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# **ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name:	Wireless Foto Transmitter
Brand Name:	N/A
Model Name:	WFT510
Model Different:	N/A
FCC ID:	W5386DWT01000
Report No.:	ER/2009/20031
Issue Date:	Apr. 02, 2009
Rule Part:	§15.247
Prepared for:	HiTi Digital, Inc
	20F., No. 100, Sec. 2, Roosevelt RD., Taipei City 100, Taiwan
Prepared by:	SGS Taiwan Ltd.
	<b>Electronics &amp; Communication Laboratory</b>
	No. 134, Wu Kung Rd., Wuku Industrial
	Zone, Taipei County, Taiwan



t (886-2) 2299-3279

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FCC ID: W5386DWT01000

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# **VERIFICATION OF COMPLIANCE**

Applicant:	HiTi Digital, Inc
	20F., No. 100, Sec. 2, Roosevelt RD., Taipei City 100, Taiwan
<b>Equipment Under Test:</b>	Wireless Foto Transmitter
Brand Name:	N/A
Model No.:	WFT510
Model Difference:	N/A
FCC ID:	W5386DWT01000
File Number:	ER/2009/20031
Date of test:	Mar. 23, 2009 ~ Mar. 31, 2009
Date of EUT Received:	Mar. 23, 2009

### We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. 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:	Brian Chang	Date:	Apr. 02, 2009	
_	Brian Chang / Engineer			
Prepared By:	Elise Chen	Date:	Apr. 02, 2009	
-	Elisa Chen / Supervisor			_
Approved By:	Timent du	Date:	Apr. 02, 2009	
-	~ /	_		

Vincent Su / Manager

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# Version

Version No. Date		Description
00 Apr. 02, 2009		Initial creation of document

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# 1. GENERAL INFORMATION

#### General:

Product Name:	Wireless Foto Transmitter
Brand Name:	N/A
Model Number:	WFT510
Model Difference:	N/A
Data Cable:	1 provided; Model: N/A Supplier: SUZHOU PETER'S PRECISE INDUSTRIAL CO. LTD
Power Supply:	4.8V from AA battery *4
Hardware Version:	N/A
Software Version:	N/A

#### 802.11 b/g WLAN:

Frequency Range & Channel number:	802.11 b/g: 2412 – 2462 MHz, 11 channels	
Rated Power:	802.11 b: 11.48 dBm (peak) 802.11 g: 11.15 dBm (peak)	
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM	
Transmission Rate:	802.11 b: 1/2/5.5/11 Mbps; 802.11 g: 6/9/12/18/24/36/48/54 Mbps	
Antenna Designation:	Reversed SMA type, Dipole Antenna, 2.0 dBi	
Type of Emission:	802.11 b: 14M9G1D 802.11 g: 16M5D1D	

The EUT is compliance with IEEE 802.11 b/g Standard.

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### **1.1. Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for FCC ID: <u>MM8RHOD210</u> filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with Subpart B is authorized under a Doc procedure.

### **1.2. Test Methodology**

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

### **1.3. 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. 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 are: 990257 and 236194, Canada Registration Number: 4620A-1

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. 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.

#### **1.4. Special Accessories**

Not available for this EUT intended for grant.

### **1.5. 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 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 Configuration of Tested System



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

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	Notebook	IBM	T43	L3LHHN6	Shielded	Un-shield

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# 3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	N/A
§15.247(b) (3),(4)(c)	Peak Output Power	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.247(d)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.247(d)	Spurious Emission	Compliant
§15.247(e)	§15.247(e)Peak Power Density	
§15.203 Antenna Requirement		Compliant

# 4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

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

802.11 b mode: Channel low (2412MHz)  $\sim$  mid (2437MHz) and high (2462MHz) with 1 and 11Mbps data rate were chosen for full testing. The Worst case 1Mbps was reported for radiated spurious emission.

802.11 g mode: Channel low (2412MHz)  $\sim$  mid (2437MHz) and high (2462MHz) with 6 and 54Mbps data rate were chosen for full testing. The Worst case 6Mbps was reported for radiated spurious emission.

