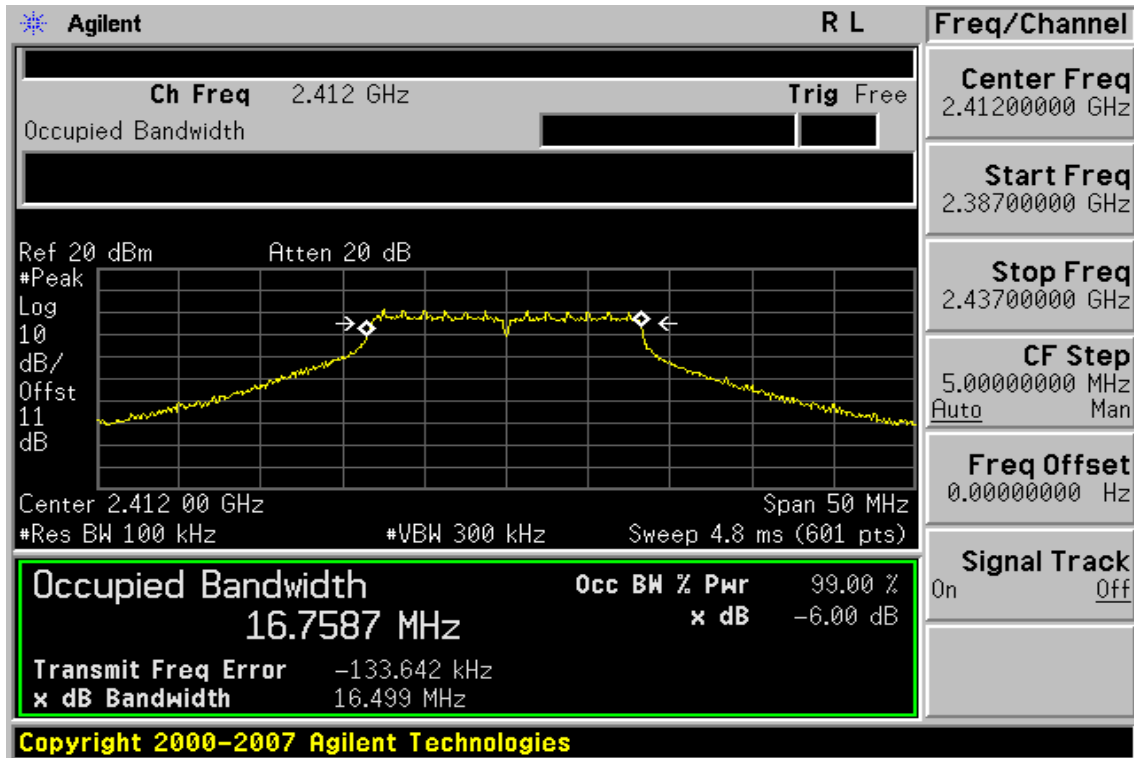
## 6dB Band Width Test Data CH-High



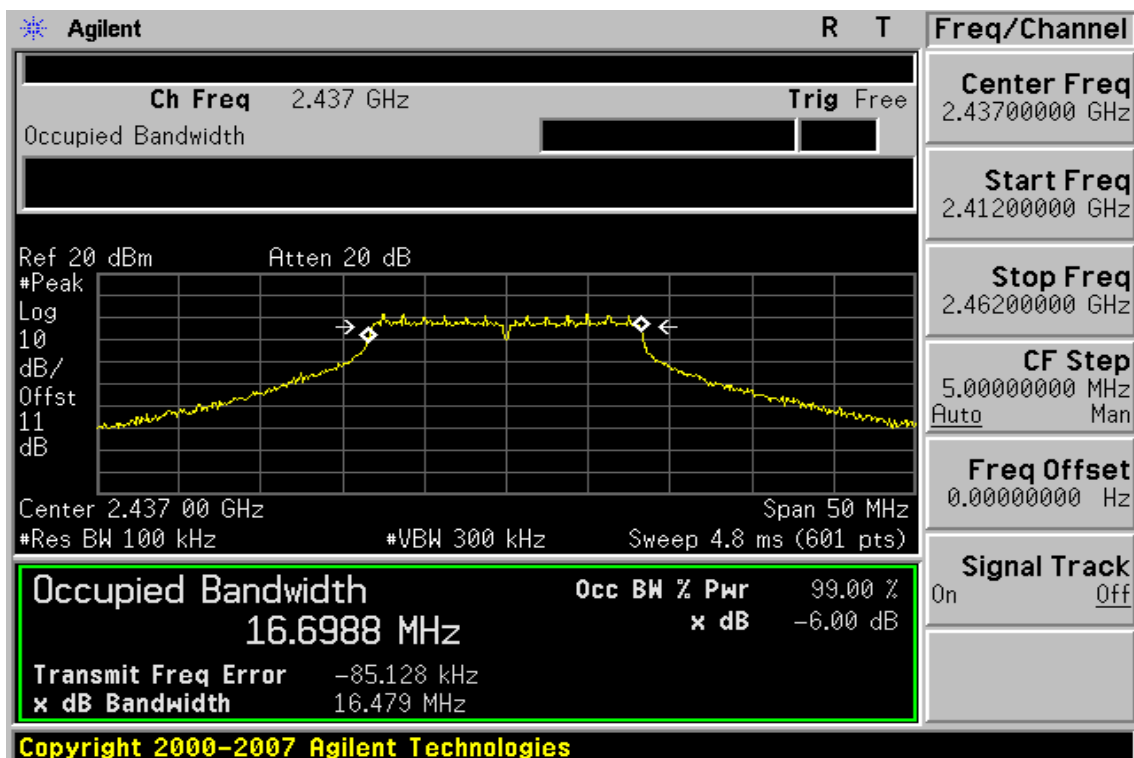
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## 802.11g

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

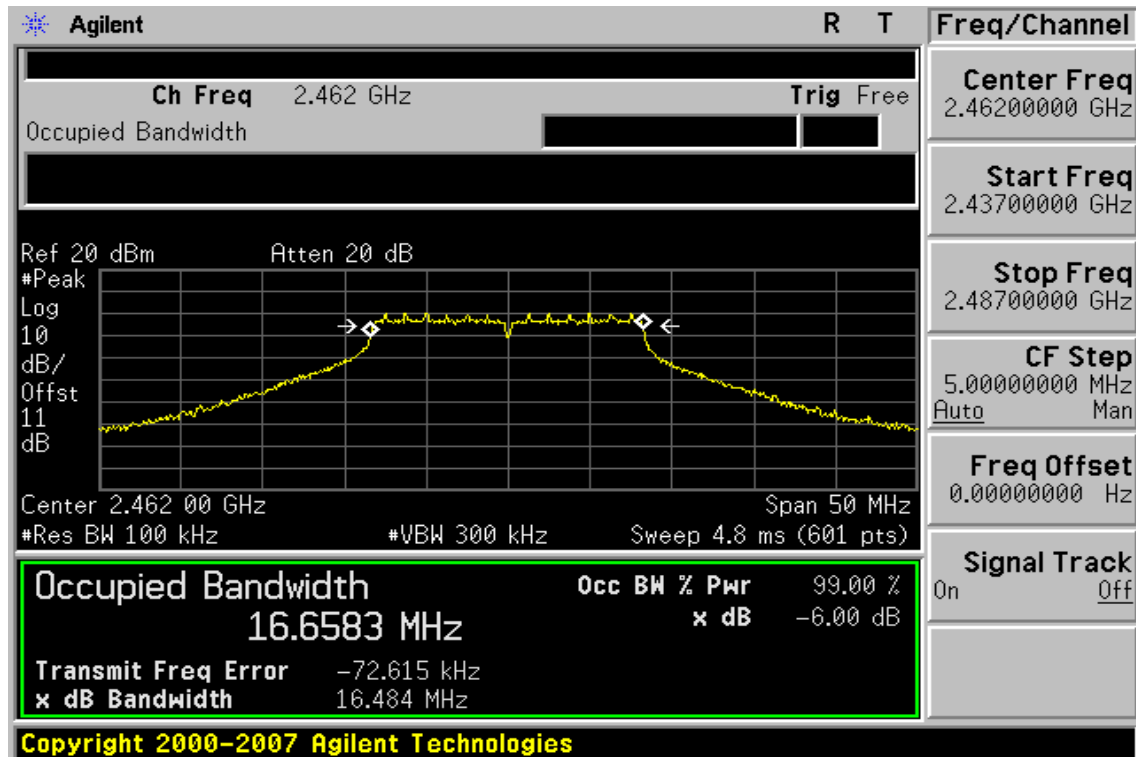


### 6dB Band Width Test Data CH-Mid



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## 6dB Band Width Test Data CH-High



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## 8 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

### 8.1 Standard Applicable:

According to §15.247(c), 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 100KHz 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).

### 8.2 Measurement Equipment Used:

#### 8.2.1 Conducted Emission at antenna port:

Refer to section 6.2 for details.

#### 8.2.2 Radiated emission:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	02/12/2009	02/11/2010
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Bilog Antenna	SCHWAZBECK	VULB9160	9160-3136	11/15/2008	11/14/2009
Horn antenna	SCHWAZBECK	BBHA 9120D	9120D-673	05/09/2008	05/08/2010
Pre-Amplifier	Agilent	8447D	1937A02834	11/30/2008	11/29/2009
Pre-Amplifier	Agilent	8449B	3008A01973	01/05/2009	01/04/2010
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	SUCOFLEX 104PEA-10M	10m	01/05/2009	01/04/2010
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2009	01/04/2010
3m Site	SGS	966 chamber	N/A	11/08/2008	11/09/2009

### 8.3 Test SET-UP:

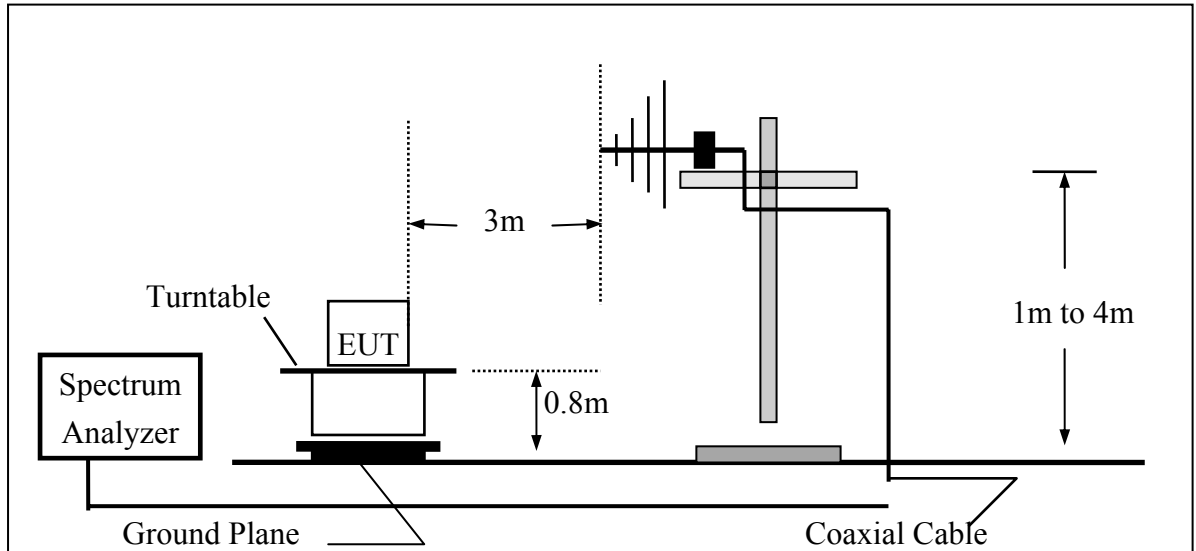
#### 8.3.1 Conducted Emission at antenna port:

Refer to section 6.3 for details.

