

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

OF

**Product Name:** Smart Phone

**Brand Name:** DELL

**Model Name:** V02S

**Model Different:** N/A

**FCC ID:** E2KV02S001

**Report No.:** EH/2010/70042

**Issue Date:** Nov. 03, 2010

**FCC Rule Part:** §15.247,DTS

**Prepared for:** DELL Inc.

**One Dell Way, Round Rock, Tx 78682**

**Prepared by:** SGS Taiwan Ltd.

**Electronics & Communication Laboratory**

**No. 134, Wu Kung Rd., Wuku Industrial Zone,  
Taipei County, Taiwan.**



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## VERIFICATION OF COMPLIANCE

**Applicant:** DELL Inc.  
 One Dell Way, Round Rock, Tx 78682

**Product Name:** Smart Phone

**Brand Name:** DELL

**FCC ID:** E2KV02S001

**Model Name:** V02S

**Model Difference:** N/A

**File Number:** EH/2010/70042

**Date of test:** Jul. 28, 2010 ~ Sep. 15, 2010

**Date of EUT Received:** Jul. 28, 2010

**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:** Jason Wu **Date:** Nov. 03, 2010  
 \_\_\_\_\_  
*Jason Wu / Asst. Supervisor*

**Prepared By:** Eva Kao **Date:** Nov. 03, 2010  
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*Eva Kao / Asst. Supervisor*

**Approved By:** Arno Hsieh **Date:** Nov. 03, 2010  
 \_\_\_\_\_  
*Arno Hsieh / Asst. Supervisor*

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## Version

Version No.	Date	Description
00	Nov. 03, 2010	Initial creation of document

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# 1 GENERAL INFORMATION

## 1.1 Product Description

General:

Product Name	Smart Phone	
Brand Name	DELL	
Model Name	V02S	
Model Difference	N/A	
Micro USB Cable	Model No.: 5K.16R01.001 / CU04C04U05-K66-EF, Supplier: HELM	
Simple Hands-free (SHF)	1. Model No.: 525283 / TY.2C190.003, Supplier: Foster 2. Model No.: C055T / TY.2C190.001, Supplier: PCH	
Power Supply	3.7 Vdc re-chargeable battery or 5Vdc by AC/DC power adapter	
	Battery:	Model: 214L0 / 2C.214L0.001, Supplier: CHENG UEI
	Adapter:	Model No.: 32HD9/ 0005ADUUS, Supplier: PCH
	Car Charge:	Model No.: DT933 / LD5V50-00, Supplier: PCH

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GSM and WCDMA:

Cellular Phone Standards Frequency Range and Power:	Operating Frequency		Rated Power
	GSM/GPRS 850, Class 12	824.2 MHz– 848.8MHz	32.5 dBm
	EDGE 850, Class 12	824.2 MHz– 848.8MHz	26.5 dBm
	GSM/GPRS 1900, Class 12	1850.2MHz–1909.8MHz	29.5 dBm
	EDGE 1900, Class 12	1850.2MHz–1909.8MHz	25.5 dBm
	WCDMA/HSUPA/HSDPA Band II	1852.4MHz–1907.6MHz	23.5 dBm
	WCDMA/HSUPA/HSDPA Band V	826.4MHz–846.6MHz	23.5 dBm
Hardware Version:	N/A		
Software Version:	N/A		
IMEI:	01228600XXXXXX		

Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
GPRS 850	3.7V	450
GPRS 1900	3.7V	380
EDGE 850	3.7V	360
EDGE 1900	3.7V	320
WCDMA Band II	3.7V	610
HSUPA Band II	3.7V	620
WCDMA Band V	3.7V	550
HSUPA Band V	3.7V	560

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WLAN: 802.11 b/g

Frequency Range:	2412 – 2462MHz
Channel number:	11 channels
Max. Output Power:	802.11 b: 17.38 dBm 802.11 g: 13.84 dBm
Modulation Technology:	DSSS, 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, -0.02dBi.

Bluetooth:

Bluetooth Version:	V2.1 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK)
Channel number:	79 channels
Modulation type:	Frequency Hopping Spread Spectrum
Transmit Power:	6.76 dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	$\leq 0.4s$
Operating Mode:	Point-to-Point
Antenna Designation:	PIFA Antenna, -0.02dBi.

This report applies for with IEEE 802.11 b/g function.

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

This submittal(s) (test report) is intended for FCC ID: **E2KV02S001** filing to comply with Section 15.247 of the FCC Part 15.

## 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.

Tested in accordance with Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

## 1.4 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number is: 990257 and 236194, Canada Registration Number: 4620A-4.

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

## 1.5 Special Accessories

Not available for this EUT intended for grant.

## 1.6 Equipment Modifications

Not available for this EUT intended for grant.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

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

### 2.2 EUT Exercise

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

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on as 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 30MHz using CISPR Quasi-Peak and Average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as 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.

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## 2.4 Configuration of Tested System

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

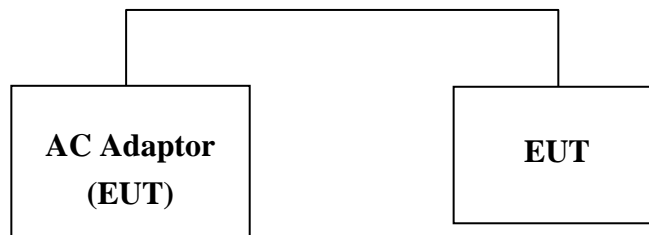


Table 2-1 Equipment Used in Tested System

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

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### 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(b)	6dB Bandwidth	Compliant
§15.247(c)	100 KHz Bandwidth of Frequency Band Edges	Compliant
§15.247(c)	TX Spurious Emission	Compliant
§15.247/§A8.3(2)	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 mode 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.

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## 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

- The lower limit shall apply at the transition frequencies
- 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	09/15/2010	09/14/2011
LISN	Rolf-Heine	NNB-2/16Z	99012	02/02/2010	02/01/2011
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	02/02/2010	02/01/2011
Coaxial Cables	N/A	WK CE Cable	N/A	11/28/2009	11/27/2010

### 5.3 EUT Setup:

- The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.
- The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 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.

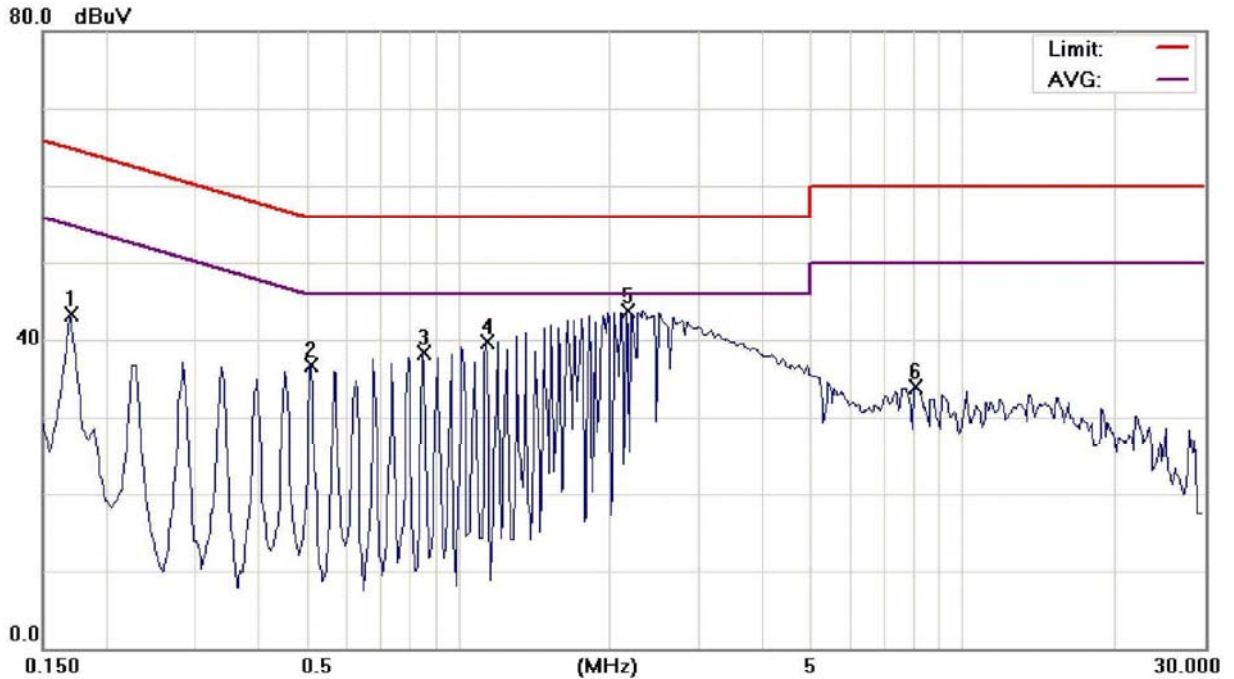
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### AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode			Test Date:	Sep. 14, 2010
Temperature:	24 °C	Humidity:	56 %	Test By:	Jason



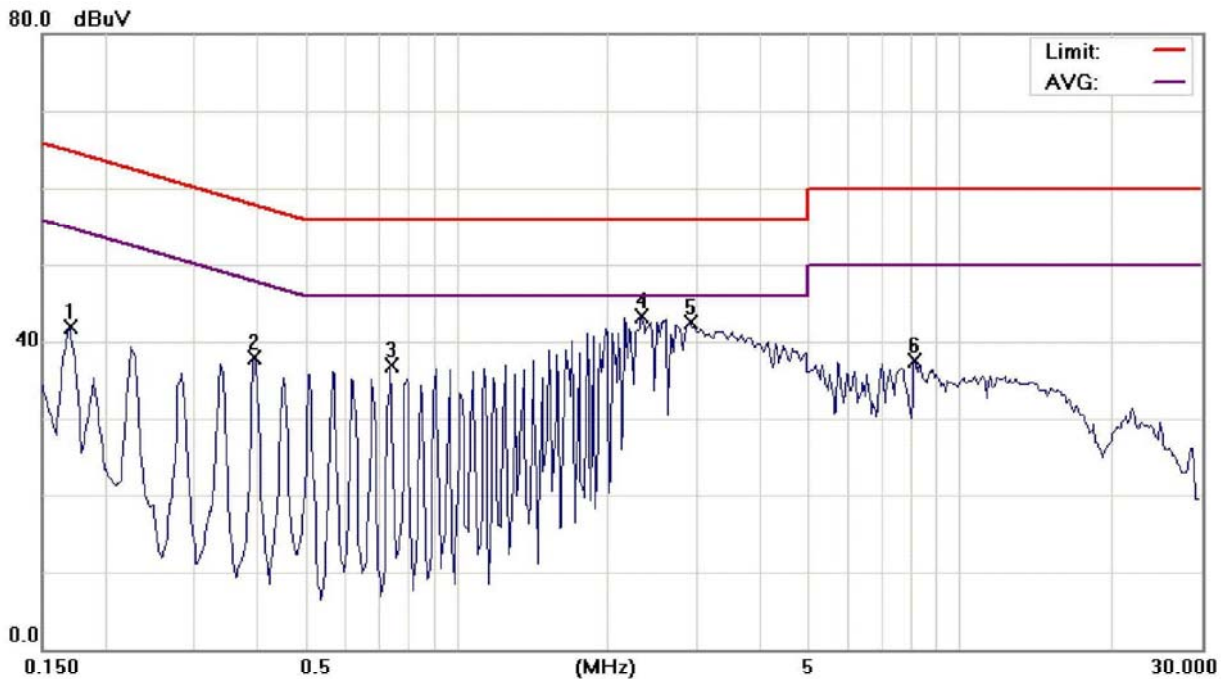
Site SGS CONDUCTED #1 Phase: L1 Temperature: 24 °C  
 Limit: CISPR22/11/EN55022 Class B Power: AC 120V/60Hz Humidity: 56 %  
 EUT: Smart Phone(GSM/DCS/WCDMA/BT/WLAN Distance: Air Pressure: hpa  
 M/N: V02S001  
 Note: WLAN /BT Operation

No.	Mk.	Freq. MHz	Reading Level dBuV	Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1700	43.13	0.13	43.26	64.96	-21.70	peak	
2		0.5100	36.65	0.12	36.77	56.00	-19.23	peak	
3		0.8500	38.09	0.12	38.21	56.00	-17.79	peak	
4		1.1400	39.48	0.13	39.61	56.00	-16.39	peak	
5	*	2.1600	43.63	0.16	43.79	56.00	-12.21	peak	
6		8.0400	33.62	0.38	34.00	60.00	-26.00	peak	

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Site: SGS CONDUCTED #1      Phase: **N**      Temperature: 24 °C  
 Limit: CISPR22/11/EN55022 Class B      Power: AC 120V/60Hz      Humidity: 56 %  
 EUT: Smart Phone(GSM/DCS/WCDMA/BT/WLAN)      Distance:      Air Pressure: hpa  
 M/N: V02S001  
 Note: WLAN /BT Operation

No.	Mk.	Freq. MHz	Reading Level dBuV	Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1700	41.84	0.14	41.98	64.96	-22.98	peak	
2		0.3950	37.73	0.12	37.85	57.96	-20.11	peak	
3		0.7400	36.75	0.13	36.88	56.00	-19.12	peak	
4	*	2.3300	43.14	0.17	43.31	56.00	-12.69	peak	
5		2.9000	42.33	0.18	42.51	56.00	-13.49	peak	
6		8.1400	37.16	0.37	37.53	60.00	-22.47	peak	

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## 6 PEAK OUTPUT POWER MEASUREMENT

### 6.1 Standard Applicable:

According to §15.247(a)(2), (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.

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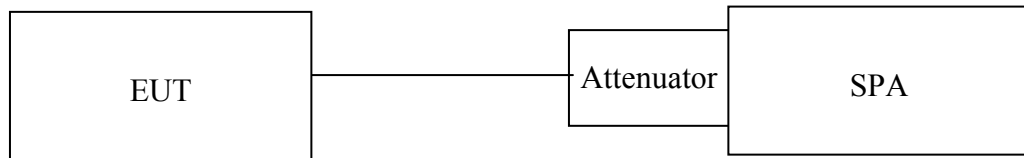
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**6.2 Measurement Equipment Used:**

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Sensor	Anritsu	MA2411B	917032	01/21/2010	01/20/2012
Power Meter	Anritsu	ML2495A	1005007	02/17/2010	02/16/2012
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2010	04/18/2012
Spectrum Analyzer	Agilent	E4440A	MY45304525	01/25/2010	01/24/2011
DC Block	Agilent	BLK-18	155452	07/05/2010	07/04/2011
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2010	01/04/2011
Attenuator	Mini-Circuit	BW-S6W5	001	07/05/2010	07/04/2011
Attenuator	Mini-Circuit	BW-S10W5	001	07/05/2010	07/04/2011
Attenuator	Mini-Circuit	BW-S20W5	001	07/05/2010	07/04/2011
Splitter	Agilent	11636B	N/A	07/05/2010	07/04/2011

**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.

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**6.5 Measurement Result:**

**802.11b Mode**

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Peak Power (dBm)	Peak Power (W)	Limit (W)
2412.00	16.20	0.00	16.20	0.04169	1
2437.00	16.52	0.00	16.52	0.04487	1
2462.00	17.38	0.00	17.38	0.05470	1

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Avg. Power (dBm)	Avg. Power (W)	Limit (W)
2412.00	13.74	0.00	13.74	0.02366	1
2437.00	14.04	0.00	14.04	0.02535	1
2462.00	14.92	0.00	14.92	0.03105	1

**802.11g Mode**

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Peak Power (dBm)	Peak Power (W)	Limit (W)
2412.00	12.81	0.00	12.81	0.01910	1
2437.00	13.11	0.00	13.11	0.02046	1
2462.00	13.84	0.00	13.84	0.02421	1

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Avg. Power (dBm)	Avg. Power (W)	Limit (W)
2412.00	9.54	0.00	9.54	0.00899	1
2437.00	9.93	0.00	9.93	0.00984	1
2462.00	10.53	0.00	10.53	0.01130	1

*offset: 0.6dB*

Note: Refer to next page for plots.