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# 5. CONDUCTED EMISSION TEST

### 5.1. Standard Applicable

According to \$15.207. frequency within 150KHz to 30MHz shall not exceed the Limit table as below.

Frequency range		mits (uV)			
MHz	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. 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 rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 3. The LISN was connected with 110Vac/60Hz power source.

### 5.3. Measurement Procedure

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



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### **5.4. Measurement Equipment Used:**

Conducted Emission Test Site					
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
EMI Test Receiver	R&S	ESCS30	828985/004	09/16/2008	09/15/2009
LISN	Rolf-Heine	NNB-2/16Z	99012	04/28/2008	04/27/2009
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	04/28/2008	04/27/2009
Coaxial Cables	N/A	WK CE Cable	N/A	10/30/2008	10/29/2009

### 5.5. Measurement Result

N/A

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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.



### 6.2. Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Channel power function, RBW= 1MHz, VBW = 3MHz, Bandwidth=26dB occupied Bandwidth)
- 3. Record the max. reading.
- 4. Repeat above procedures until all frequency measured were complete.

#### 6.3. Measurement Equipment Used:

Conducted Emission Test Site										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.					
ТҮРЕ		NUMBER	NUMBER	CAL.						
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	07/05/2008	07/04/2009					
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2009	01/04/2010					
Attenuator	Mini-Circuit	BW-S6W5	001	07/05/2008	07/04/2009					
Attenuator	Mini-Circuit	BW-S10W5	001	07/05/2008	07/04/2009					
Attenuator	Mini-Circuit	BW-S20W5	001	07/05/2008	07/04/2009					
Splitter	Agilent	11636B	N/A	07/05/2008	07/04/2009					

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### 6.4. Measurement Result

#### Test Results (802.11b):

Cabl	e loss = 0	Peak Power Output				
	Frequency		Rate			
СН	(MHz)	1	2	5.5	11	
1	2412	11.48	11.13	10.74	10.25	
6	2437	11.33	11.02	10.68	10.33	
11	2462	11.35	11.01	10.55	10.28	

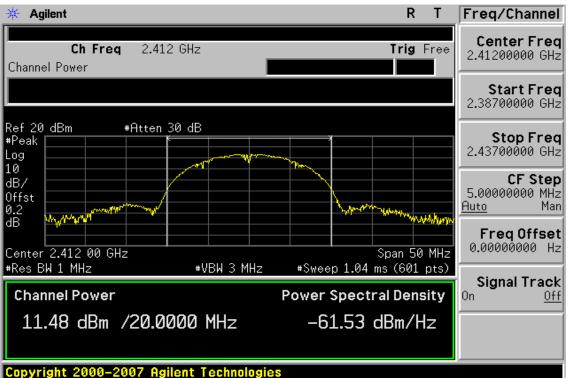
### Test Results (802.11g):

Cabl	e loss = 0	Peak Power Output							
	Frequency				Data	Rate			
СН	(MHz)	6	9	12	18	24	36	48	54
1	2412	11.08	10.94	10.86	10.63	10.49	9.98	9.83	9.59
6	2437	11.15	11.03	10.9	10.76	10.65	10.11	9.96	9.70
11	2462	11.07	10.97	10.83	10.68	10.52	9.95	9.88	9.65

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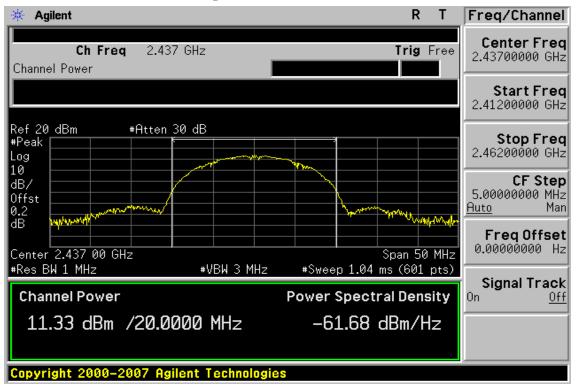