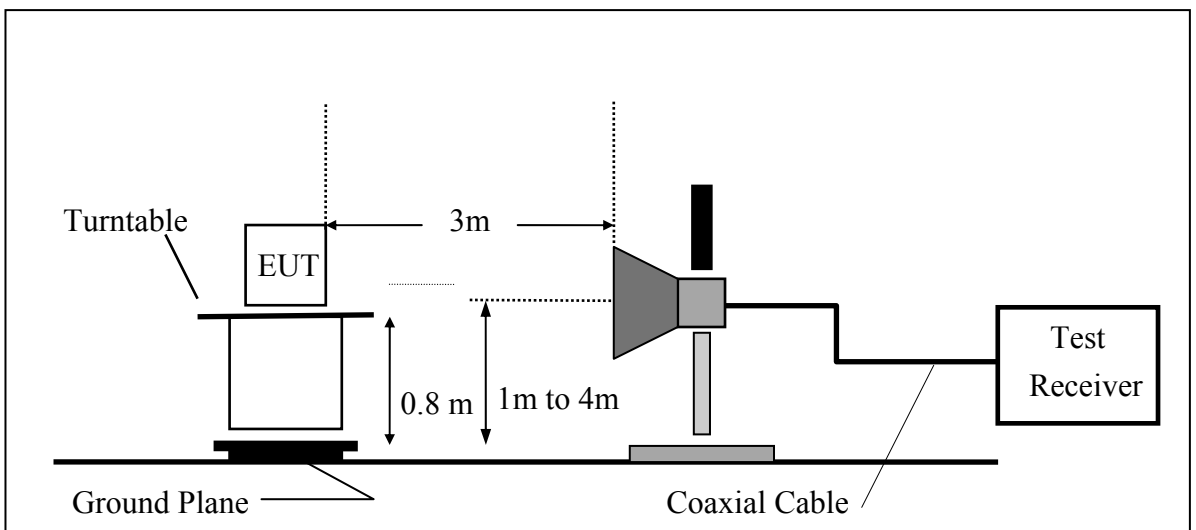
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### 8.3.2 Radiated emission:

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



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



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#### 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 center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, Sweep = auto
5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

#### 8.5 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:

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

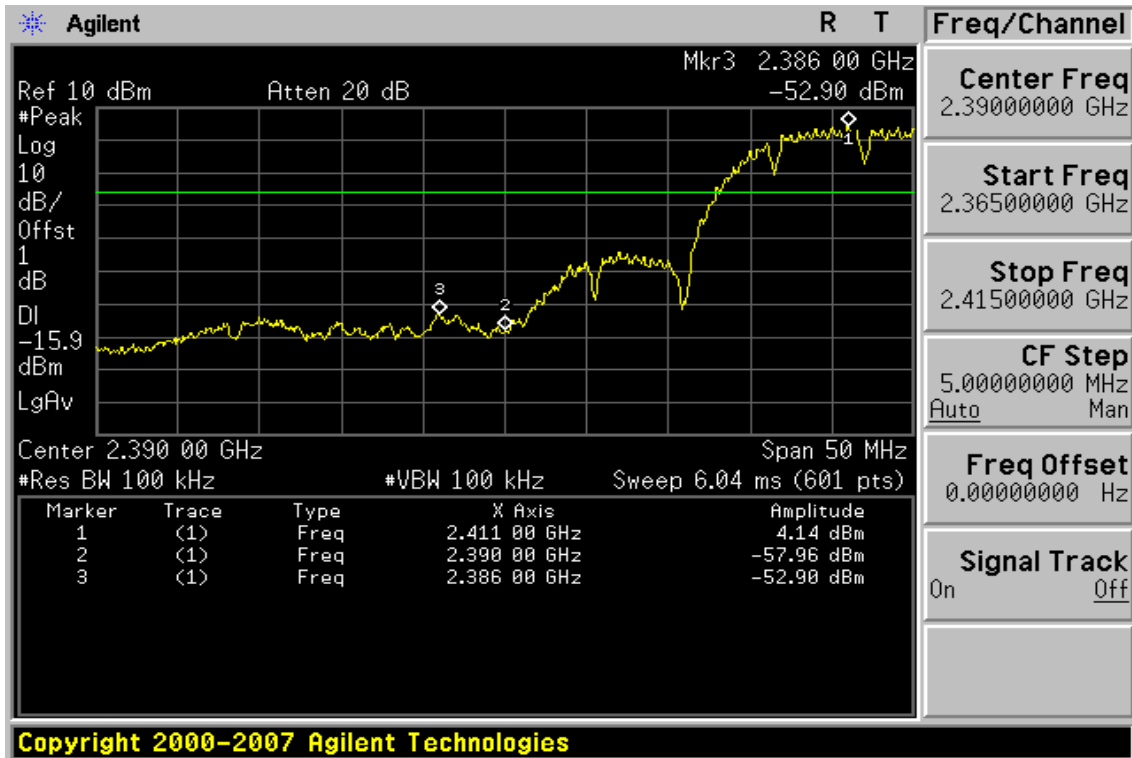
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

#### 8.6 Measurement Result:

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

## 802.11b

### Band Edges Test Data CH-Low



### Band Edges Test Data CH-High



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**Radiated Emission: 802.11 b mode**

Operation Mode TX CH Low  
Fundamental Frequency 2412 MHz  
Temperature 25 °C  
Humidity 65 %

Test Date Oct. 26, 2009  
Test By Jason  
Pol Ver.

	Peak	AV		Actual FS		Peak	AV		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390.00	42.88	---	-1.39	41.49	---	74.00	54.00	-12.51	Peak

Operation Mode TX CH Low  
Fundamental Frequency 2412 MHz  
Temperature 25 °C  
Humidity 65 %

Test Date Oct. 26, 2009  
Test By Jason  
Pol Hor.

	Peak	AV		Actual FS		Peak	AV		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390.00	51.87	---	-1.39	50.48	---	74.00	54.00	-3.52	Peak

**Remark:**

- (1) 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.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Emission: 802.11 b mode

Operation Mode TX CH High  
Fundamental Frequency 2462 MHz  
Temperature 25 °C  
Humidity 65 %

Test Date Oct. 26, 2009  
Test By Jason  
Pol Ver.

	Peak	AV		Actual FS		Peak	AV		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.56	42.82	---	-0.92	41.90	---	74.00	54.00	-12.10	Peak

Operation Mode TX CH High  
Fundamental Frequency 2462 MHz  
Temperature 25 °C  
Humidity 65 %

Test Date Oct. 26, 2009  
Test By Jason  
Pol Hor.

	Peak	AV		Actual FS		Peak	AV		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.56	49.82	---	-0.92	48.90	---	74.00	54.00	-5.10	Peak

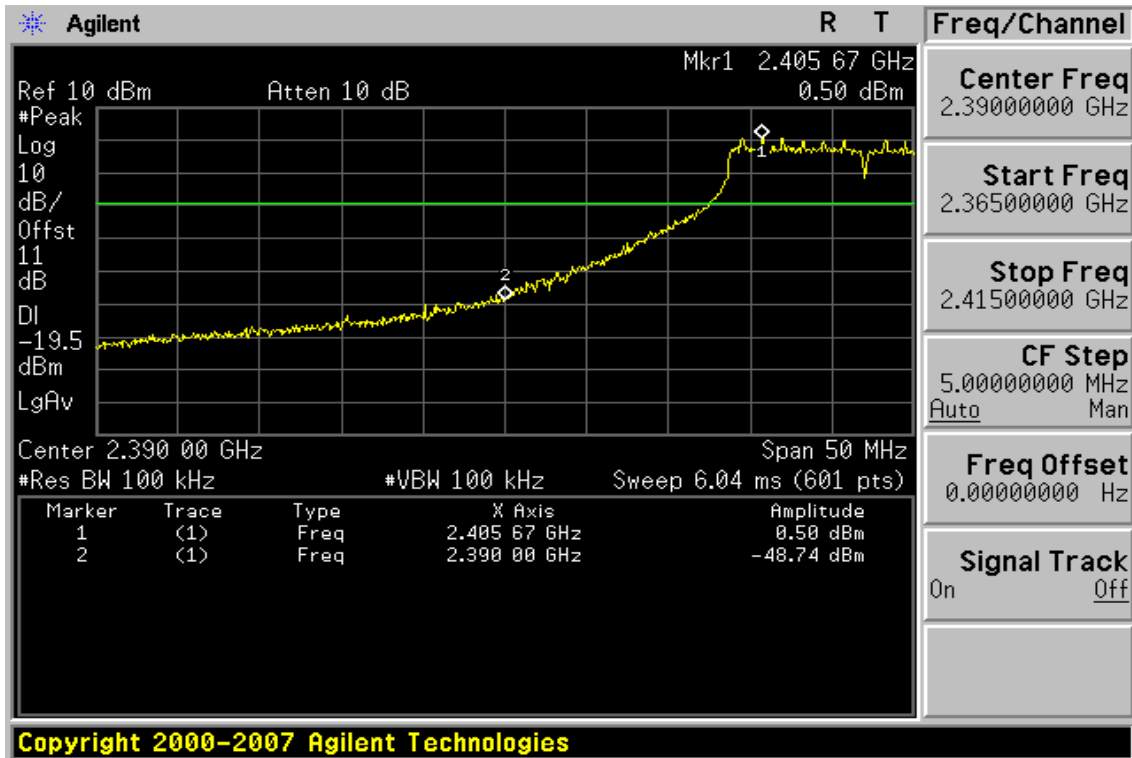
### Remark:

- (1) 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.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

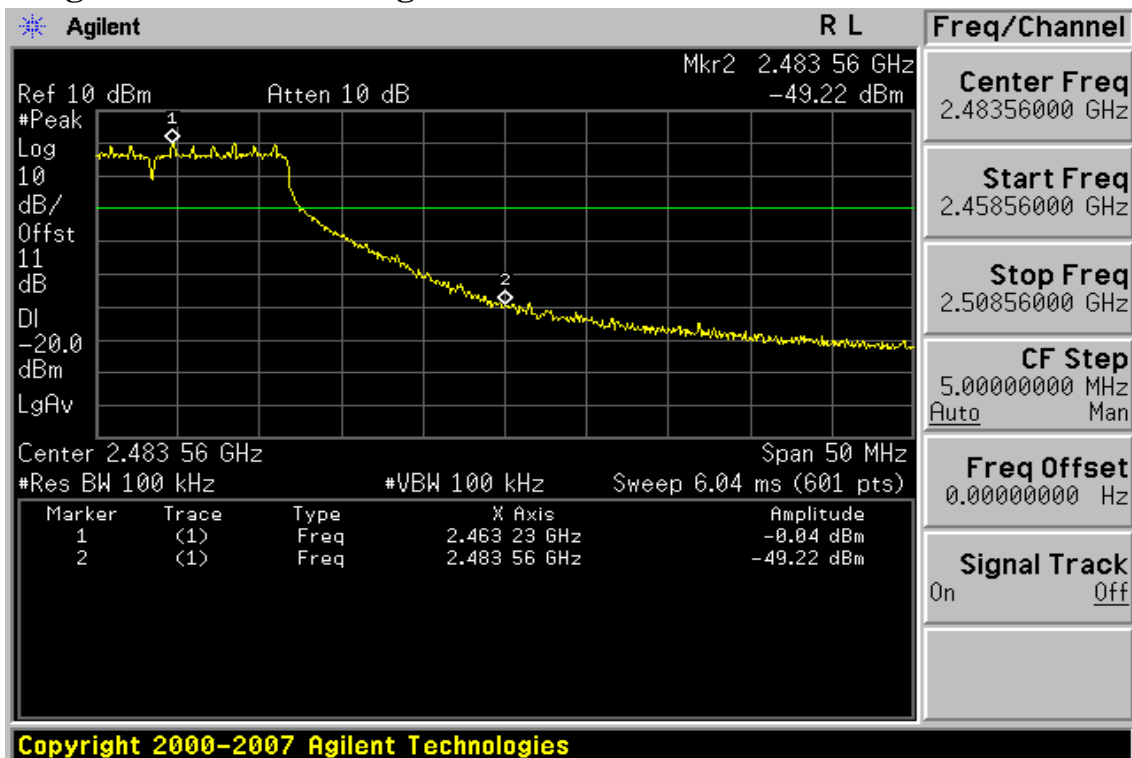
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## 802.11g