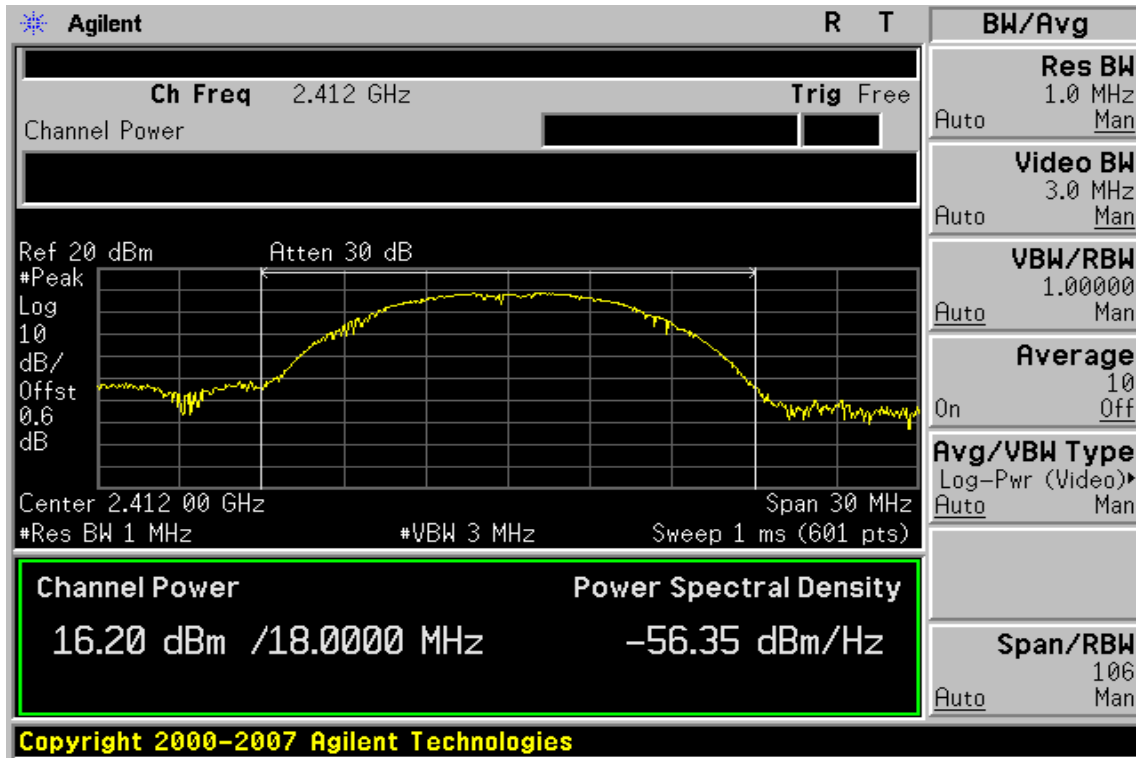
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### 802.11b, 1Mbps

### Power Output Plot (CH Low)



### Power Output Plot (CH Mid)

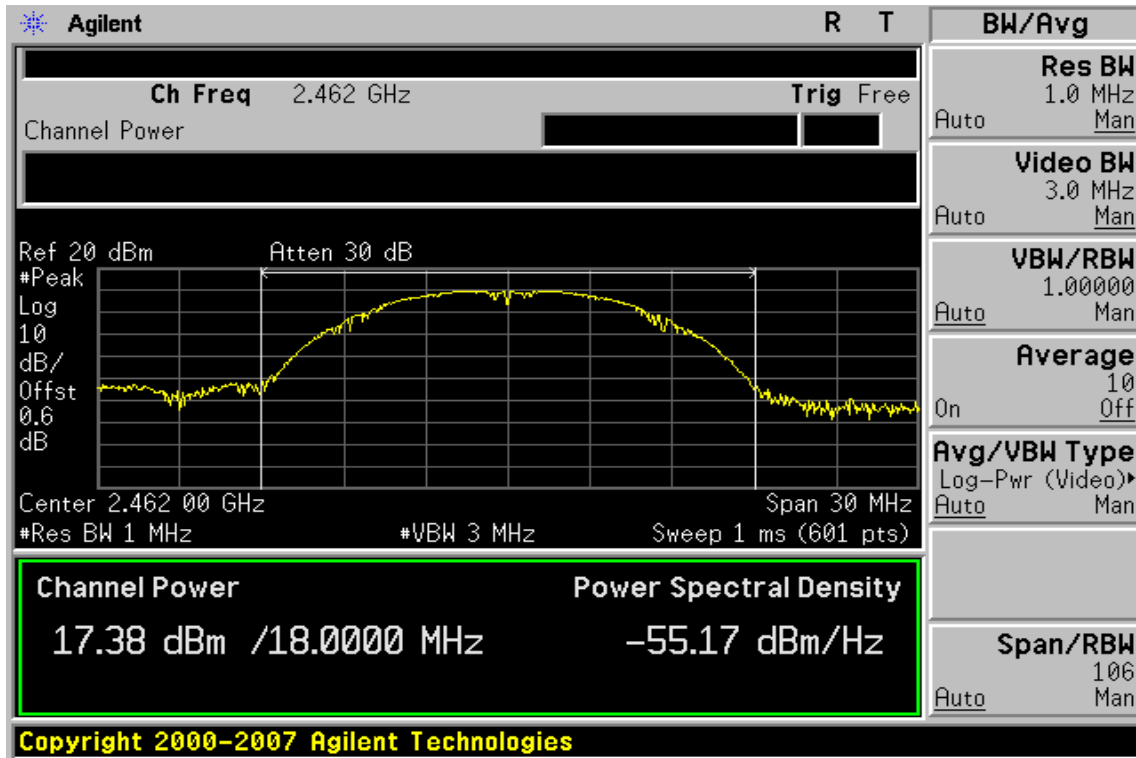


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**Power Output Plot (CH High)**

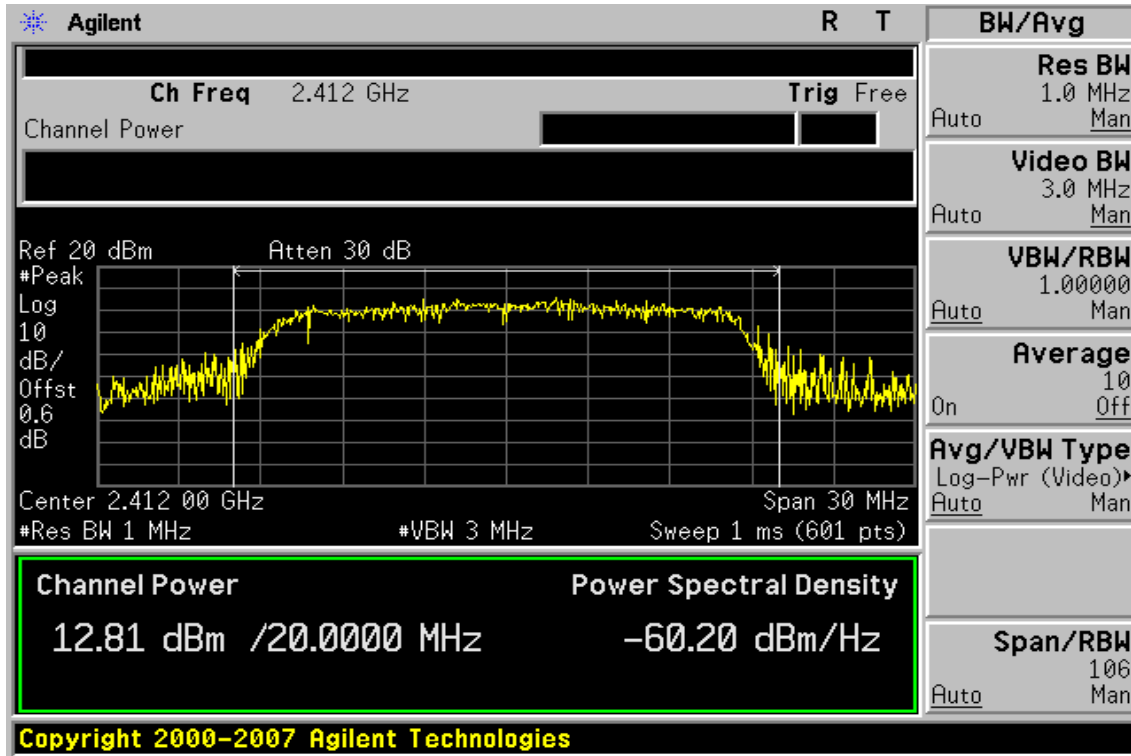


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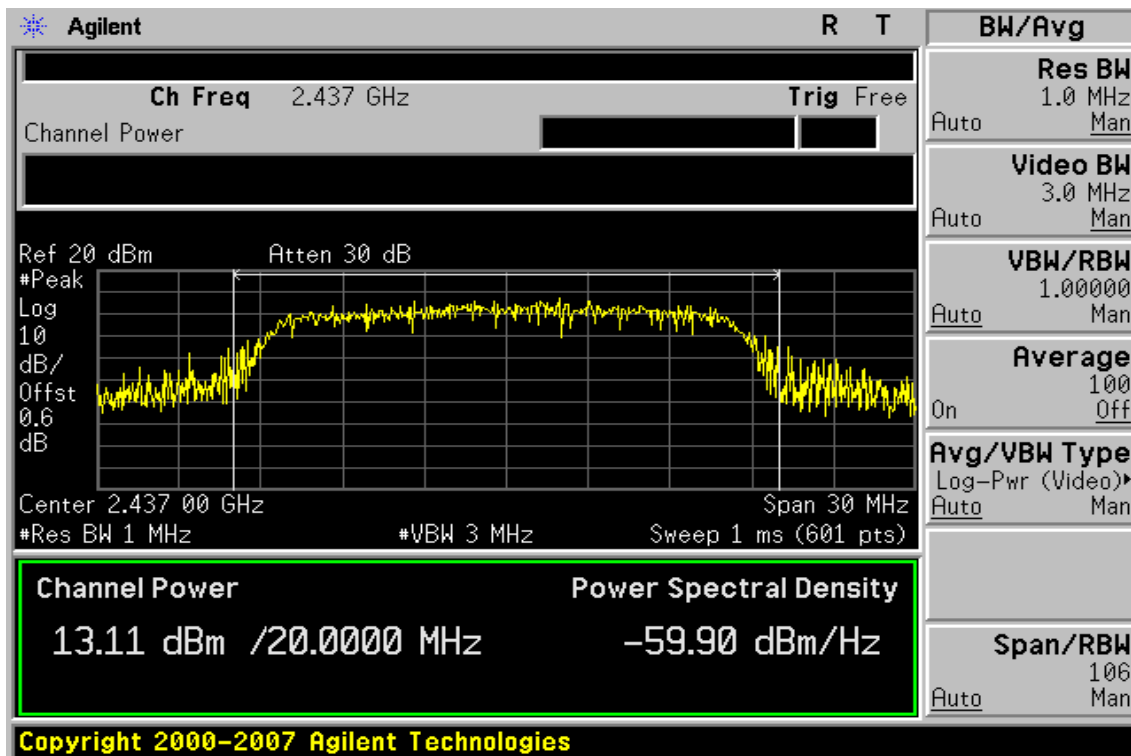
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### 802.11g, 6Mbps Power Output Plot (CH Low)



### Power Output Plot (CH Mid)

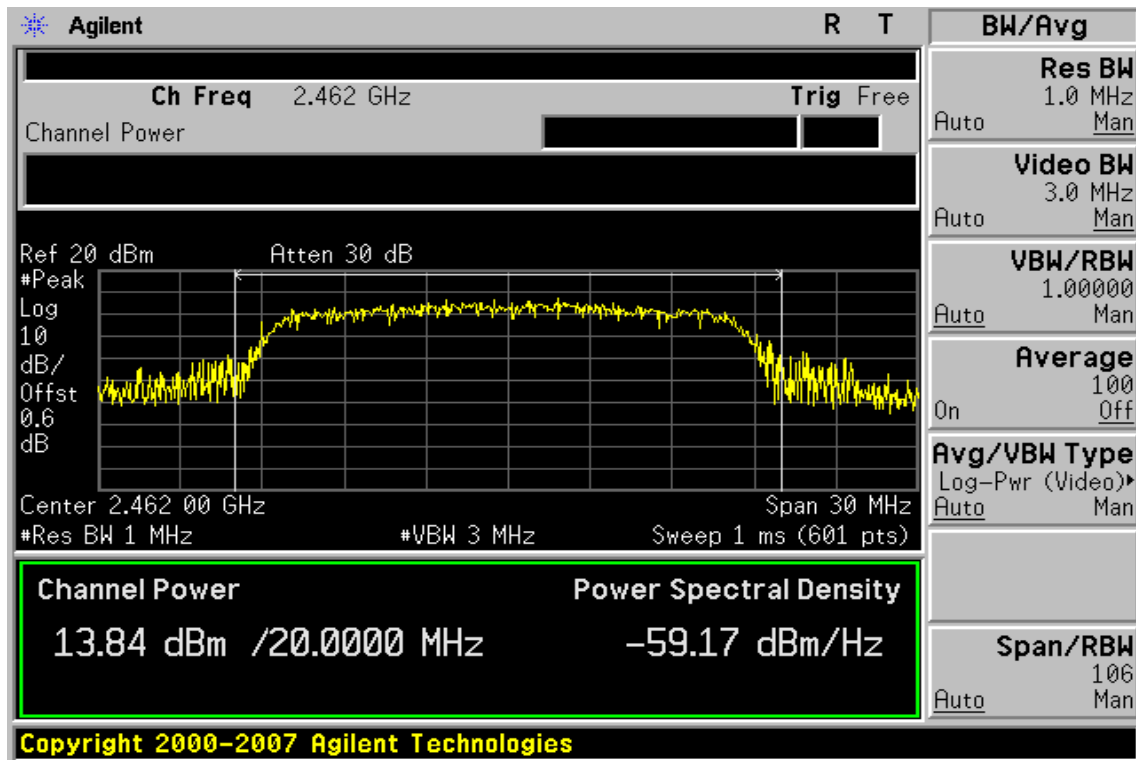


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### Power Output Plot (CH High)



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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= 30M/50MHz, 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	8.123	> 500	PASS
2437	8.117	> 500	PASS
2462	8.133	> 500	PASS

802.11b

Frequency (MHz)	Bandwidth (MHz)	Bandwidth (KHz)	Result
2412	15.136	> 500	PASS
2437	15.073	> 500	PASS
2462	15.091	> 500	PASS

*offset 0.6dB*

Note: Refer to next page for plots.