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Peak Power Output Data Plot (CH Low) 802.11b mode

#### Peak Power Output Data Plot (CH Mid) 802.11b mode

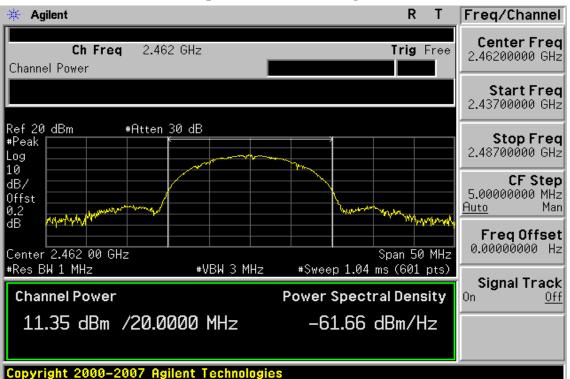


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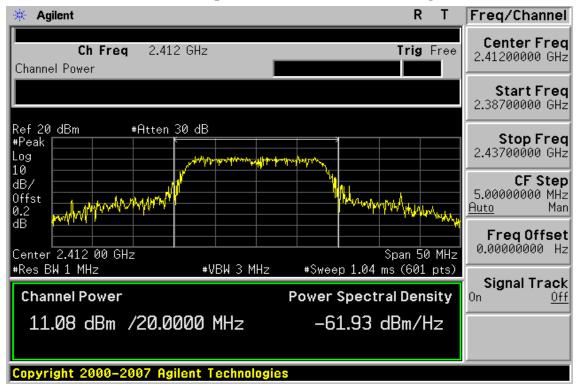


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Peak Power Output Data Plot (CH High) 802.11b mode

Peak Power Output Data Plot (CH Low) 802.11g mode

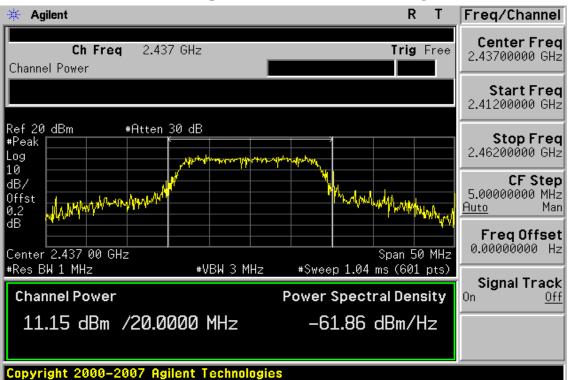


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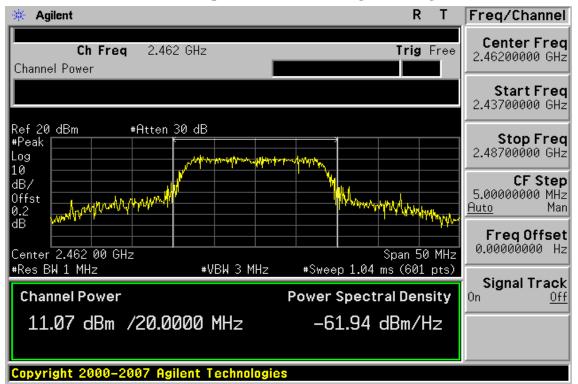


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Peak Power Output Data Plot (CH Mid) 802.11g mode

Peak Power Output Data Plot (CH High) 802.11g mode



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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 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=1% bandwidth, VBW =3\* RBW, Span= 50MHz, Sweep=auto
- 4. Mark the peak frequency and –6dB (upper and lower) frequency.
- 5. Repeat above procedures until all frequency measured were complete.