### Band Edges Test Data CH-Low



### Band Edges Test Data CH-High



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**Radiated Emission: 802.11 g mode**

Operation Mode TX CH Low  
 Fundamental Frequency 2412 MHz  
 Temperature 25 °C  
 Humidity 65 %

Test Date Oct. 26, 2009  
 Test By Jason  
 Pol Ver.

	Peak	AV		Actual FS		Peak	AV		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390.00	48.42	---	-1.39	47.03	---	74.00	54.00	-6.97	Peak

Operation Mode TX CH Low  
 Fundamental Frequency 2412 MHz  
 Temperature 25 °C  
 Humidity 65 %

Test Date Oct. 26, 2009  
 Test By Jason  
 Pol Hor.

	Peak	AV		Actual FS		Peak	AV		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390.00	61.17	47.11	-1.39	59.78	45.72	74.00	54.00	-8.28	AV

**Remark:**

- (1) 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.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Emission: 802.11 g mode**

Operation Mode TX CH High  
Fundamental Frequency 2462 MHz  
Temperature 25 °C  
Humidity 65 %

Test Date Oct. 26, 2009  
Test By Jason  
Pol Ver.

	Peak	AV		Actual FS		Peak	AV		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.56	43.72	---	-0.92	42.80	---	74.00	54.00	-11.20	Peak

Operation Mode TX CH High  
Fundamental Frequency 2462 MHz  
Temperature 25 °C  
Humidity 65 %

Test Date Oct. 26, 2009  
Test By Jason  
Pol Hor.

	Peak	AV		Actual FS		Peak	AV		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.56	55.01	42.45	-0.92	54.09	41.53	74.00	54.00	-12.47	AV

**Remark:**

- (1) 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.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- (3) Spectrum Peak Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting: 1GHz- 40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## 9 SPURIOUS RADIATED EMISSION TEST

### 9.1 Standard Applicable

According to §15.247(d), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). 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.

### 9.2 Measurement Equipment Used:

#### 9.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

#### 9.2.2. Radiated emission:

Refer to section 8.2 for details.

### 9.3 Test SET-UP:

#### 9.3.1. Conducted Emission at antenna port:

Refer to section 6.3 for details.

#### 9.3.2. Radiated emission:

Refer to section 8.3 for details.

### 9.4 Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. 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. Repeat above procedures until all frequency measured were 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:

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

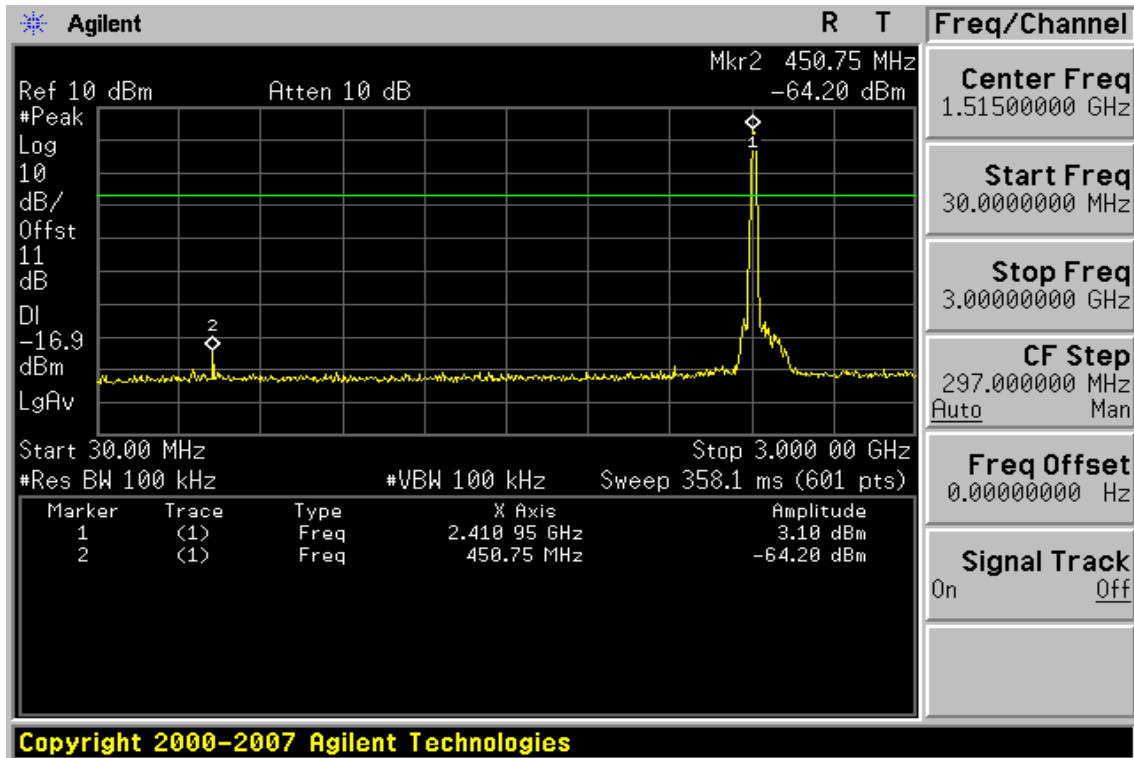
Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

## 9.6 Measurement Result:

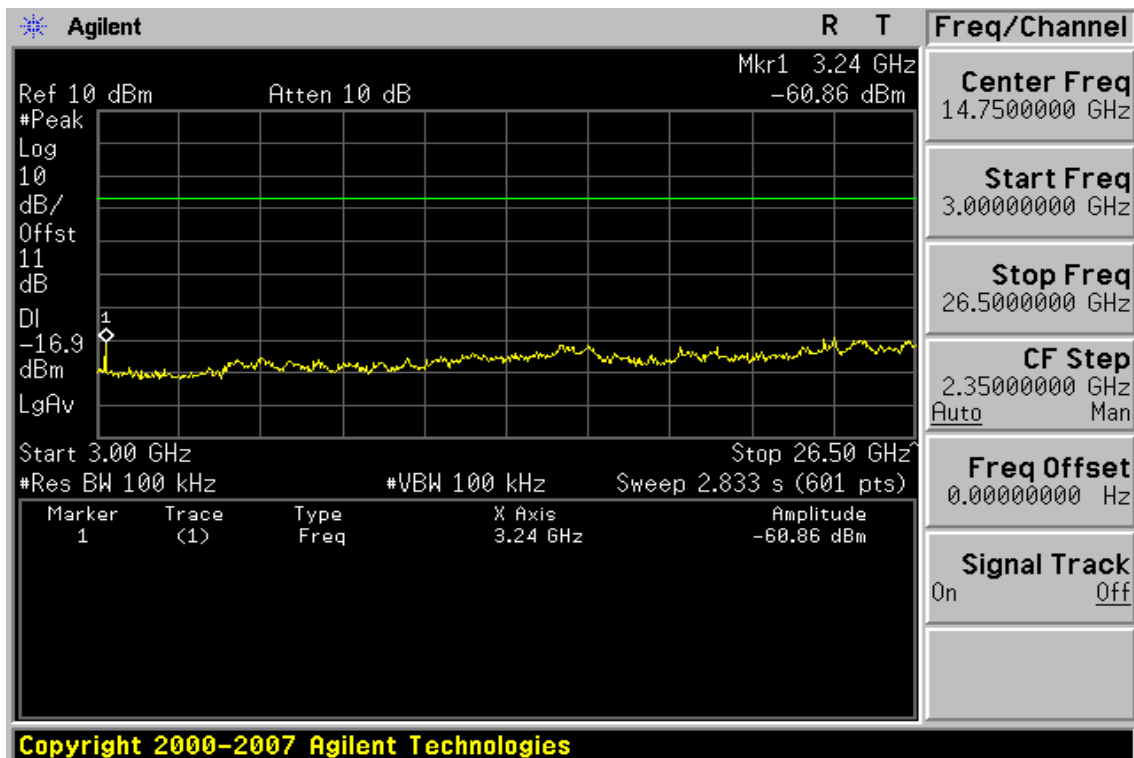
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