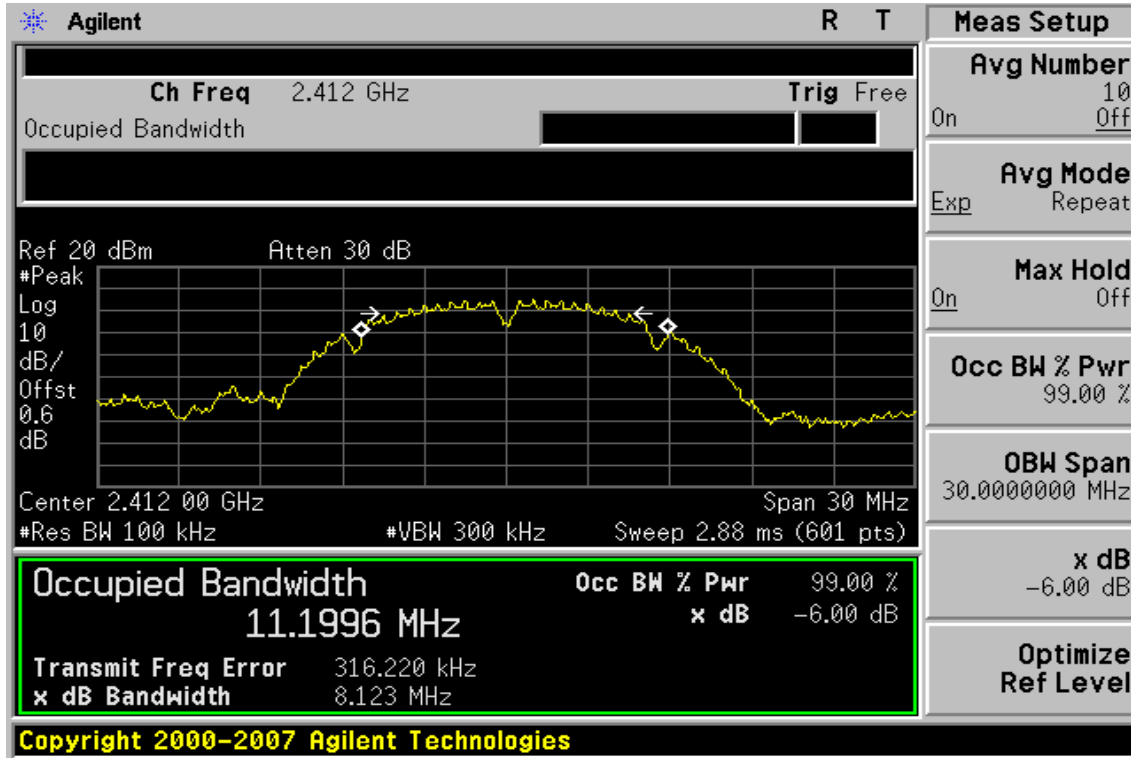
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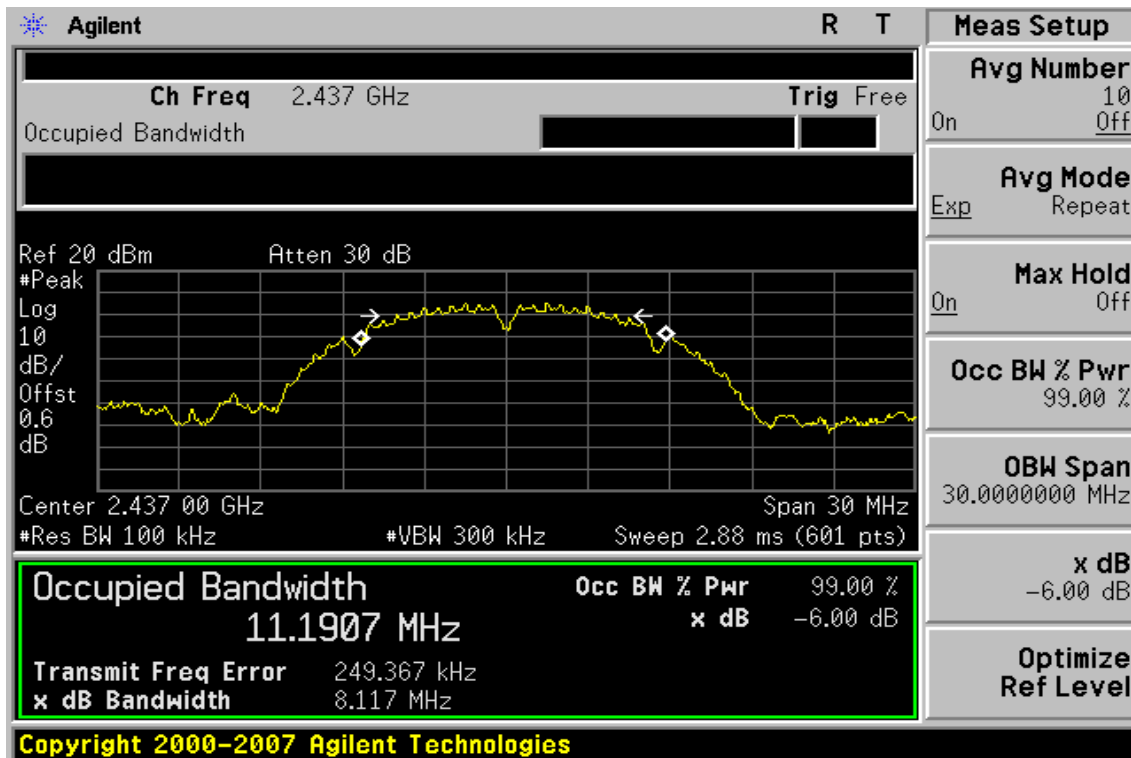
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802.11b

6dB Band Width Test Data CH-Low

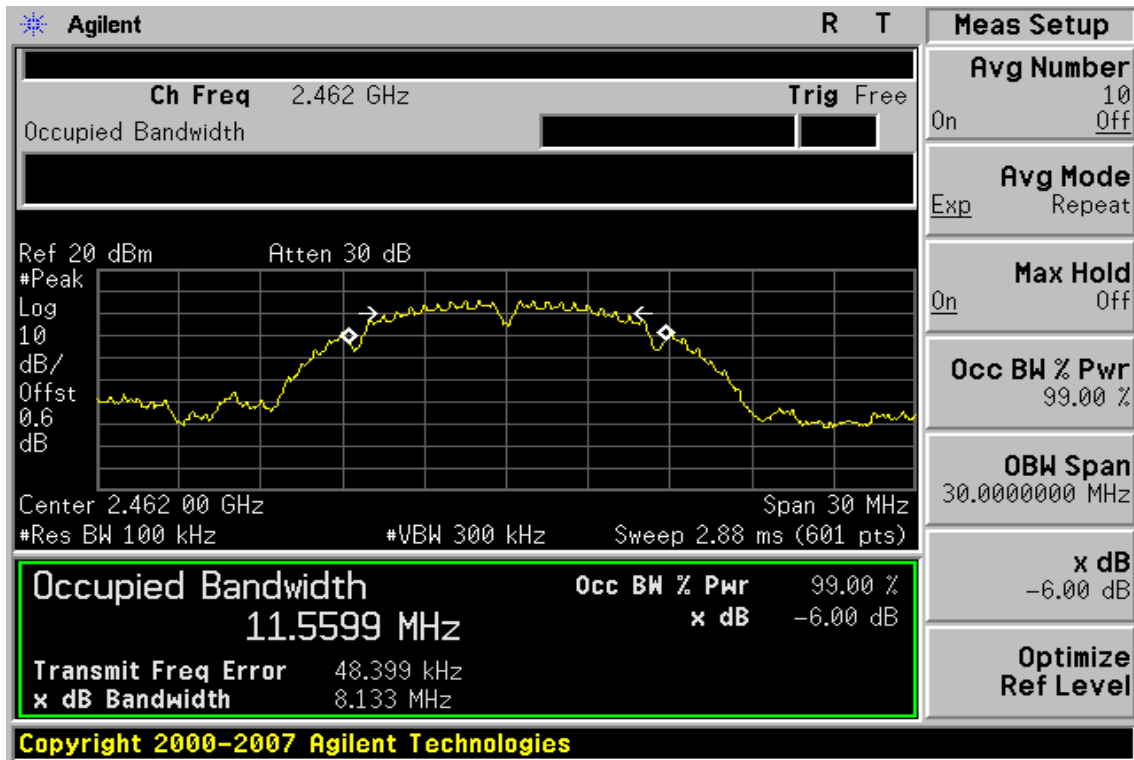


6dB Band Width Test Data CH-Mid



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



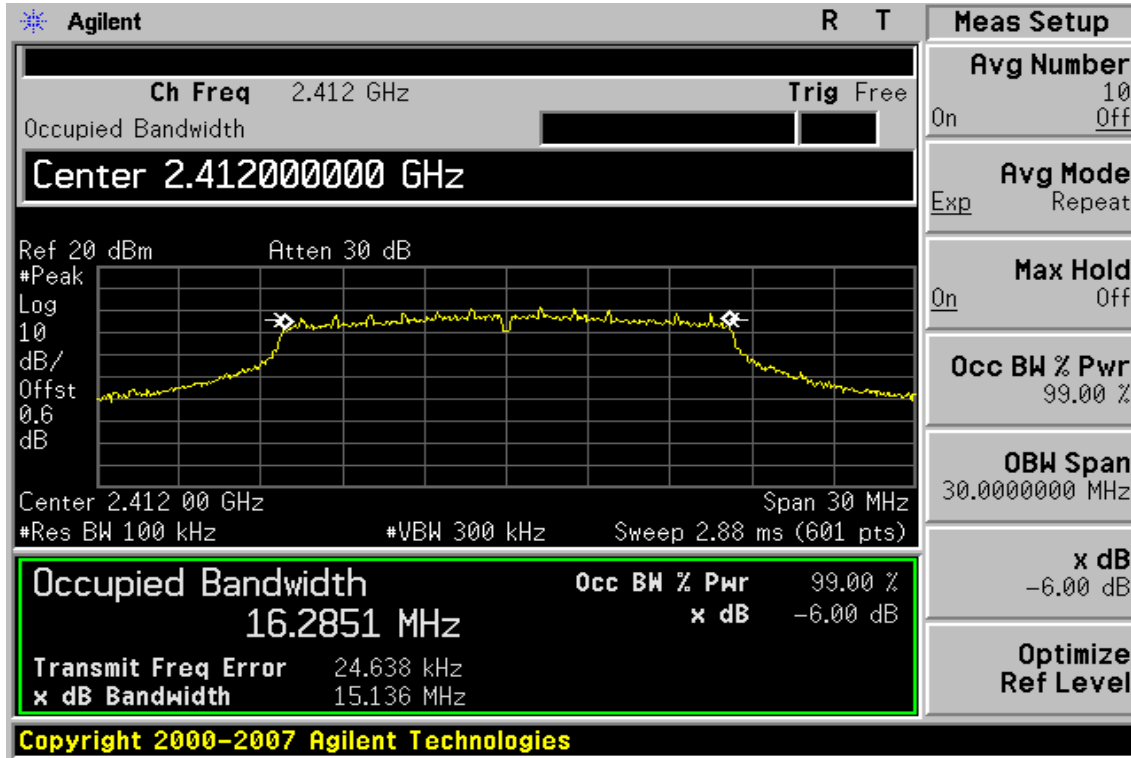
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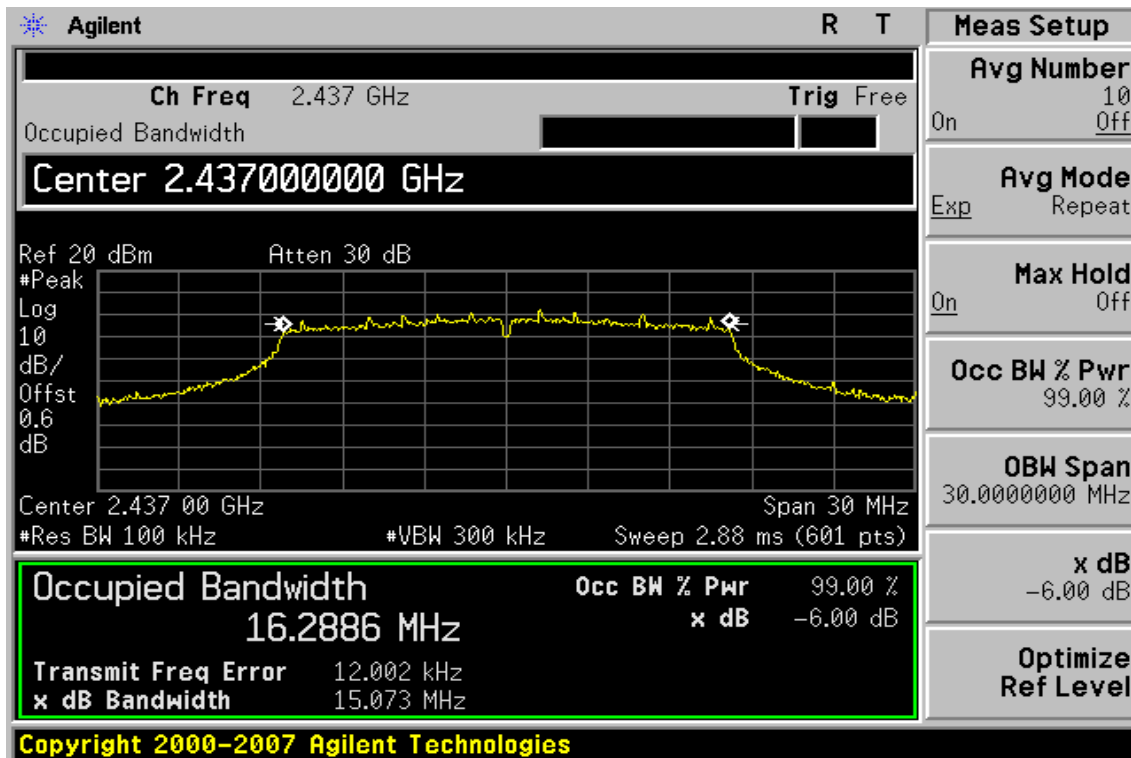
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802.11g

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

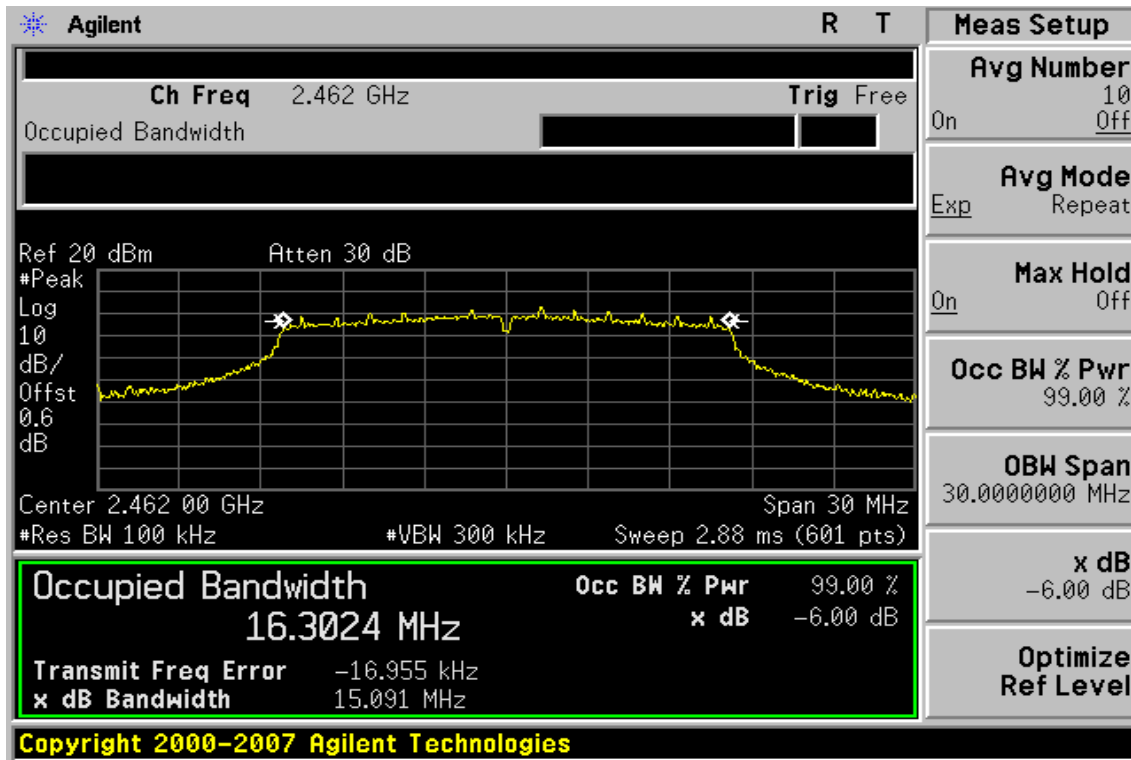


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### 6dB Band Width Test Data CH-High



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## 8 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

### 8.1 Standard Applicable:

According to §15.247(d), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 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	02/12/2010	02/11/2011
Bilog Antenna	SCHWAZBECK	VULB9160	3136	11/19/2009	11/18/2010
Horn antenna	SCHWAZBECK	BBHA 9120D	9120D-673	03/09/2009	03/08/2011
Pre-Amplifier	Agilent	8447D	1937A02834	11/28/2009	11/28/2010
Pre-Amplifier	Agilent	8449B	3008A01973	01/05/2010	01/04/2011
Radio Communication Analyzer	R & S	CMU200	102189	10/31/2008	10/30/2010
DC Block	Agilent	BLK-18	155452	07/05/2010	07/04/2011
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	01/05/2010	01/04/2011
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2010	01/04/2011
3m Site	SGS	966 chamber	N/A	11/08/2009	11/09/2010

### 8.3 Test SET-UP:

#### 8.3.1 Conducted Emission at antenna port:

Refer to section 6.3 for details.

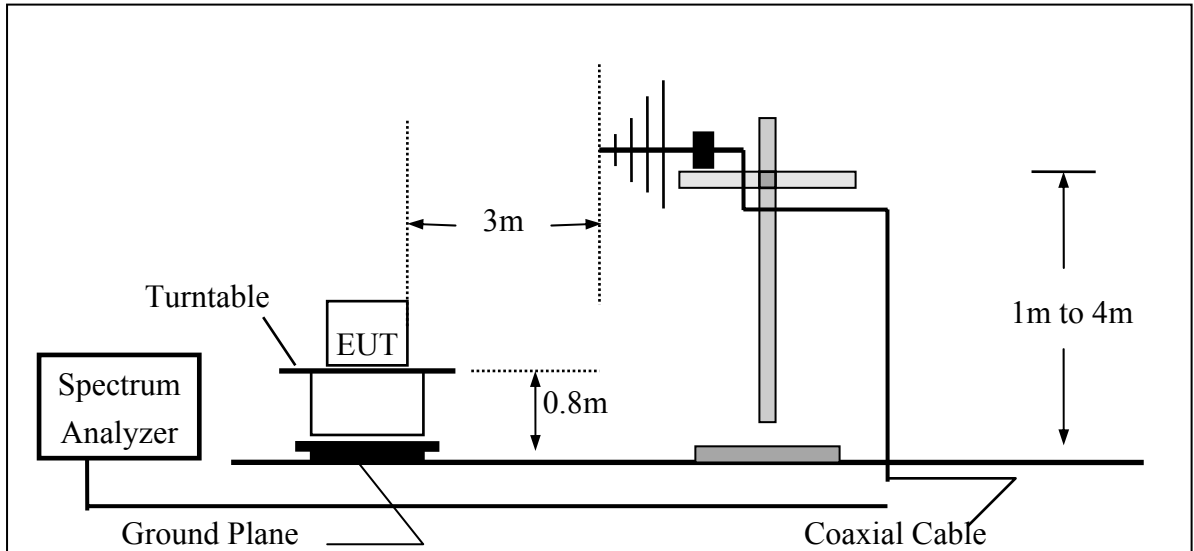
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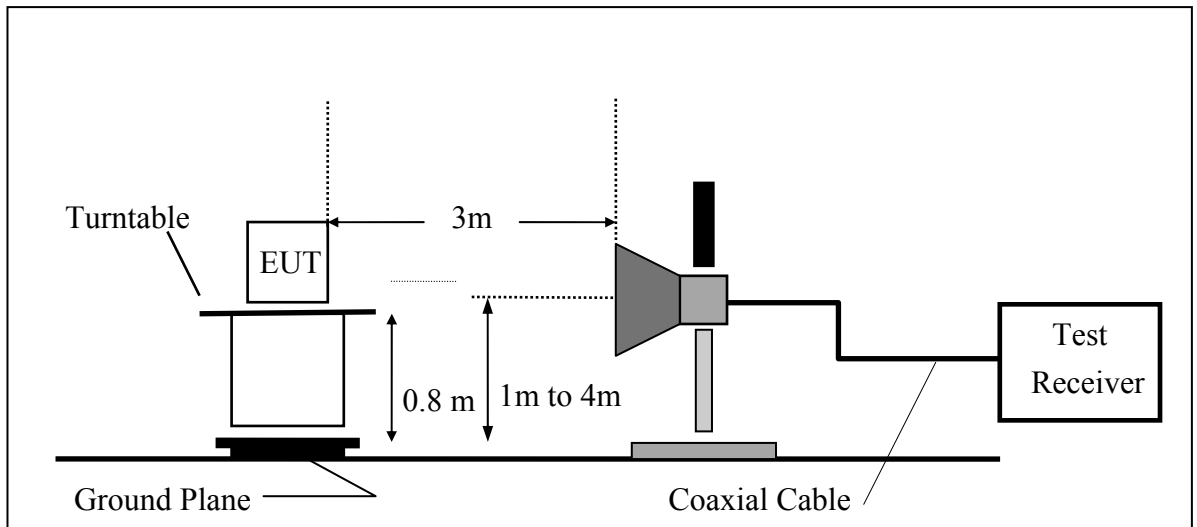
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**8.3.2 Radiated emission:**

**(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.

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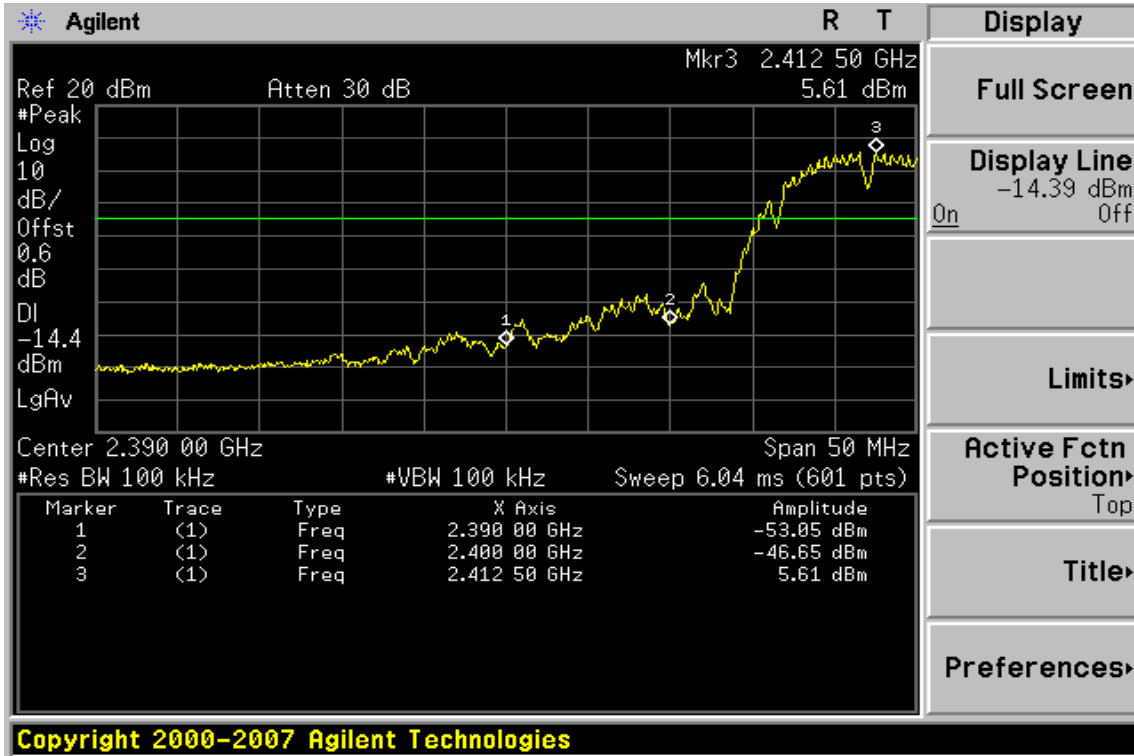
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### 802.11b

#### 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 Sep. 14, 2010  
 Test By Jason  
 Pol Ver.

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2386.40	52.82	---	-0.69	52.13	---	74.00	54.00	-1.87	Peak
2390.00	50.09	---	-0.67	49.42	---	74.00	54.00	-4.58	Peak

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

Test Date Sep. 14, 2010  
 Test By Jason  
 Pol Hor.

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2386.50	60.51	53.50	-0.69	59.82	52.81	74.00	54.00	-1.19	AV
2390.00	57.58	47.90	-0.67	56.91	47.23	74.00	54.00	-6.77	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 b mode**

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

Test Date Sep. 14, 2010  
 Test By Jason  
 Pol Ver.

Freq. (MHz)	Peak	AV	Ant./CL CF (dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2483.56	53.52	45.90	-0.52	53.00	45.38	74.00	54.00	-8.62	AV

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

Test Date Sep. 14, 2010  
 Test By Jason  
 Pol Hor.

Freq. (MHz)	Peak	AV	Ant./CL CF (dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2483.56	57.59	50.55	-0.52	57.07	50.03	74.00	54.00	-3.97	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.

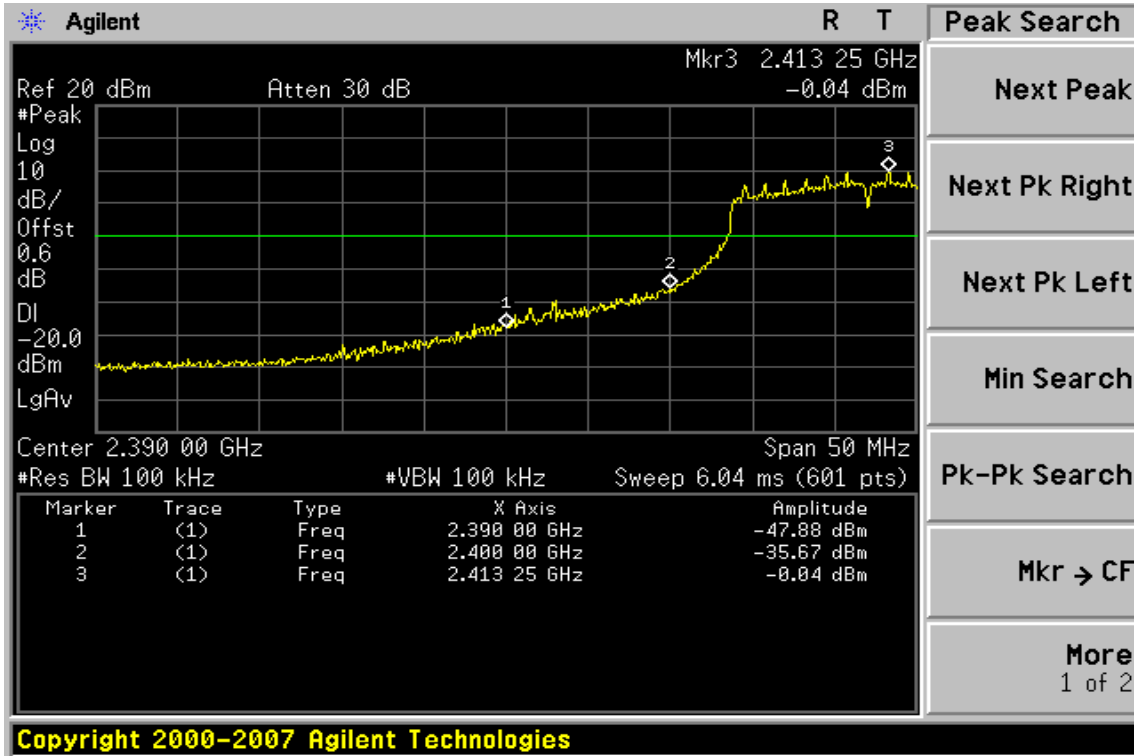
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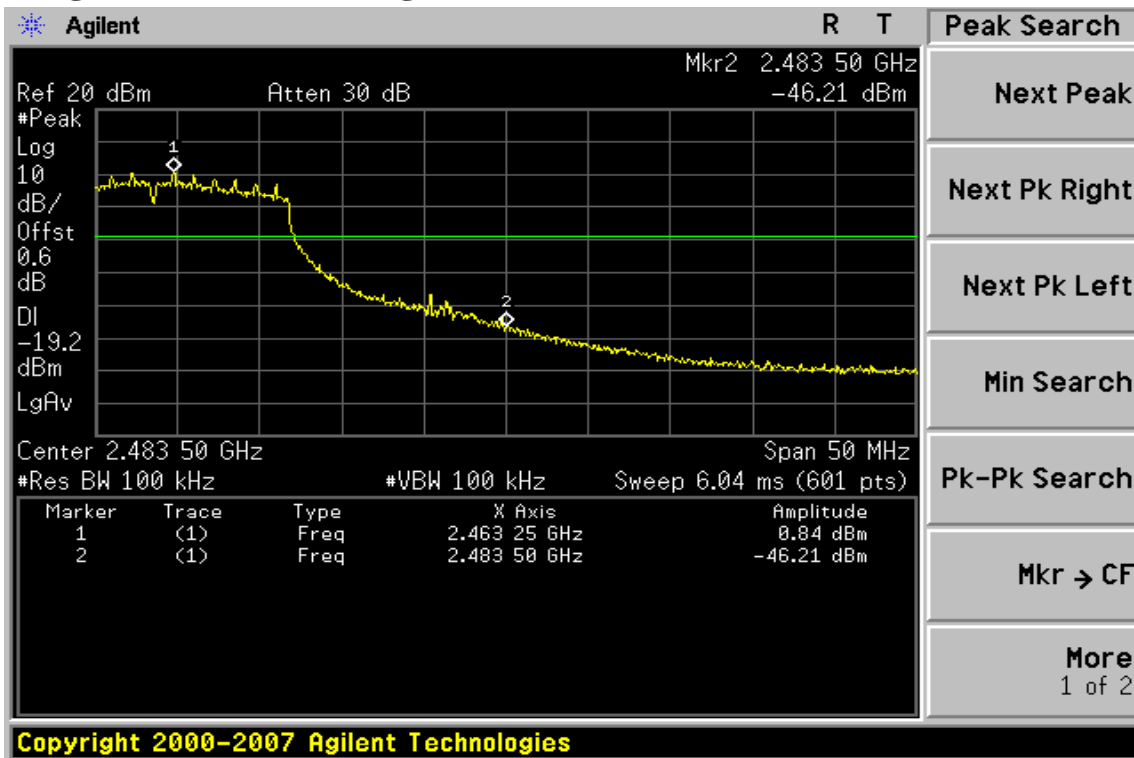
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### 802.11g

### 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 Sep. 14, 2010  
 Test By Jason  
 Pol Ver.

Freq. (MHz)	Peak	AV	Ant./CL CF (dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2385.90	62.41	45.98	-0.69	61.72	45.29	74.00	54.00	-8.71	AV
2390.00	62.66	48.56	-0.67	61.99	47.89	74.00	54.00	-6.11	AV

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

Test Date Sep. 14, 2010  
 Test By Jason  
 Pol Hor.