## Conducted Spurious Emission Measurement Result (802.11b)

### Ch Low 30MHz – 3GHz



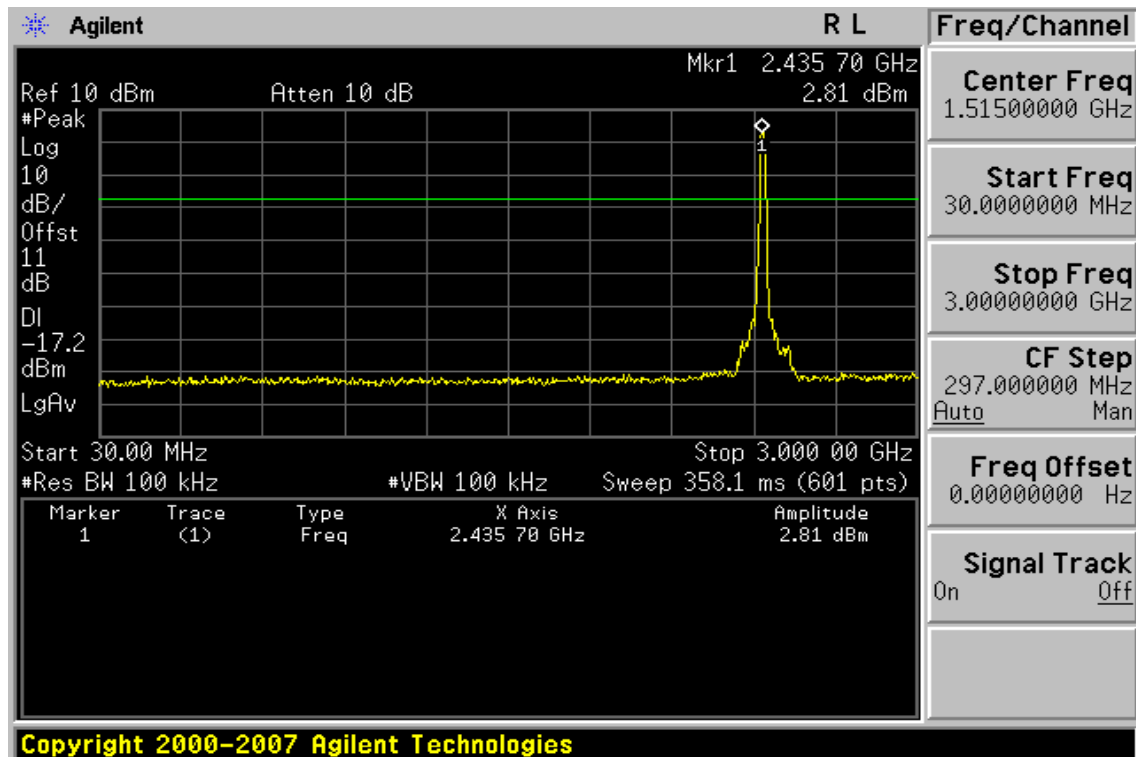
### Ch Low 3GHz – 26.5GHz



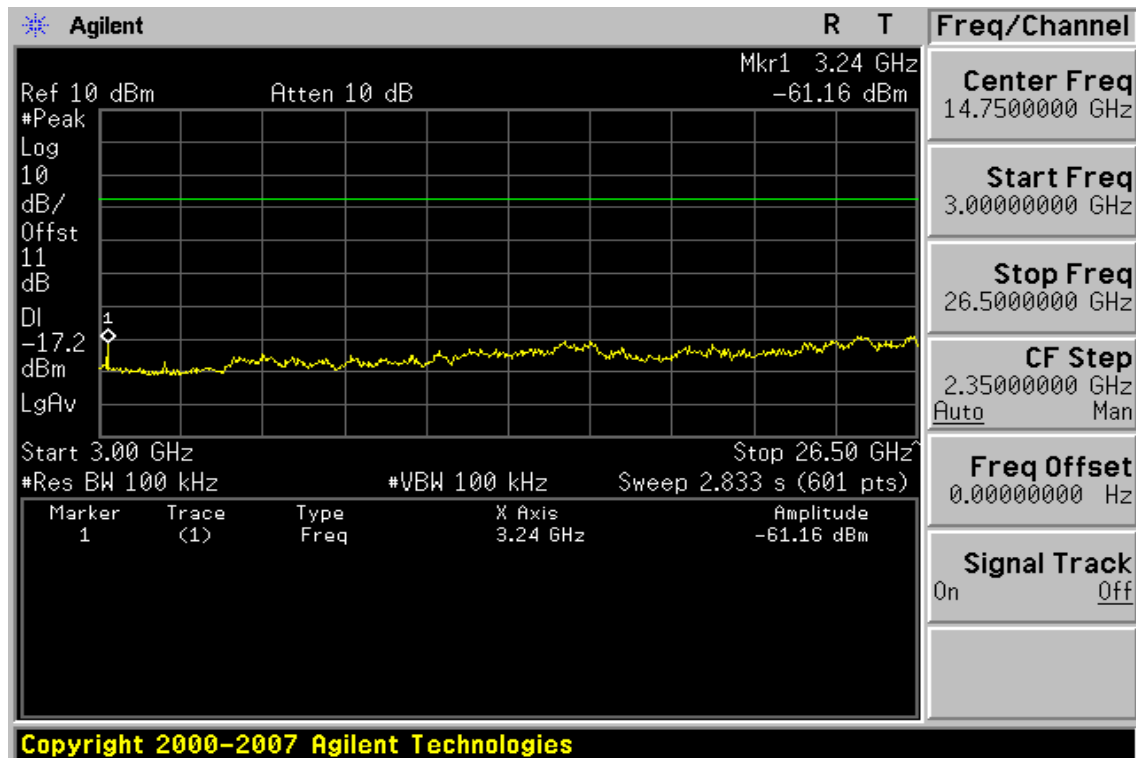
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## Ch Mid 30MHz – 3GHz