Freq. (MHz)	Peak	AV	Ant./CL CF (dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2389.10	70.18	53.17	-0.69	69.49	52.48	74.00	54.00	-1.52	AV
2390.00	67.14	52.89	-0.67	66.47	52.22	74.00	54.00	-1.78	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 Sep. 14, 2010  
 Test By Jason  
 Pol Ver.

Freq. (MHz)	Peak	AV	Ant./CL CF (dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2483.56	61.20	47.44	-0.52	60.68	46.92	74.00	54.00	-7.08	AV

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

Test Date Sep. 14, 2010  
 Test By Jason  
 Pol Hor.

Freq. (MHz)	Peak	AV	Ant./CL CF (dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
2483.56	67.11	52.55	-0.52	66.59	52.03	74.00	54.00	-1.97	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:

Conducted mode refer to WLAN module report Number: FR9D0210-01AA

Radiated mode : Refer to page spectrum analyzer data chart and tabular data sheets.

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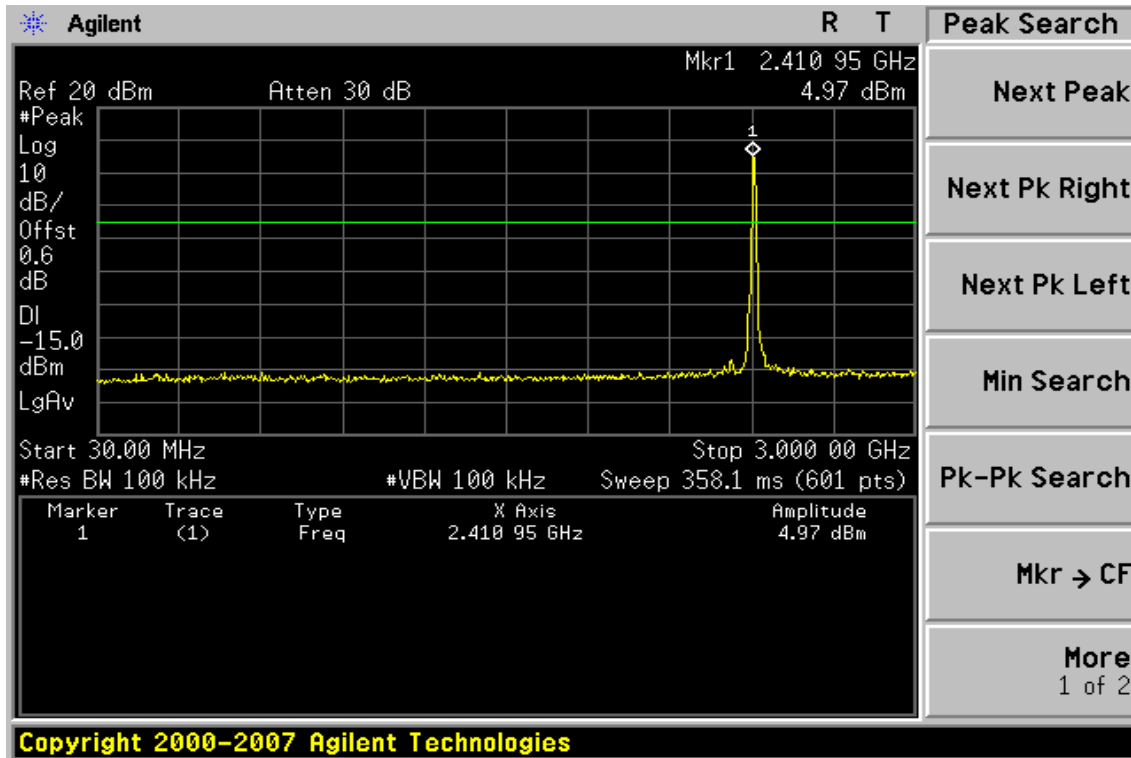
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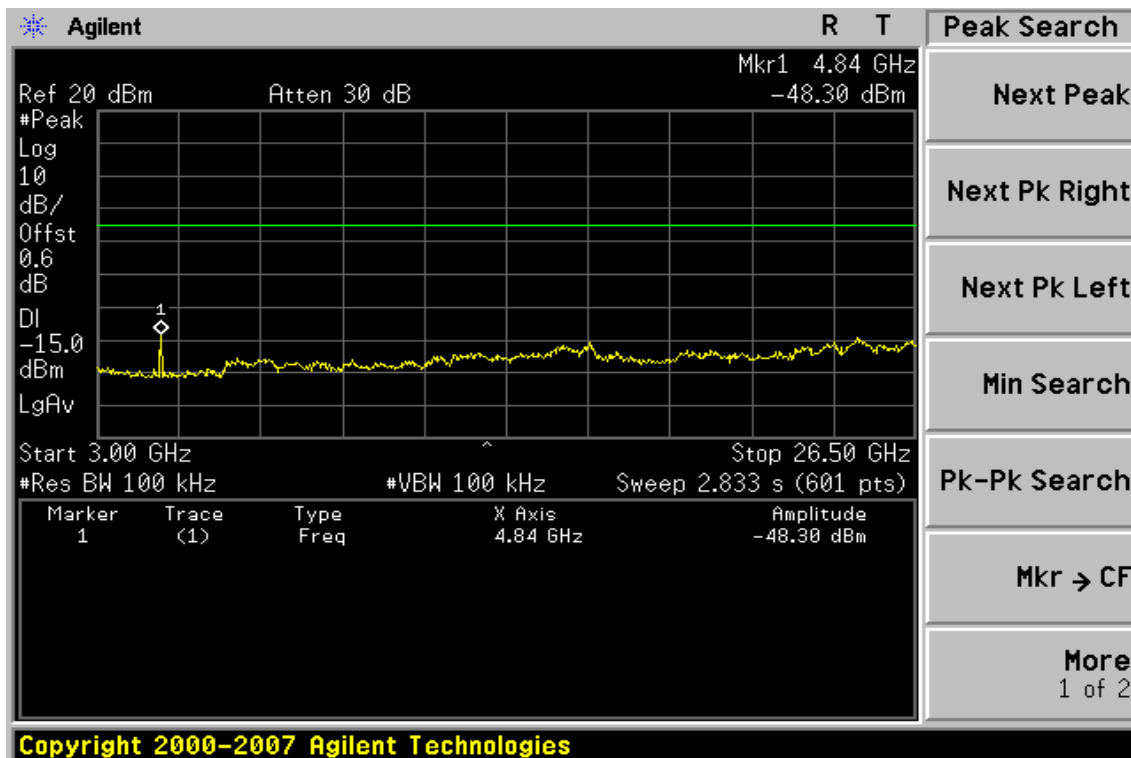


### Conducted Spurious Emission Measurement Result (802.11b)

#### Ch Low 30MHz – 3GHz



#### Ch Low 3GHz – 26.5GHz

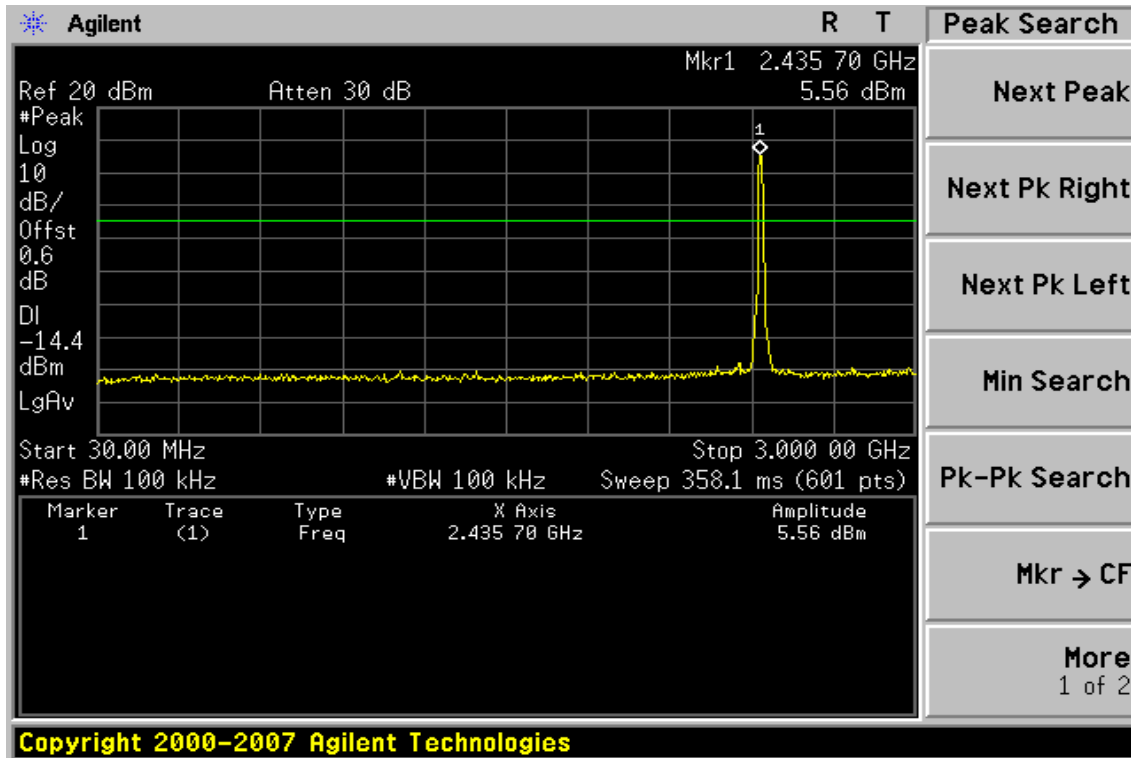


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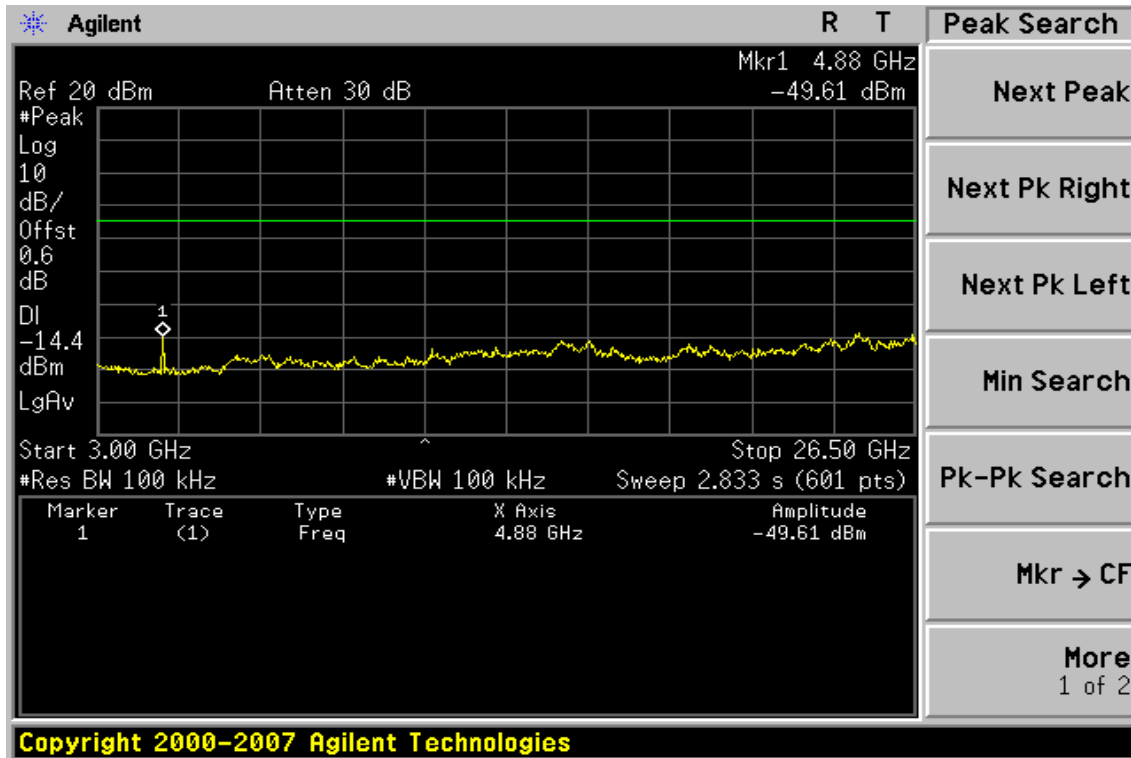
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Ch Mid 30MHz – 3GHz



Ch Mid 3GHz – 26.5GHz

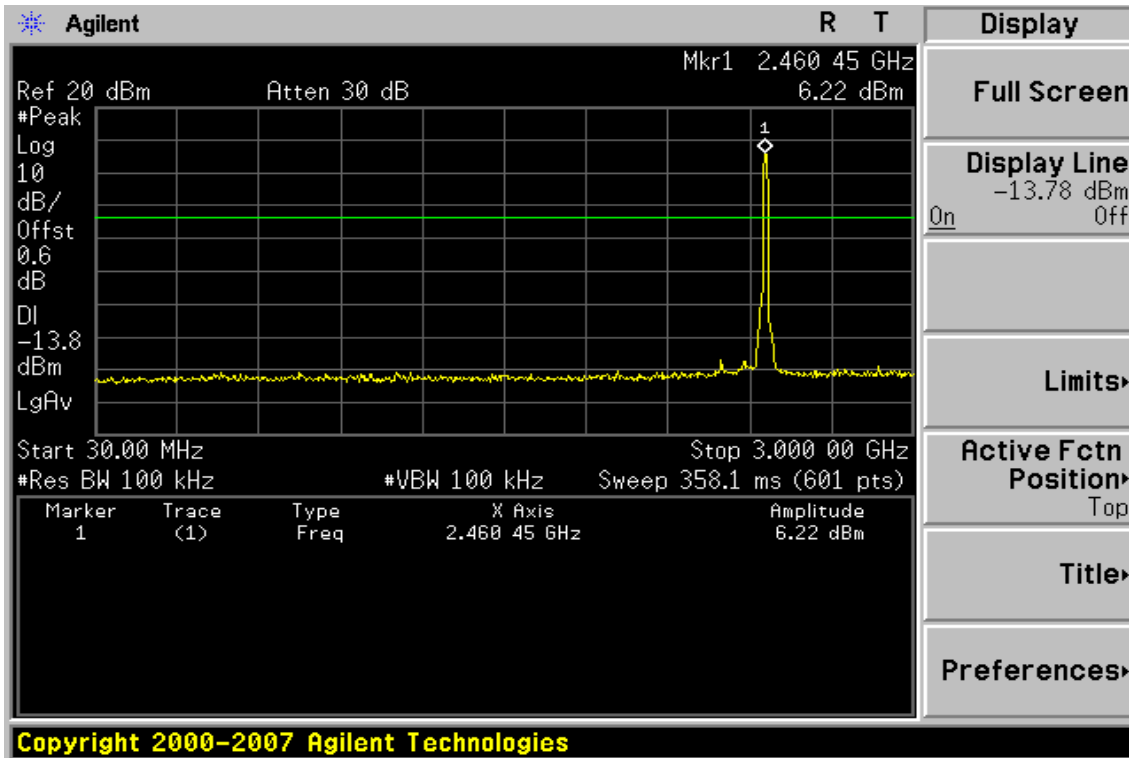


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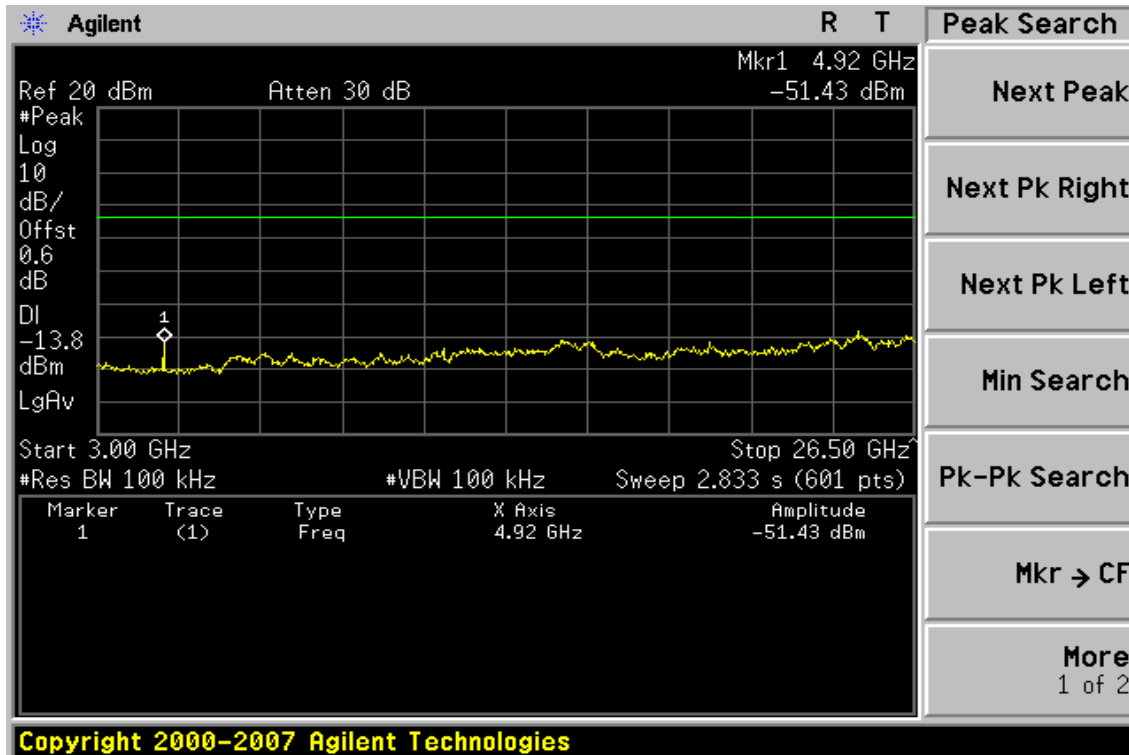
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**Ch High 30MHz – 3GHz**



**Ch High 3GHz – 26.5GHz**

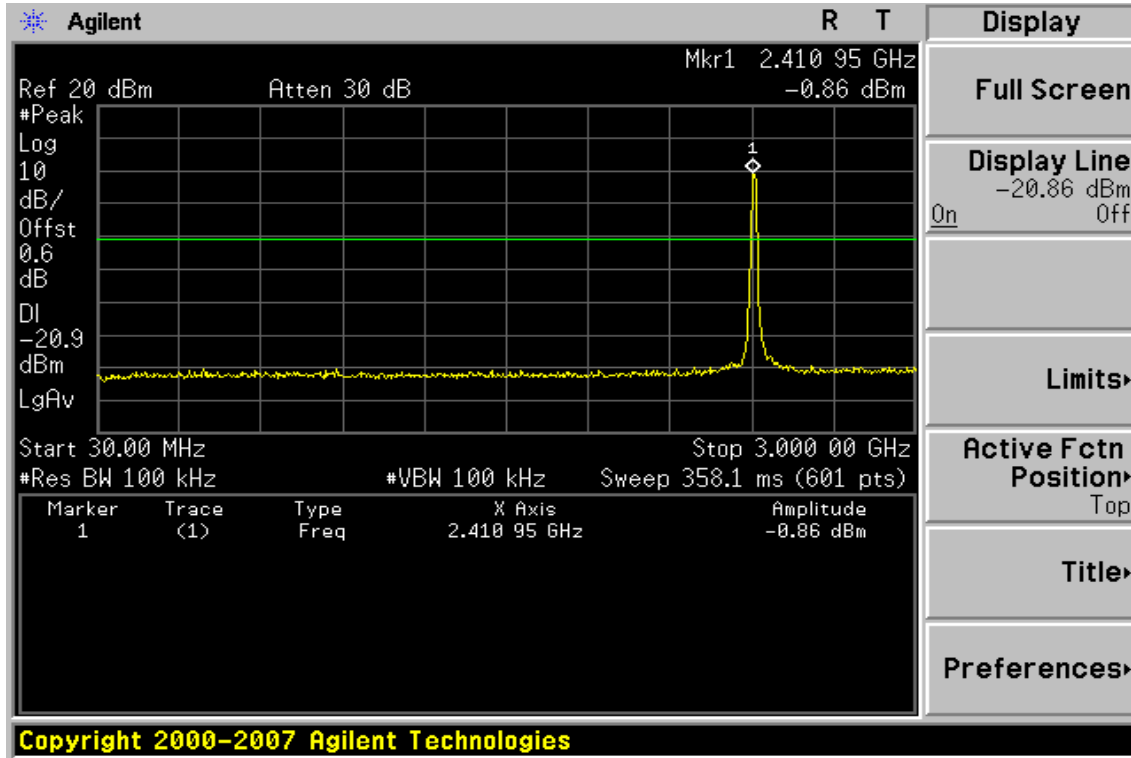


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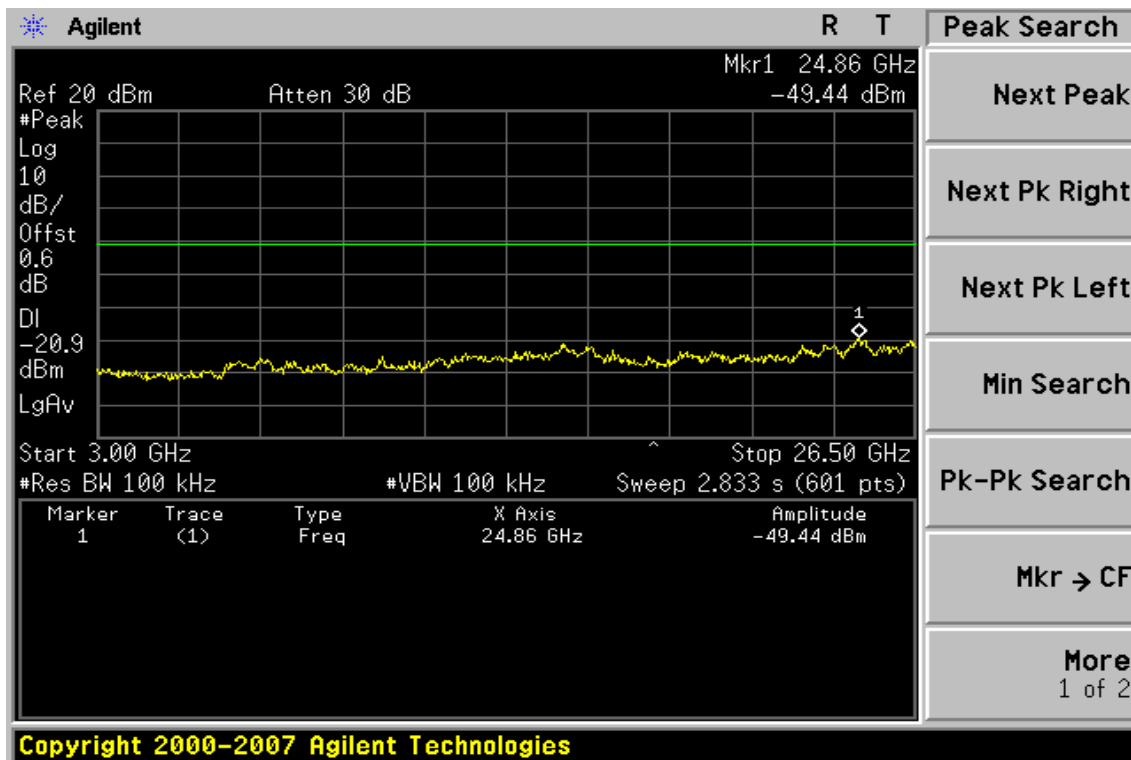
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### Conducted Spurious Emission Measurement Result (802.11g) Ch Low 30MHz – 3GHz



### Ch Low 3GHz – 26.5GHz

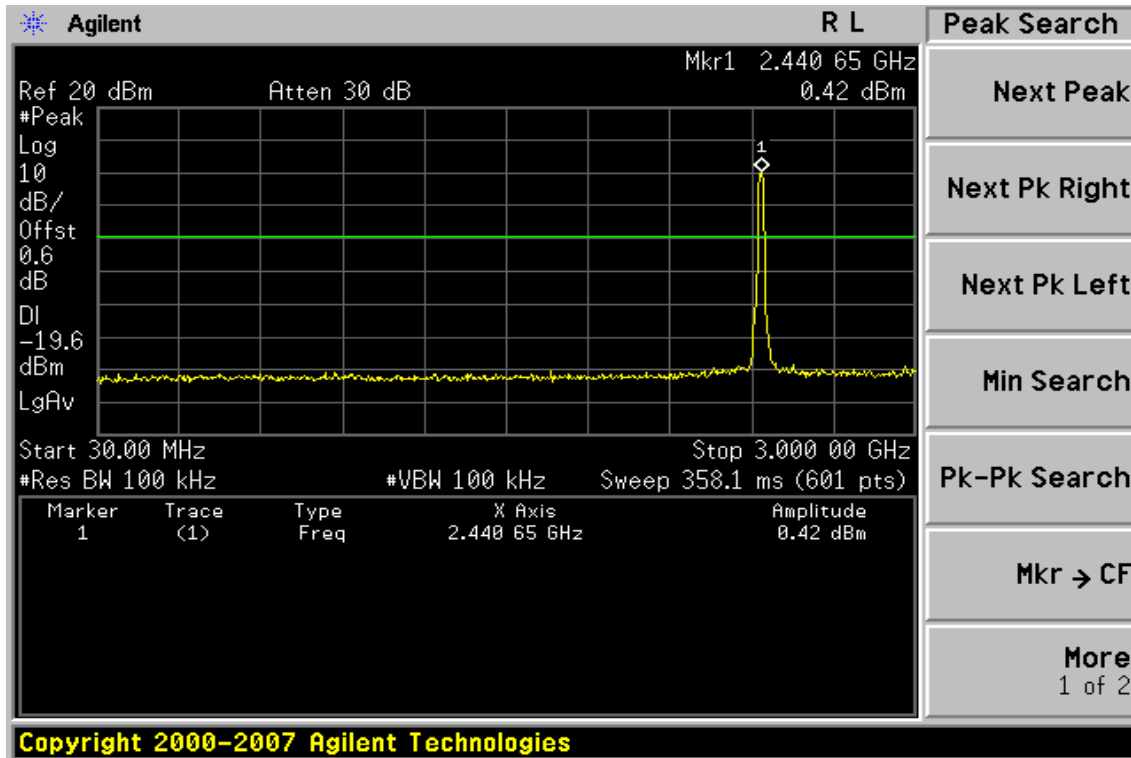


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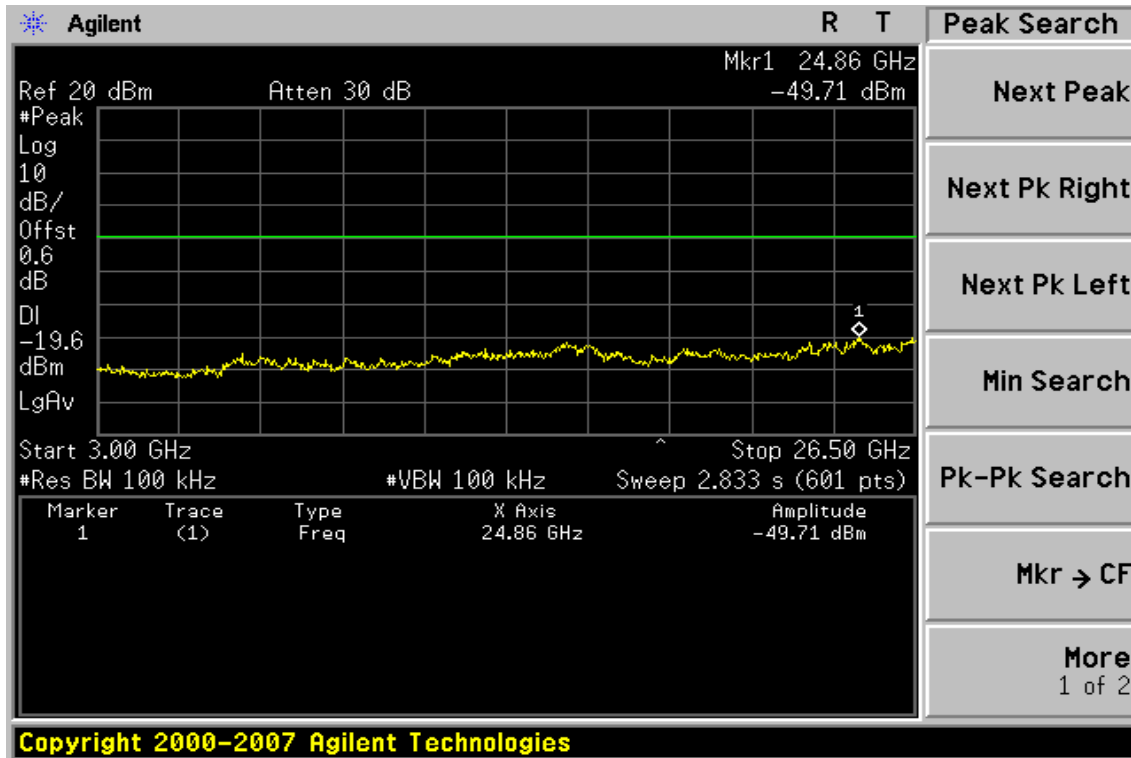
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**Ch Mid 30MHz – 3GHz**