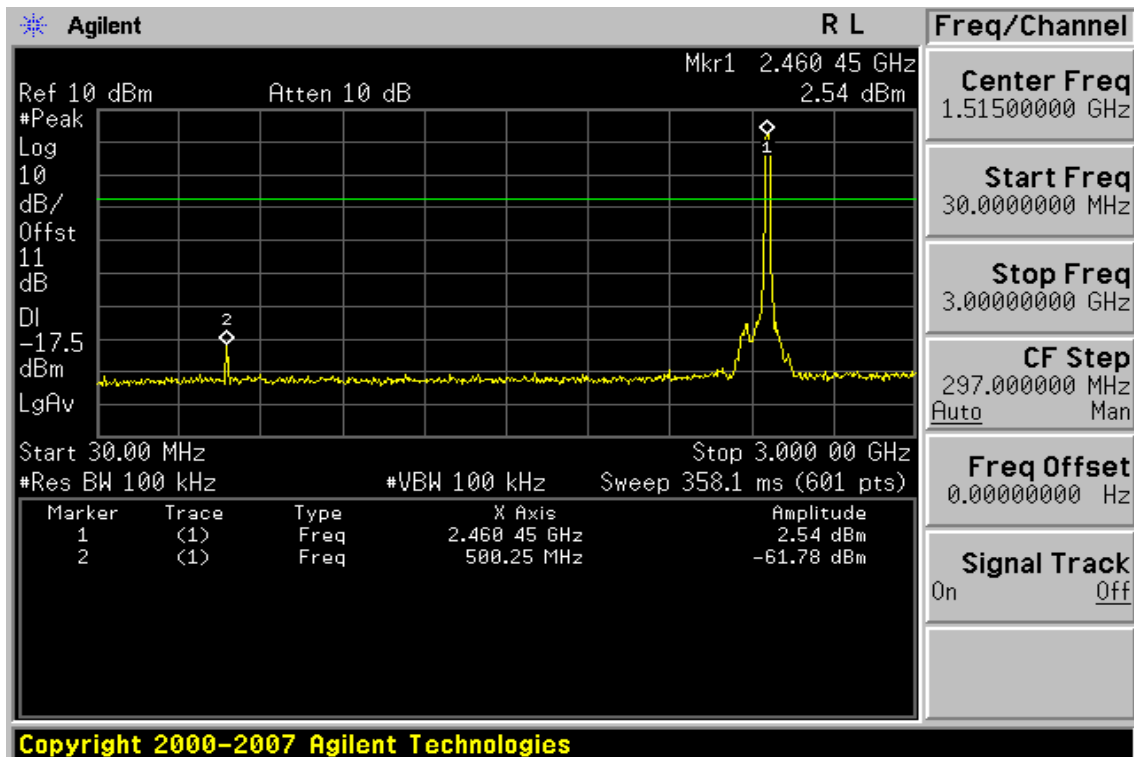


## Ch Mid 3GHz – 26.5GHz

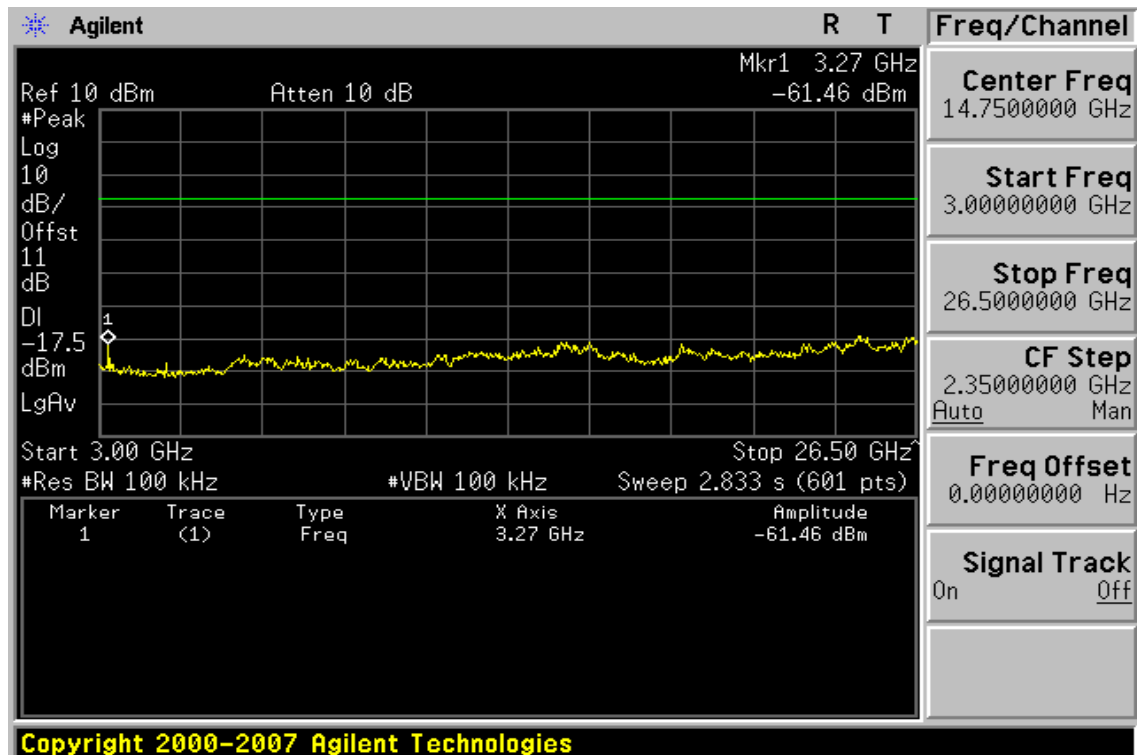


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## Ch High 30MHz – 3GHz



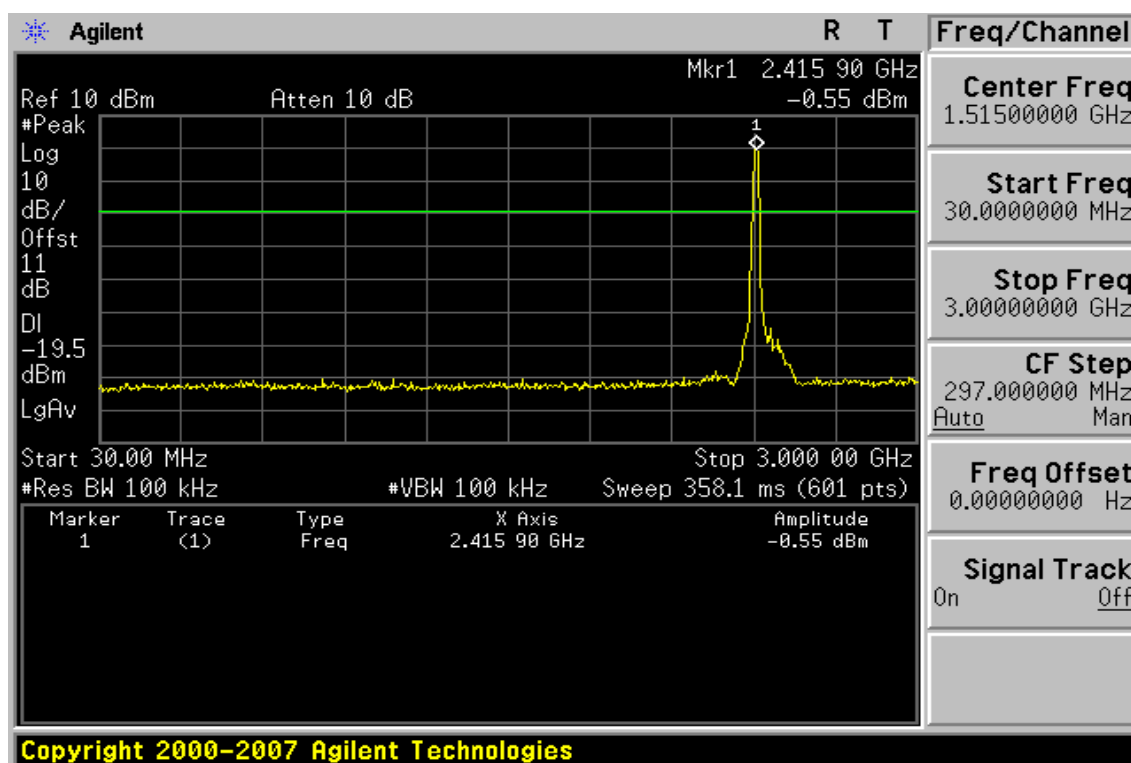
## Ch High 3GHz – 26.5GHz



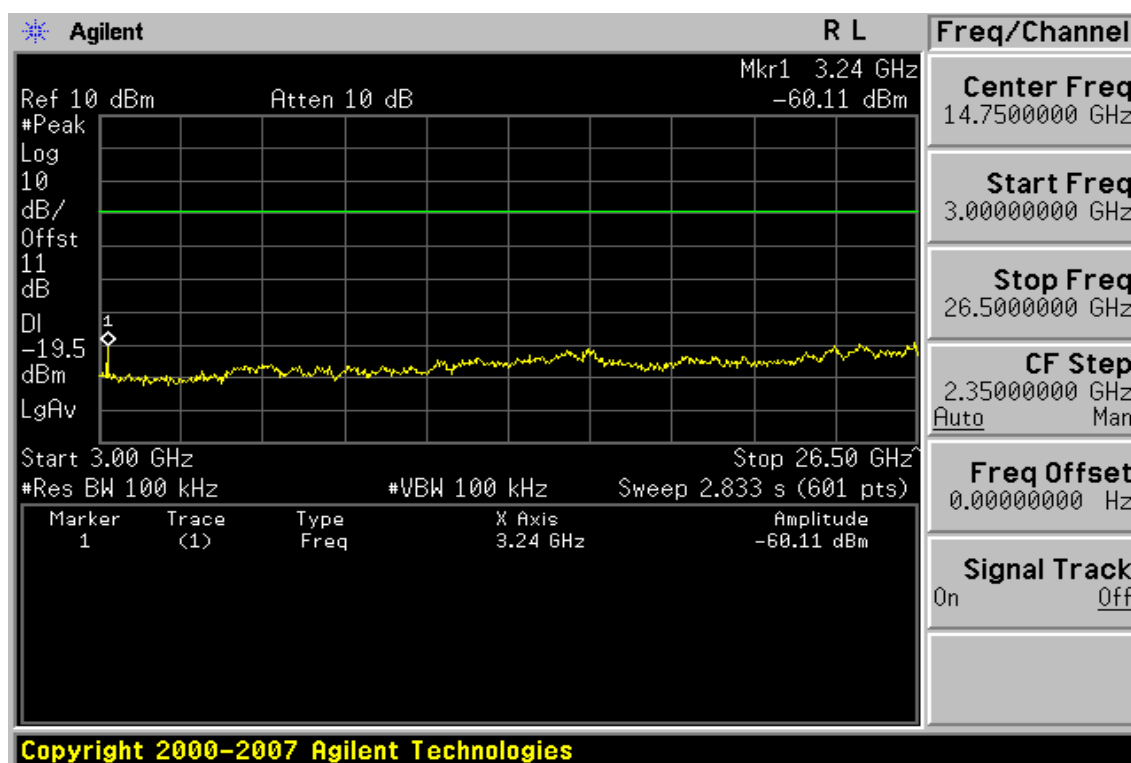
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## Conducted Spurious Emission Measurement Result (802.11g)