**Ch Mid 3GHz – 26.5GHz**

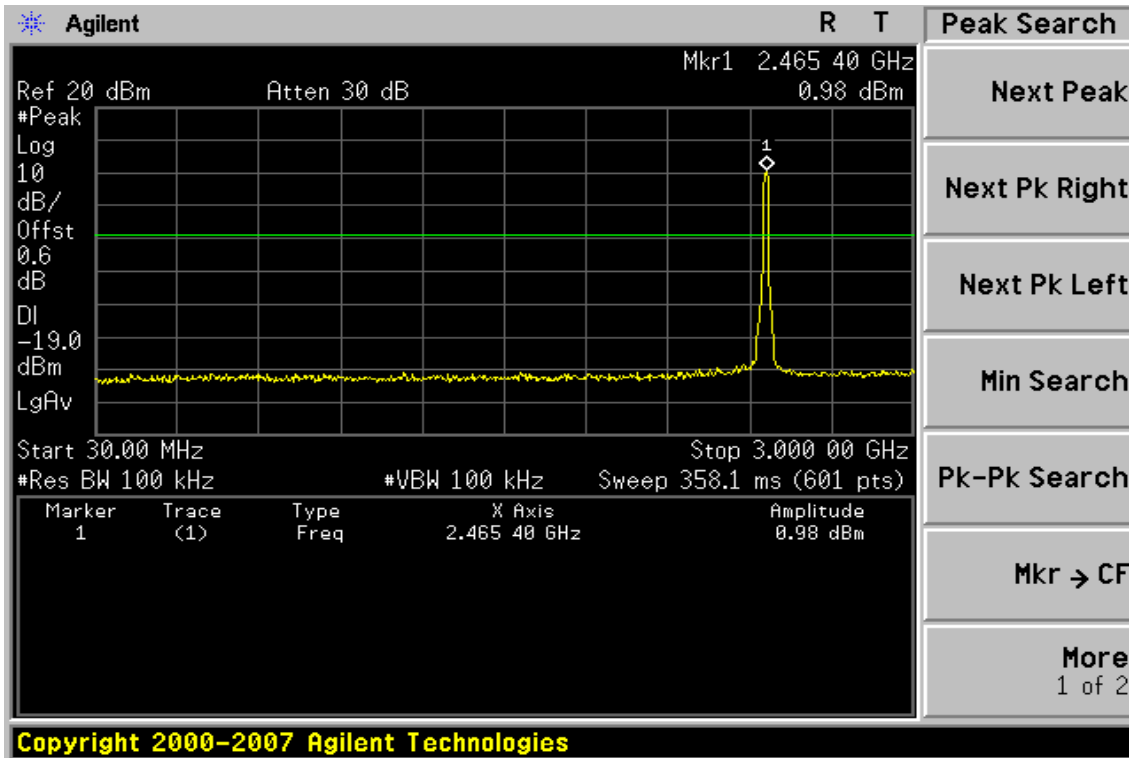


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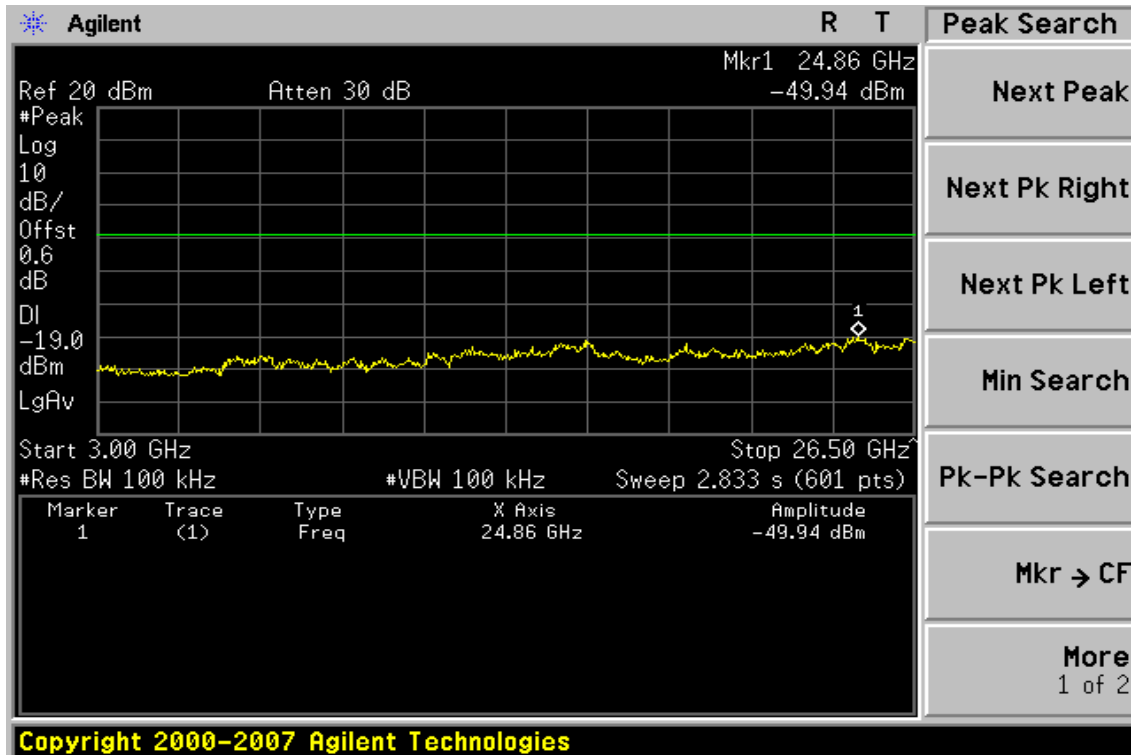
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### Ch High 30MHz – 3GHz



### 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	Sep. 14, 2010
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)
30.00	V	Peak	44.59	-14.25	30.34	40.00	-9.66
604.24	V	Peak	33.85	-6.97	26.88	46.00	-19.12
759.44	V	Peak	33.93	-4.22	29.71	46.00	-16.29
325.85	H	Peak	40.69	-11.92	28.77	46.00	-17.23
687.66	H	Peak	34.40	-5.43	28.97	46.00	-17.03
759.44	H	Peak	36.86	-4.22	32.64	46.00	-13.36

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 (below 1GHz) (802.11b)**

Operation Mode	802.11b TX CH Mid	Test Date	Sep. 14, 2010
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)
30.00	V	Peak	45.09	-14.25	30.84	40.00	-9.16
616.85	V	Peak	34.10	-6.68	27.42	46.00	-18.58
742.95	H	Peak	35.39	-4.47	30.92	46.00	-15.08
871.96	H	Peak	36.23	-2.86	33.37	46.00	-12.63
959.26	H	Peak	33.77	-1.54	32.23	46.00	-13.77

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 (below 1GHz) (802.11b)**

Operation Mode	802.11b TX CH High	Test Date	Sep. 14, 2010
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)
30.00	V	Peak	43.59	-14.25	29.34	40.00	-10.66
740.04	V	Peak	33.67	-4.51	29.16	46.00	-16.84
30.00	H	Peak	34.61	-14.25	20.36	40.00	-19.64
626.55	H	Peak	34.01	6.47	40.48	46.00	-5.52
849.65	H	Peak	33.61	-3.22	30.39	46.00	-15.61

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 (below 1GHz) (802.11g)**

Operation Mode	802.11g TX CH Low	Test Date	Sep. 14, 2010
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)
30.00	V	Peak	43.84	-14.25	29.59	40.00	-10.41
668.26	V	Peak	33.13	-5.70	27.43	46.00	-18.57
30.00	H	Peak	34.61	-14.25	20.36	40.00	-19.64
820.55	H	Peak	33.07	-3.43	29.64	46.00	-16.36
949.56	H	Peak	32.94	-1.58	31.36	46.00	-14.64

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 (below 1GHz) (802.11g)**

Operation Mode	802.11g TX CH Mid	Test Date	Sep. 14, 2010
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)
30.00	V	Peak	44.01	-14.25	29.76	40.00	-10.24
726.46	V	Peak	33.76	-4.82	28.94	46.00	-17.06
949.56	V	Peak	33.39	-1.58	31.81	46.00	-14.19
30.00	H	Peak	34.36	-14.25	20.11	40.00	-19.89
723.55	H	Peak	33.37	-4.88	28.49	46.00	-17.51
912.70	H	Peak	32.70	-2.05	30.65	46.00	-15.35

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 (below 1GHz) (802.11g)**

Operation Mode	802.11g TX CH High	Test Date	Sep. 14, 2010
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)
30.00	V	Peak	43.78	-14.25	29.53	40.00	-10.47
633.34	V	Peak	33.52	-6.27	27.25	46.00	-18.75
914.64	V	Peak	33.49	-2.02	31.47	46.00	-14.53
30.00	H	Peak	35.05	-14.25	20.80	40.00	-19.20
590.66	H	Peak	33.59	-7.26	26.33	46.00	-19.67
817.64	H	Peak	33.41	-3.49	29.92	46.00	-16.08

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	Sep. 14, 2010
Fundamental Frequency	2412MHz	Test By	Jason
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4824.0	45.45	---	5.30	50.75	---	74.00	54.00	-3.25	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	Sep. 14, 2010
Fundamental Frequency	2412MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4824.0	41.57	---	5.30	46.87	---	74.00	54.00	-7.13	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	Sep. 14, 2010
Fundamental Frequency	2437MHz	Test By	Jason
Temperature	25 °C	Pol	Ver
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4874.0	44.86	---	5.42	50.28	---	74.00	54.00	-3.72	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	Sep. 14, 2010
Fundamental Frequency	2437MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4874.0	40.72	---	5.42	46.14	---	74.00	54.00	-7.86	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	Sep. 14, 2010
Fundamental Frequency	2462MHz	Test By	Jason
Temperature	25 °C	Pol	Ver
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4924.0	41.61	---	5.56	47.17	---	74.00	54.00	-6.83	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	Sep. 14, 2010
Fundamental Frequency	2462MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4924.0	39.56	---	5.56	45.12	---	74.00	54.00	-8.88	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	Sep. 14, 2010
Fundamental Frequency	2412MHz	Test By	Jason
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4824.0	39.68	---	5.30	44.98	---	74.00	54.00	-9.02	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	Sep. 14, 2010
Fundamental Frequency	2412MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4824.0	40.05	---	5.30	45.35	---	74.00	54.00	-8.65	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	Sep. 14, 2010
Fundamental Frequency	2437MHz	Test By	Jason
Temperature	25 °C	Pol	Ver
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
1812.5	42.30	---	-3.74	38.56	---	74.00	54.00	-15.44	Peak
4874.0	39.27	---	5.42	44.69	---	74.00	54.00	-9.31	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	Sep. 14, 2010
Fundamental Frequency	2437MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4874.0	38.82	---	5.42	44.24	---	74.00	54.00	-9.76	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	Sep. 14, 2010
Fundamental Frequency	2462MHz	Test By	Jason
Temperature	25 °C	Pol	Ver
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4924.0	38.94	---	5.56	44.50	---	74.00	54.00	-9.50	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	Sep. 14, 2010
Fundamental Frequency	2462MHz	Test By	Jason
Temperature	25 °C	Pol	Hor
Humidity	65 %		

Freq. (MHz)	Peak	AV	Ant./CL CF(dB)	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)		
4924.0	38.45	---	5.56	44.01	---	74.00	54.00	-9.99	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.
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- 4 Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, 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.

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**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	-6.82	0.00	-6.82	8
2437	-5.89	0.00	-5.89	8
2462	-5.58	0.00	-5.58	8

**802.11g Mode**

Frequency MHz	RF Power Density Reading (dBm)	Cable loss (dB)	RF Power Density Level (dBm)	Maximum Limit (dBm)
2412	-14.10	0.00	-14.10	8
2437	-13.35	0.00	-13.35	8
2462	-13.01	0.00	-13.01	8

*offset 0.6dB*

Note: Refer to next page for plots.