### Ch Low 30MHz – 3GHz

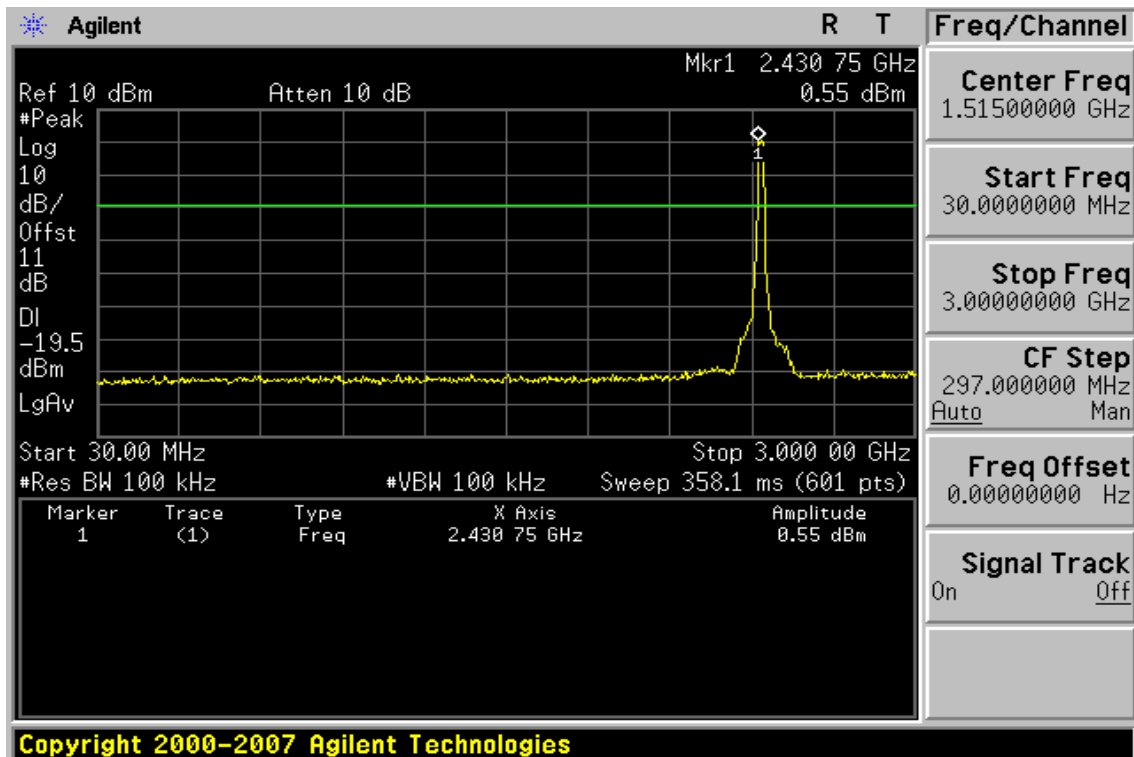


### Ch Low 3GHz – 26.5GHz

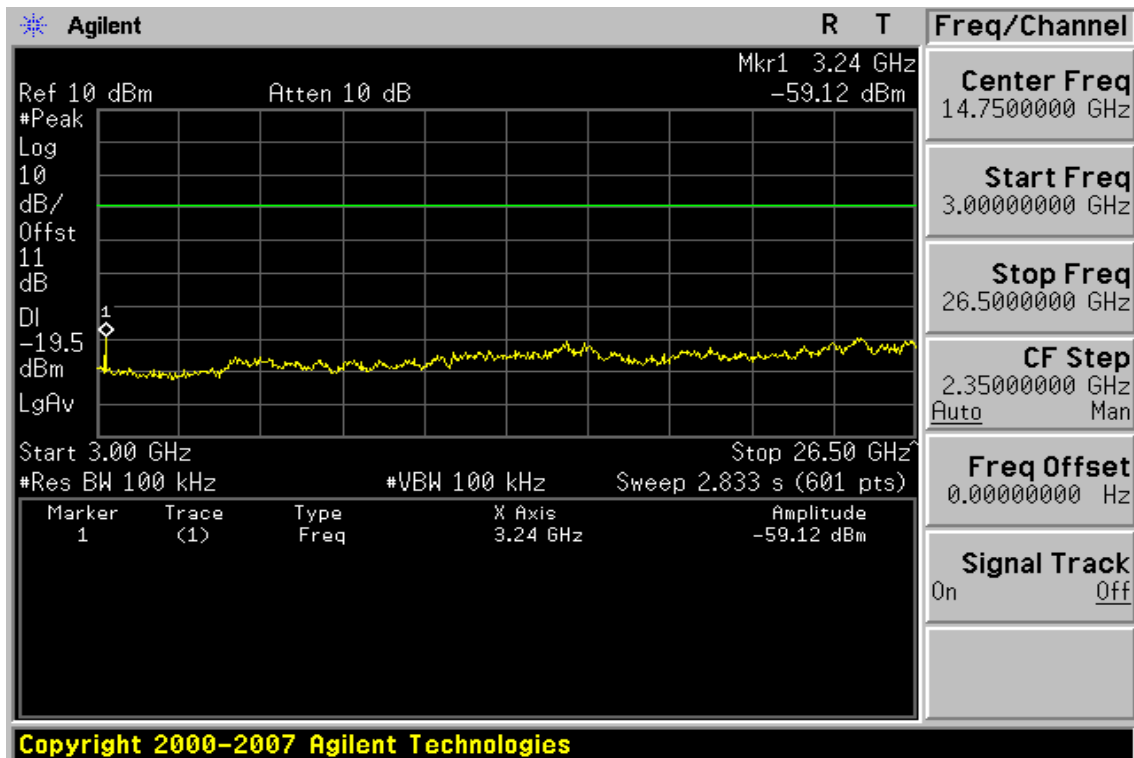


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## Ch Mid 30MHz – 3GHz

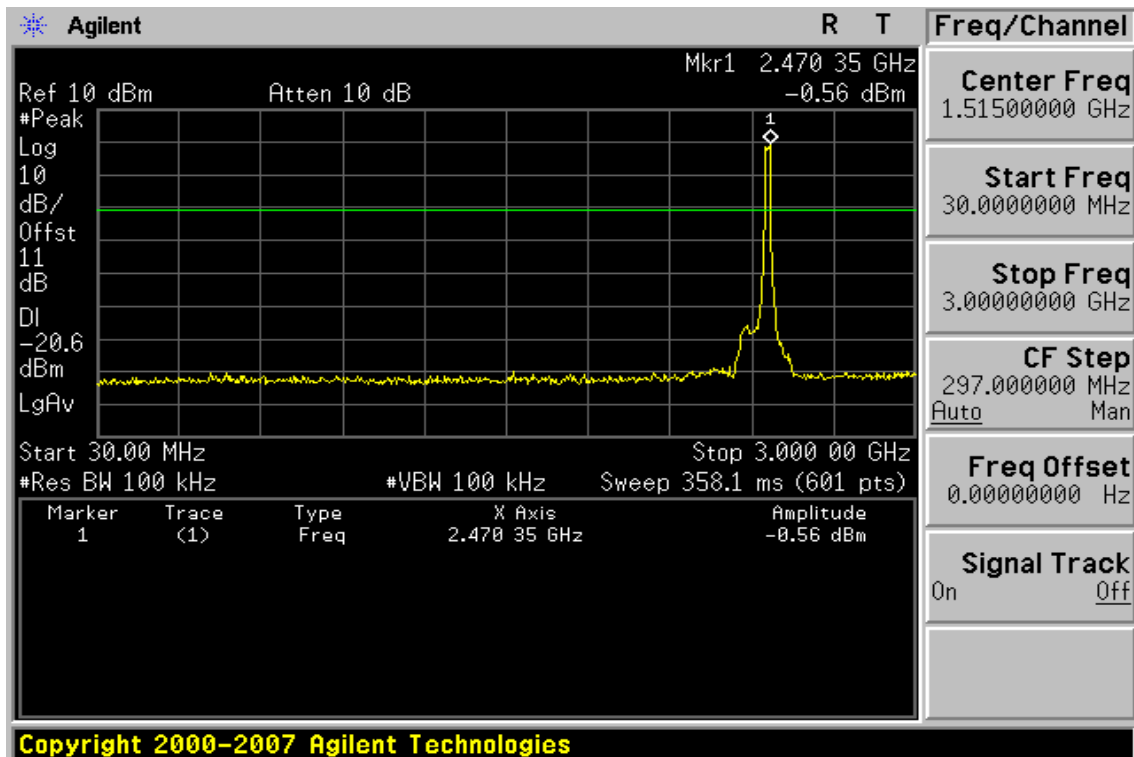


## Ch Mid 3GHz – 26.5GHz

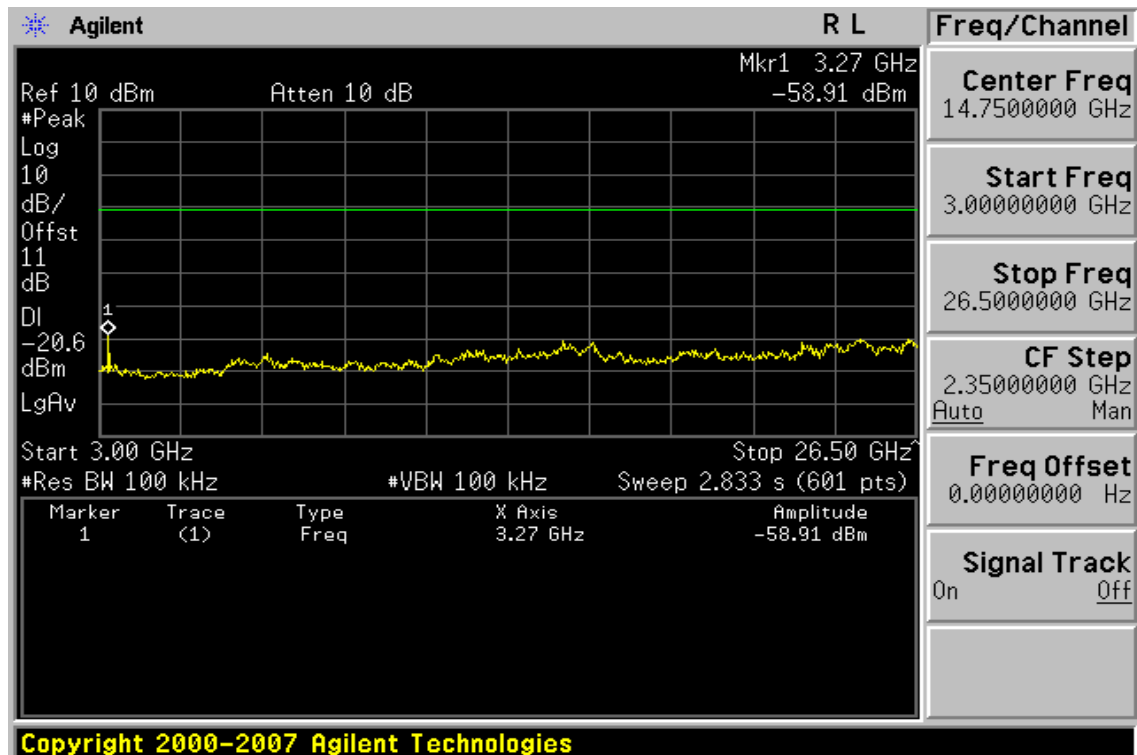


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## Ch High 30MHz – 3GHz



## Ch High 3GHz – 26.5GHz



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**Radiated Spurious Emission Measurement Result (below 1GHz) (802.11b)**

Operation Mode	802.11b TX CH Low	Test Date	Oct. 26, 2009
Fundamental Frequency	2412MHz	Test By	Jason
Temperature	25 °C	Pol	Ver./Hor
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
38.73	V	Peak	47.95	-13.84	34.11	40.00	-5.89
61.04	V	Peak	44.38	-14.75	29.63	40.00	-10.37
92.08	V	Peak	46.93	-17.38	29.55	43.50	-13.95
38.73	H	Peak	49.45	-13.84	35.61	40.00	-4.39
56.19	H	Peak	41.73	-14.63	27.10	40.00	-12.90
70.74	H	Peak	42.10	-16.27	25.83	40.00	-14.17

## Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 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.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

**Radiated Spurious Emission Measurement Result (below 1GHz) (802.11b)**

Operation Mode	802.11b TX CH Mid	Test Date	Oct. 26, 2009
Fundamental Frequency	2437MHz	Test By	Jason
Temperature	25 °C	Pol	Ver./Hor
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
38.73	V	Peak	48.26	-13.84	34.42	40.00	-5.58
62.98	V	Peak	43.28	-14.85	28.43	40.00	-11.57
92.08	V	Peak	46.84	-17.38	29.46	43.50	-14.04
38.73	H	Peak	49.61	-13.84	35.77	40.00	-4.23
56.19	H	Peak	41.64	-14.63	27.01	40.00	-12.99
70.74	H	Peak	42.09	-16.27	25.82	40.00	-14.18

## Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 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.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

**Radiated Spurious Emission Measurement Result (below 1GHz) (802.11b)**

Operation Mode	802.11b TX CH High	Test Date	Oct. 26, 2009
Fundamental Frequency	2462MHz	Test By	Jason
Temperature	25 °C	Pol	Ver./Hor
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
38.73	V	Peak	48.45	-13.84	34.61	40.00	-5.39
56.19	V	Peak	42.75	-14.63	28.12	40.00	-11.88
62.98	V	Peak	42.89	-14.85	28.04	40.00	-11.96
92.08	V	Peak	47.70	-17.38	30.32	43.50	-13.18
38.73	H	Peak	49.62	-13.84	35.78	40.00	-4.22
56.19	H	Peak	41.68	-14.63	27.05	40.00	-12.95
70.74	H	Peak	41.95	-16.27	25.68	40.00	-14.32

## Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 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.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.



**Radiated Spurious Emission Measurement Result (below 1GHz) (802.11g)**

Operation Mode	802.11g TX CH Low	Test Date	Oct. 26, 2009
Fundamental Frequency	2412MHz	Test By	Jason
Temperature	25 °C	Pol	Ver./Hor
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
38.73	V	Peak	47.24	-13.84	33.40	40.00	-6.60
62.98	V	Peak	42.86	-14.85	28.01	40.00	-11.99
92.08	V	Peak	46.83	-17.38	29.45	43.50	-14.05
38.73	H	Peak	48.67	-13.84	34.83	40.00	-5.17
56.19	H	Peak	42.29	-14.63	27.66	40.00	-12.34
70.74	H	Peak	41.67	-16.27	25.40	40.00	-14.60

## Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 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.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

**Radiated Spurious Emission Measurement Result (below 1GHz) (802.11g)**

Operation Mode	802.11g TX CH Mid	Test Date	Oct. 26, 2009
Fundamental Frequency	2437MHz	Test By	Jason
Temperature	25 °C	Pol	Ver./Hor
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
38.73	V	Peak	47.48	-13.84	33.64	40.00	-6.36
61.04	V	Peak	42.92	-14.75	28.17	40.00	-11.83
92.08	V	Peak	47.14	-17.38	29.76	43.50	-13.74
38.73	H	Peak	49.37	-13.84	35.53	40.00	-4.47
56.19	H	Peak	41.54	-14.63	26.91	40.00	-13.09
70.74	H	Peak	42.95	-16.27	26.68	40.00	-13.32

## Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 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.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

**Radiated Spurious Emission Measurement Result (below 1GHz) (802.11g)**

Operation Mode	802.11g TX CH High	Test Date	Oct. 26, 2009
Fundamental Frequency	2462MHz	Test By	Jason
Temperature	25 °C	Pol	Ver./Hor
Humidity	65 %		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
38.73	V	Peak	48.34	-13.84	34.50	40.00	-5.50
56.19	V	Peak	44.01	-14.63	29.38	40.00	-10.62
62.98	V	Peak	43.79	-14.85	28.94	40.00	-11.06
92.08	V	Peak	47.50	-17.38	30.12	43.50	-13.38
38.73	H	Peak	49.53	-13.84	35.69	40.00	-4.31
56.19	H	Peak	41.08	-14.63	26.45	40.00	-13.55
70.74	H	Peak	41.87	-16.27	25.60	40.00	-14.40

## Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz .
- 2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- 3 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.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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**Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)**

Operation Mode	802.11b TX CH Low	Test Date	Oct. 26, 2009
Fundamental Frequency	2412MHz	Test By	Jason
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4824.0	33.71	----	6.05	39.76	----	74.00	54.00	-14.24	Peak
7236.0	----					74.00	54.00		
9648.0	----					74.00	54.00		
12060.0	----					74.00	54.00		
14472.0	----					74.00	54.00		
16884.0	----					74.00	54.00		
19296.0	----					74.00	54.00		
21708.0	----					74.00	54.00		
24120.0	----					74.00	54.00		

**Remark:**

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)**

Operation Mode	802.11b TX CH Low	Test Date	Oct. 26, 2009
Fundamental Frequency	2412MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4824.0	33.13	----	6.05	39.18	----	74.00	54.00	-14.82	Peak
7236.0	----					74.00	54.00		
9648.0	----					74.00	54.00		
12060.0	----					74.00	54.00		
14472.0	----					74.00	54.00		
16884.0	----					74.00	54.00		
19296.0	----					74.00	54.00		
21708.0	----					74.00	54.00		
24120.0	----					74.00	54.00		

**Remark:**

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)**

Operation Mode	802.11b TX CH Mid	Test Date	Oct. 26, 2009
Fundamental Frequency	2437MHz	Test By	Jason
Temperature	25 °C	Pol	Ver
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4874.0	33.34	----	6.20	39.54	----	74.00	54.00	-14.46	Peak
7311.0	----					74.00	54.00		
9748.0	----					74.00	54.00		
12185.0	----					74.00	54.00		
14622.0	----					74.00	54.00		
17059.0	----					74.00	54.00		
19496.0	----					74.00	54.00		
21933.0	----					74.00	54.00		
24370.0	----					74.00	54.00		

**Remark:**

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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# Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)

Operation Mode	802.11b TX CH Mid	Test Date	Oct. 26, 2009
Fundamental Frequency	2437MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4874.0	33.01	----	6.20	39.21	----	74.00	54.00	-14.79	Peak
7311.0	----					74.00	54.00		
9748.0	----					74.00	54.00		
12185.0	----					74.00	54.00		
14622.0	----					74.00	54.00		
17059.0	----					74.00	54.00		
19496.0	----					74.00	54.00		
21933.0	----					74.00	54.00		
24370.0	----					74.00	54.00		

## Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)**

Operation Mode	802.11b TX CH High	Test Date	Oct. 26, 2009
Fundamental Frequency	2462MHz	Test By	Jason
Temperature	25 °C	Pol	Ver
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4924.0	34.48	----	6.32	40.80	----	74.00	54.00	-13.20	Peak
7386.0	----					74.00	54.00		
9848.0	----					74.00	54.00		
12310.0	----					74.00	54.00		
14772.0	----					74.00	54.00		
17234.0	----					74.00	54.00		
19696.0	----					74.00	54.00		
22158.0	----					74.00	54.00		
24620.0	----					74.00	54.00		

**Remark:**

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz) (802.11b)**

Operation Mode	802.11b TX CH High	Test Date	Oct. 26, 2009
Fundamental Frequency	2462MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4924.0	33.62	----	6.32	39.94	----	74.00	54.00	-14.06	Peak
7386.0	----					74.00	54.00		
9848.0	----					74.00	54.00		
12310.0	----					74.00	54.00		
14772.0	----					74.00	54.00		
17234.0	----					74.00	54.00		
19696.0	----					74.00	54.00		
22158.0	----					74.00	54.00		
24620.0	----					74.00	54.00		

**Remark:**

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)**

Operation Mode	802.11g TX CH Low	Test Date	Oct. 26, 2009
Fundamental Frequency	2412MHz	Test By	Jason
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4824.0	34.01	----	6.05	40.06	----	74.00	54.00	-13.94	Peak
7236.0	----					74.00	54.00		
9648.0	----					74.00	54.00		
12060.0	----					74.00	54.00		
14472.0	----					74.00	54.00		
16884.0	----					74.00	54.00		
19296.0	----					74.00	54.00		
21708.0	----					74.00	54.00		
24120.0	----					74.00	54.00		

**Remark:**

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)**

Operation Mode	802.11g TX CH Low	Test Date	Oct. 26, 2009
Fundamental Frequency	2412MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4824.0	34.14	----	6.05	40.19	----	74.00	54.00	-13.81	Peak
7236.0	----					74.00	54.00		
9648.0	----					74.00	54.00		
12060.0	----					74.00	54.00		
14472.0	----					74.00	54.00		
16884.0	----					74.00	54.00		
19296.0	----					74.00	54.00		
21708.0	----					74.00	54.00		
24120.0	----					74.00	54.00		

**Remark:**

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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### Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)

Operation Mode	802.11g TX CH Mid	Test Date	Oct. 26, 2009
Fundamental Frequency	2437MHz	Test By	Jason
Temperature	25 °C	Pol	Ver
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4874.0	33.69	----	6.20	39.89	----	74.00	54.00	-14.11	Peak
7311.0	----					74.00	54.00		
9748.0	----					74.00	54.00		
12185.0	----					74.00	54.00		
14622.0	----					74.00	54.00		
17059.0	----					74.00	54.00		
19496.0	----					74.00	54.00		
21933.0	----					74.00	54.00		
24370.0	----					74.00	54.00		

#### Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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# Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)

Operation Mode	802.11g TX CH Mid	Test Date	Oct. 26, 2009
Fundamental Frequency	2437MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4874.0	33.97	----	6.20	40.17	----	74.00	54.00	-13.83	Peak
7311.0	----					74.00	54.00		
9748.0	----					74.00	54.00		
12185.0	----					74.00	54.00		
14622.0	----					74.00	54.00		
17059.0	----					74.00	54.00		
19496.0	----					74.00	54.00		
21933.0	----					74.00	54.00		
24370.0	----					74.00	54.00		

## Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)**

Operation Mode	802.11g TX CH High	Test Date	Oct. 26, 2009
Fundamental Frequency	2462MHz	Test By	Jason
Temperature	25 °C	Pol	Ver
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4924.0	33.99	----	6.32	40.31	----	74.00	54.00	-13.69	Peak
7386.0	----					74.00	54.00		
9848.0	----					74.00	54.00		
12310.0	----					74.00	54.00		
14772.0	----					74.00	54.00		
17234.0	----					74.00	54.00		
19696.0	----					74.00	54.00		
22158.0	----					74.00	54.00		
24620.0	----					74.00	54.00		

**Remark:**

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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**Radiated Spurious Emission Measurement Result (above 1GHz) (802.11g)**

Operation Mode	802.11g TX CH High	Test Date	Oct. 26, 2009
Fundamental Frequency	2462MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak Reading	AV Reading	Ant./CL CF(dB)	Actual FS		Peak Limit	AV Limit	Margin (dB)	Remark
	(dBuV)	(dBuV)		Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4924.0	33.94	----	6.32	40.26	----	74.00	54.00	-13.74	Peak
7386.0	----					74.00	54.00		
9848.0	----					74.00	54.00		
12310.0	----					74.00	54.00		
14772.0	----					74.00	54.00		
17234.0	----					74.00	54.00		
19696.0	----					74.00	54.00		
22158.0	----					74.00	54.00		
24620.0	----					74.00	54.00		

**Remark:**

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 3 Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- 5 Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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## 10 Peak Power Spectral Density

### 10.1 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 8 dBm 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.

### 10.2 Measurement Equipment Used:

Refer to section 6.2 for details.

### 10.3 Test Set-up:

Refer to section 6.3 for details.

### 10.4 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 = 3KHz, VBW = 10KHz, Span = 300kHz, Sweep=100s
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.



## 10.5 Measurement Result:

### 802.11b Mode

Frequency MHz	RF Power Density Reading (dBm)	Cable loss (dB)	RF Power Density Level (dBm)	Maximum Limit (dBm)
2412	-11.84	0.00	-11.84	8
2437	-11.55	0.00	-11.55	8
2462	-13.33	0.00	-13.33	8

### 802.11g Mode

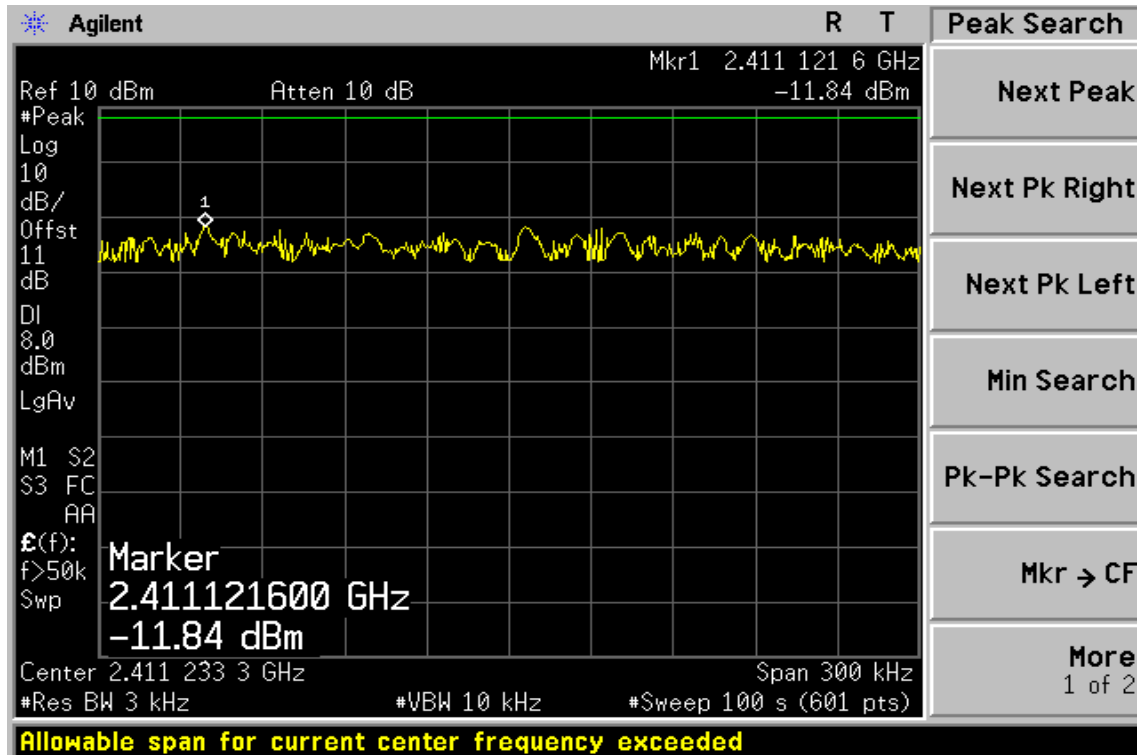
Frequency MHz	RF Power Density Reading (dBm)	Cable loss (dB)	RF Power Density Level (dBm)	Maximum Limit (dBm)
2412	-13.98	0.00	-13.98	8
2437	-13.24	0.00	-13.24	8
2462	-13.34	0.00	-13.34	8

*offset 11dB*

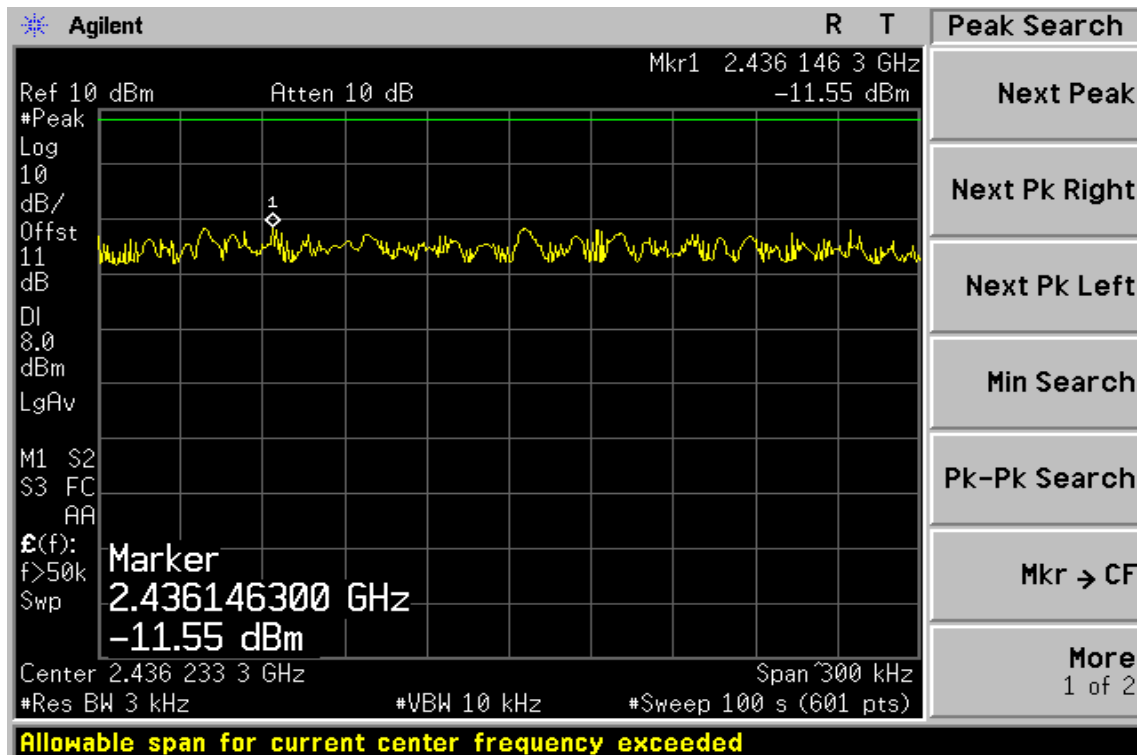
Note: Refer to next page for plots.