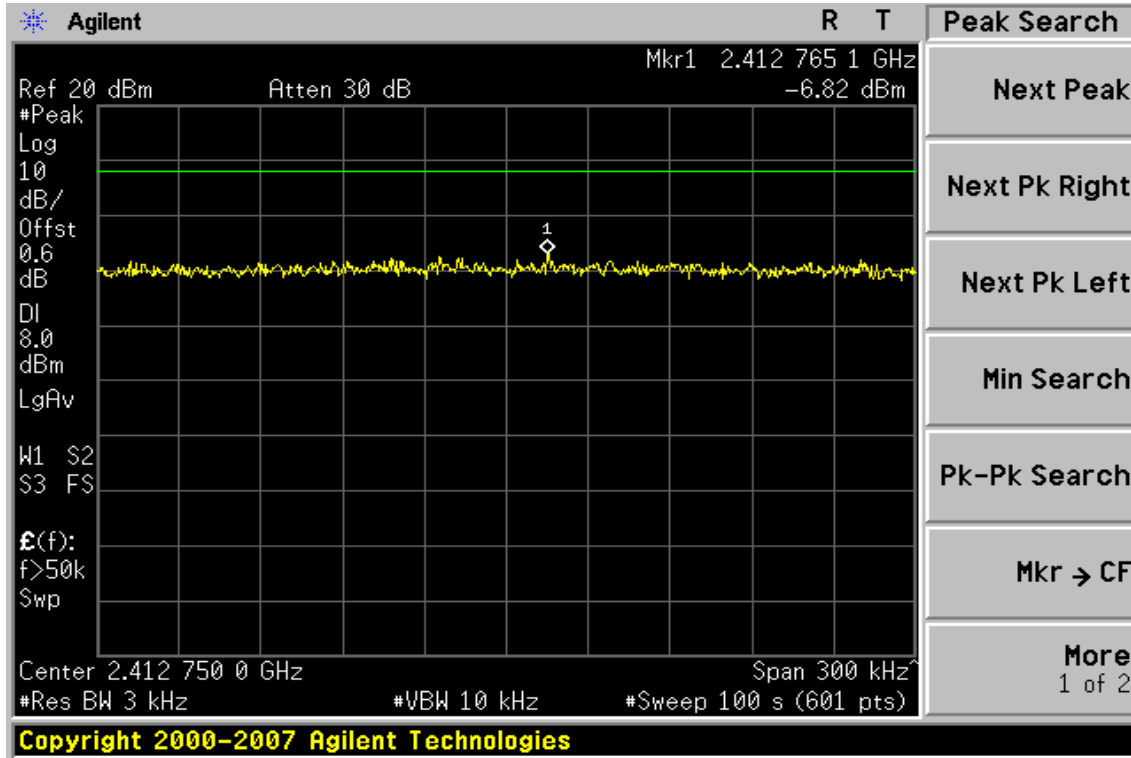
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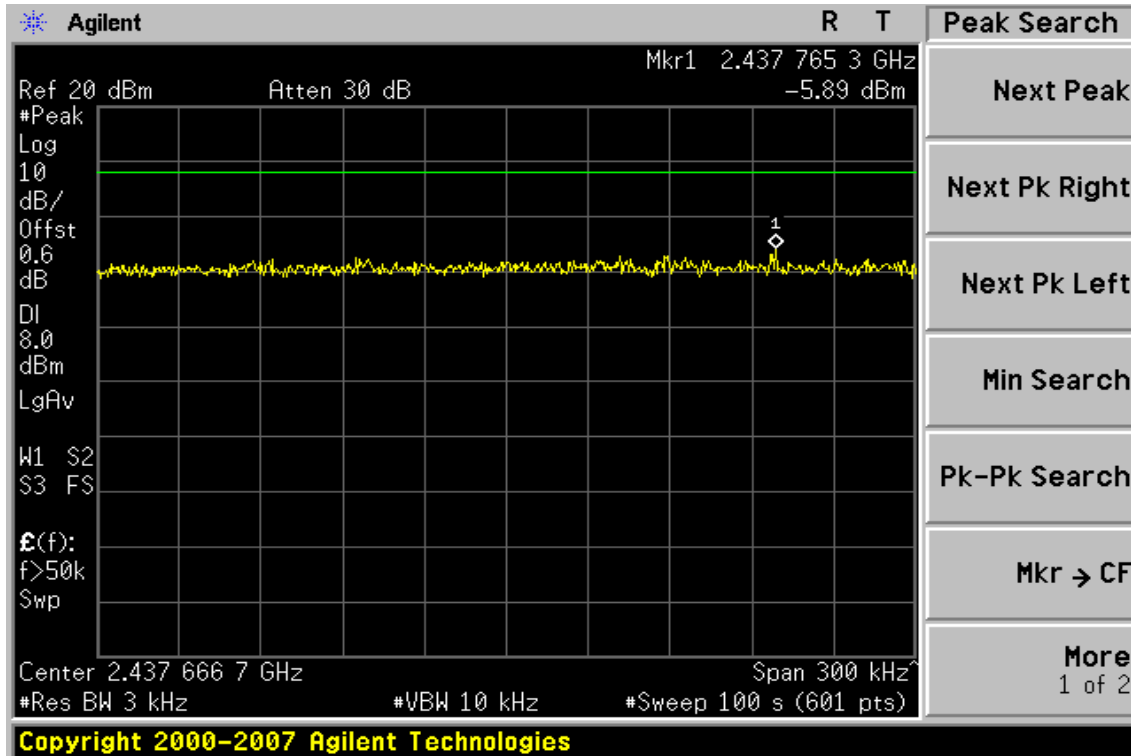
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802.11b

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

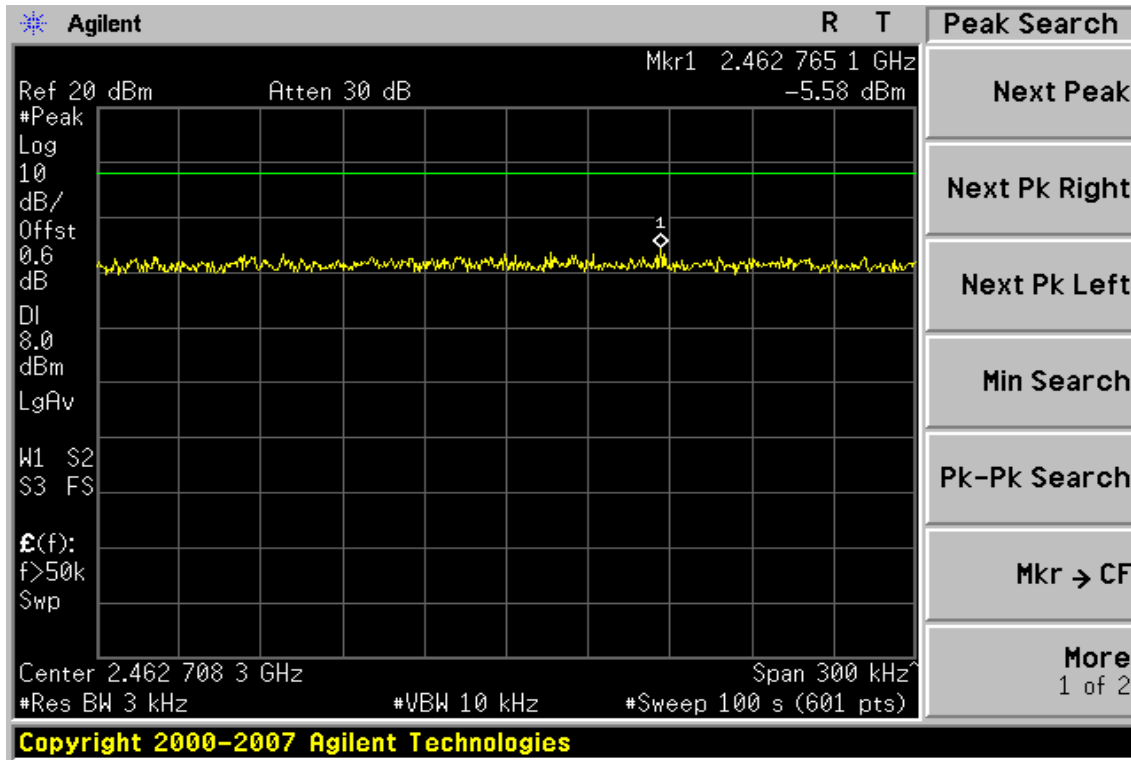


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### Power Spectral Density Test Plot (CH-High)



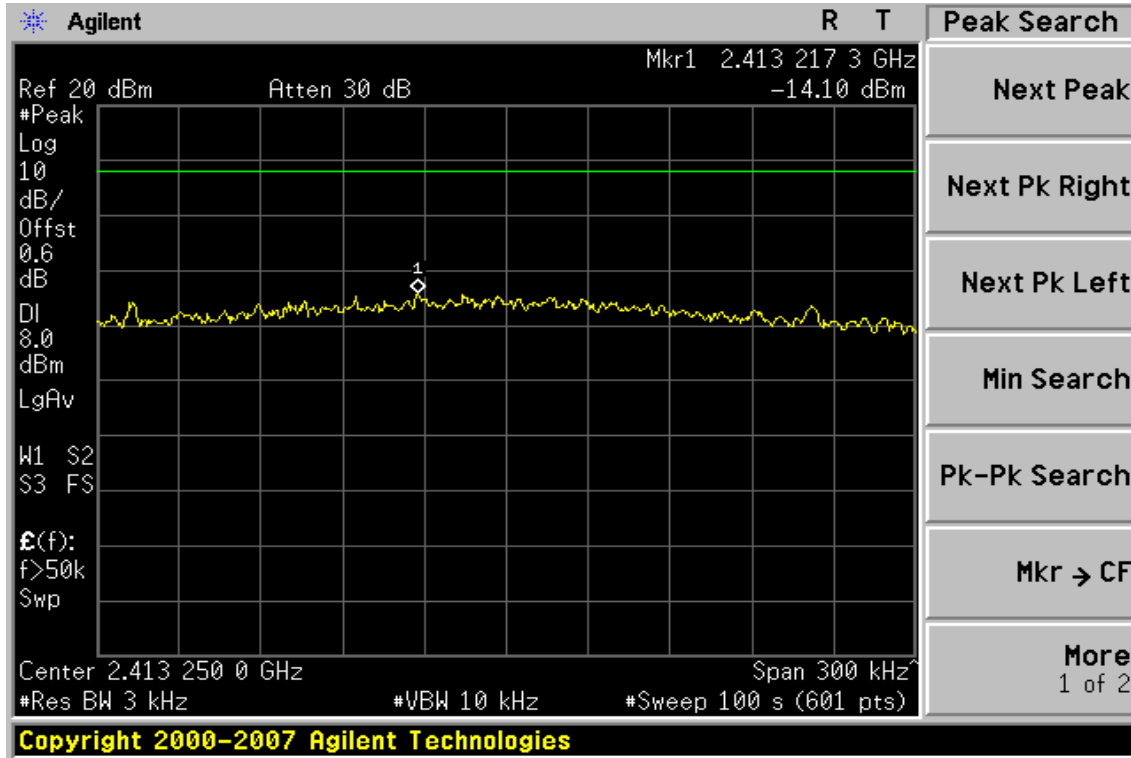
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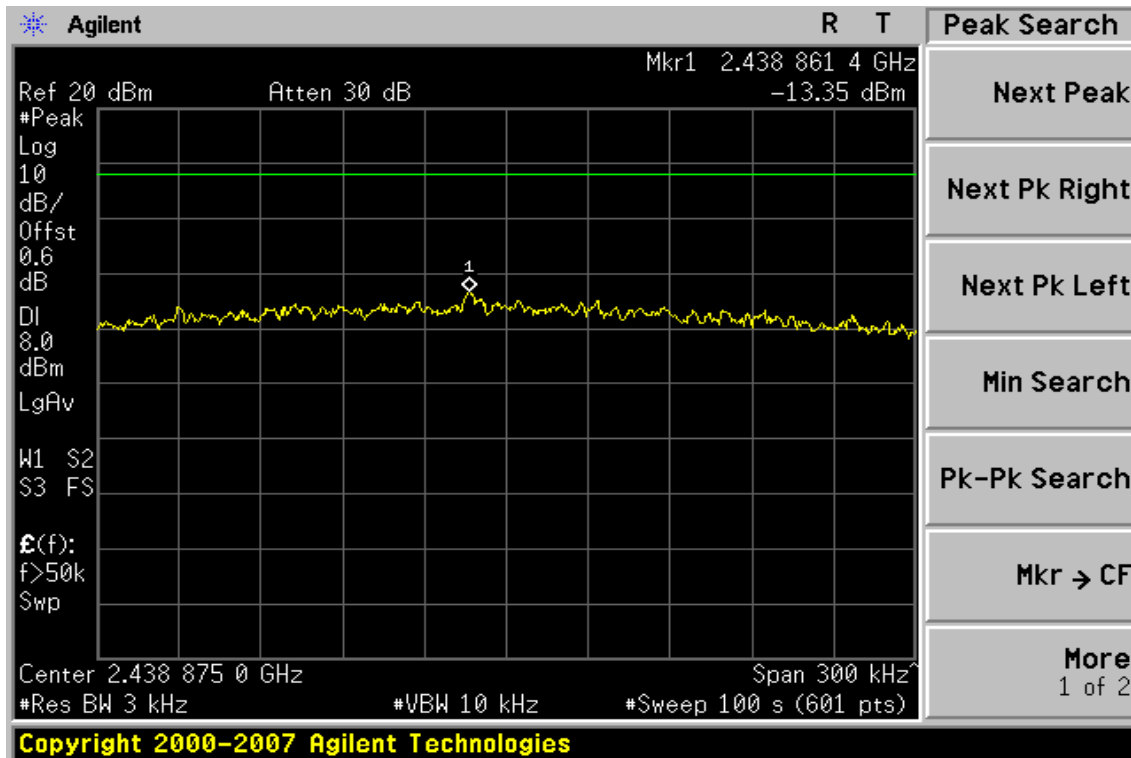
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### 802.11g

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



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

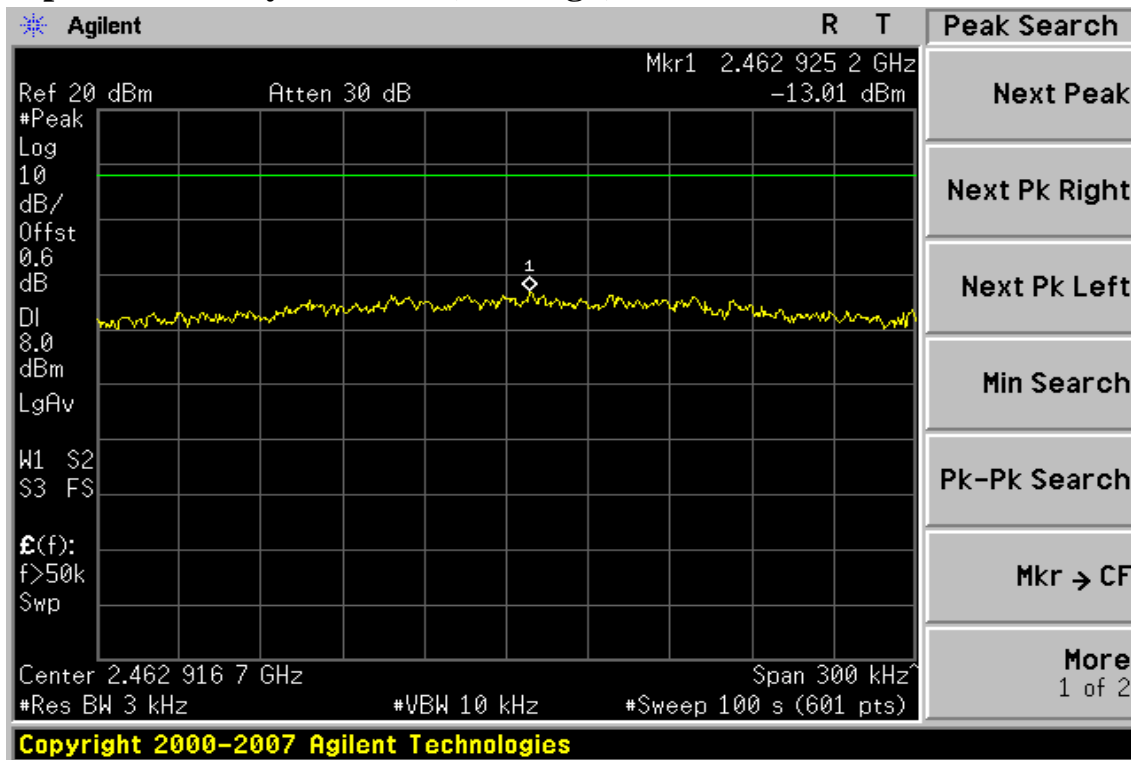


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### Power Spectral Density Test Plot (CH-High)



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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 -0.02dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

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