## 802.11b

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

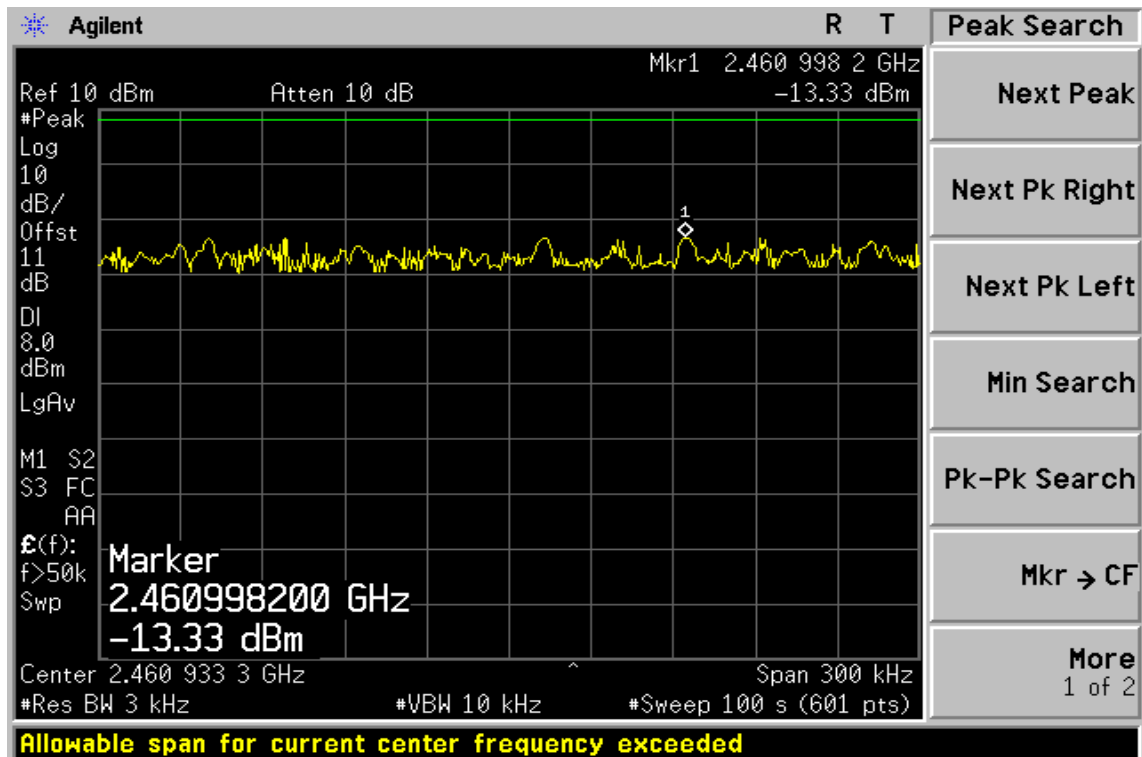


### Power Spectral Density Test Plot (CH-Mid)



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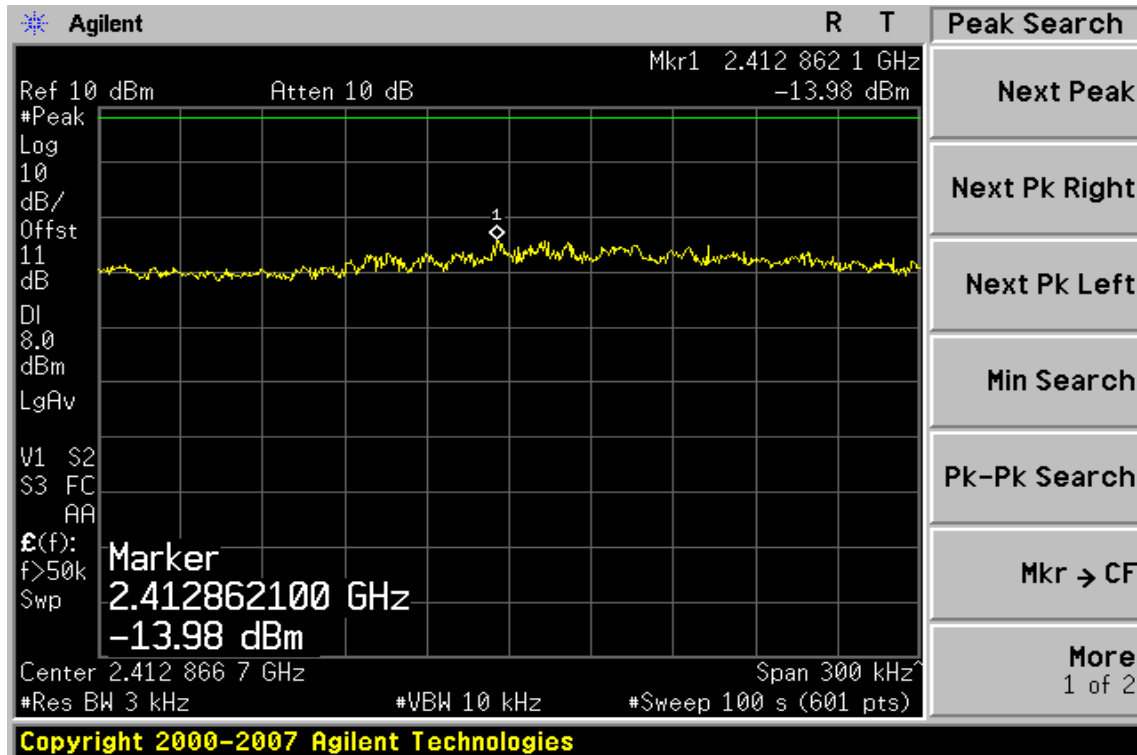
## Power Spectral Density Test Plot (CH-High)



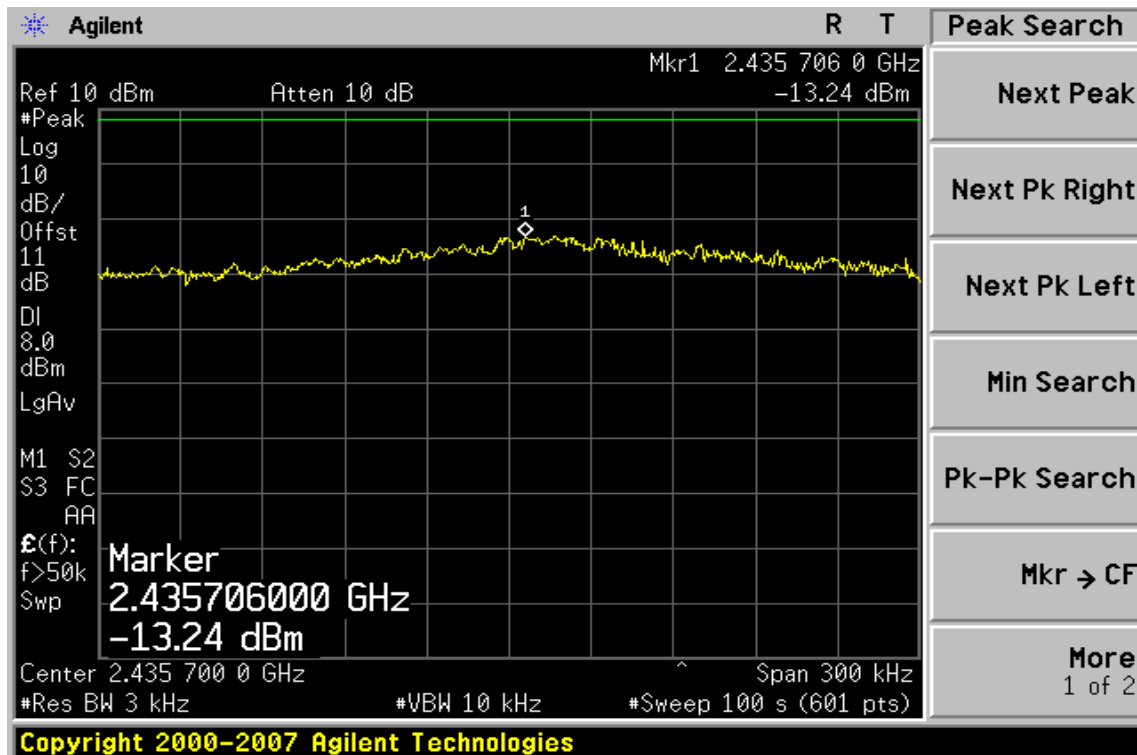
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## 802.11g

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

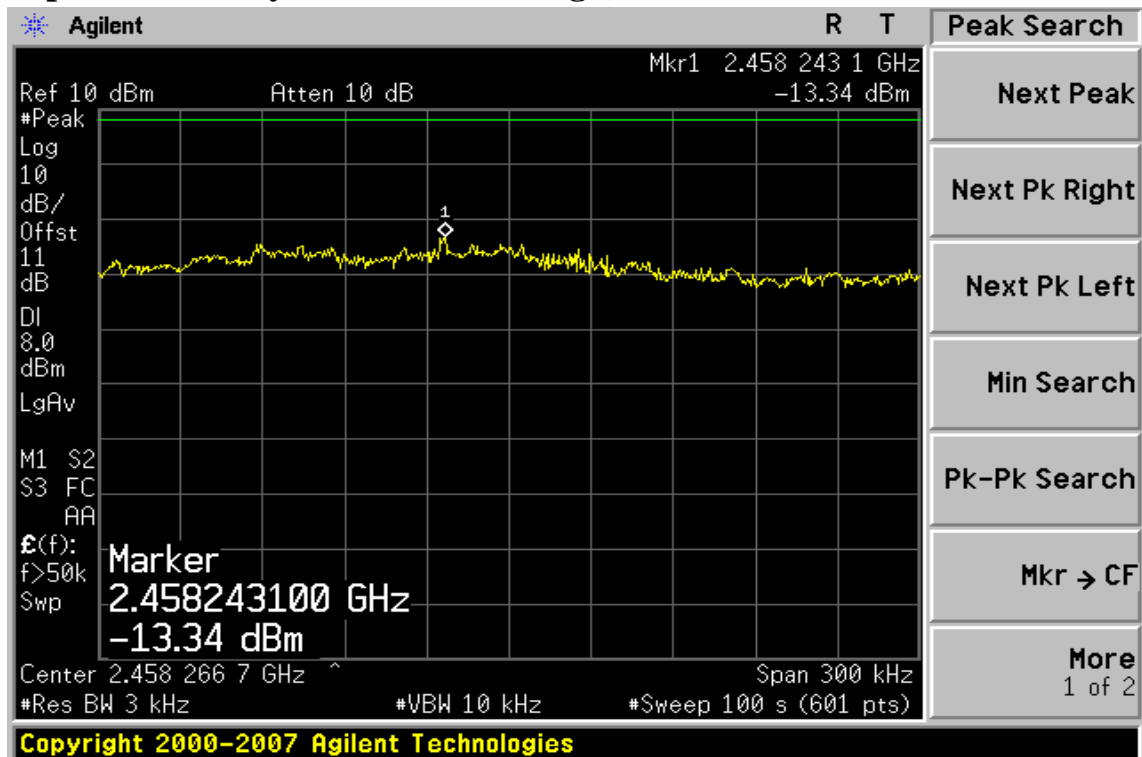


### Power Spectral Density Test Plot (CH-Mid)



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



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## 11 ANTENNA REQUIREMENT

### 11.1 Standard Applicable:

According to §15.203, Antenna requirement.

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

### 11.2 Antenna Connected Construction:

The directional gains of antenna used for transmitting is 0.7dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.