Conducted Emission Test Site									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
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	07/05/2008	07/04/2009				
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2009	01/04/2010				
Attenuator	Mini-Circuit	BW-S6W5	001	07/05/2008	07/04/2009				
Attenuator	Mini-Circuit	BW-S10W5	001	07/05/2008	07/04/2009				
Attenuator	Mini-Circuit	BW-S20W5	001	07/05/2008	07/04/2009				
Splitter	Agilent	11636B	N/A	07/05/2008	07/04/2009				

### 7.3. Measurement Equipment Used:

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### 7.4. Measurement Result

#### Test Results (802.11b):

СН	Bandwidth (MHz)	Limit Bandwidth (KHz)	Result
2412	10.121	> 500	PASS
2437	10.116	> 500	PASS
2462	9.626	> 500	PASS

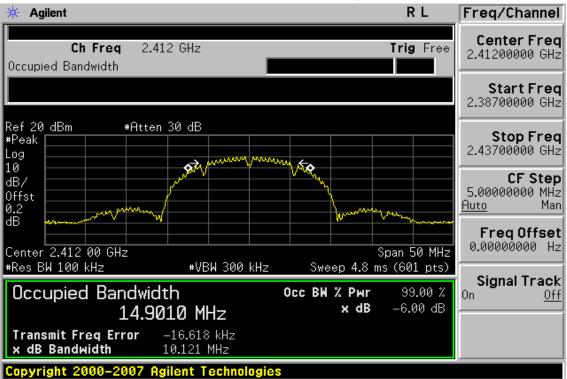
#### Test Results (802.11g):

СН	Bandwidth (MHz)	Limit Bandwidth (KHz)	Result
2412	16.637	> 500	PASS
2437	16.616	> 500	PASS
2462	16.610	> 500	PASS

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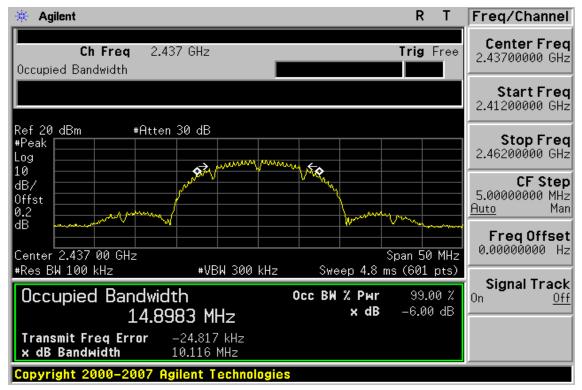


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#### 6dB Band Width Test Data CH-Low, 802.11b mode

6dB Band Width Test Data CH-Mid, 802.11b mode

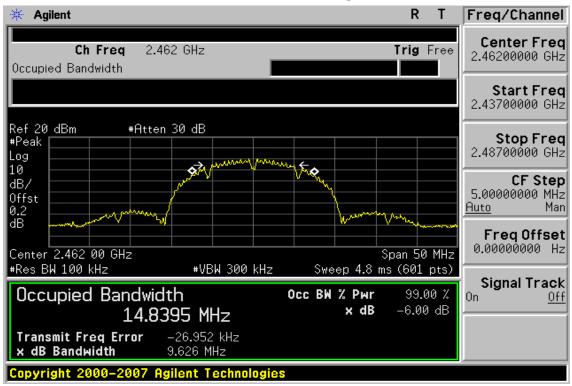


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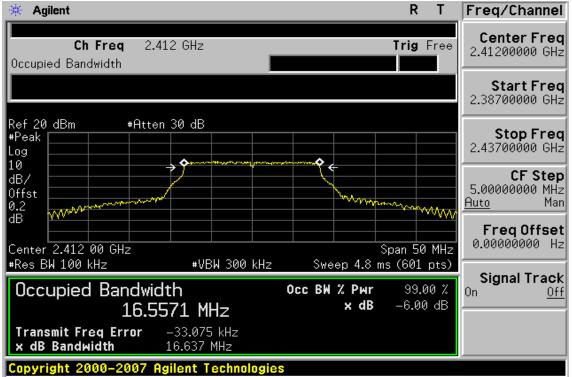


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#### 6dB Band Width Test Data CH-High, 802.11b mode

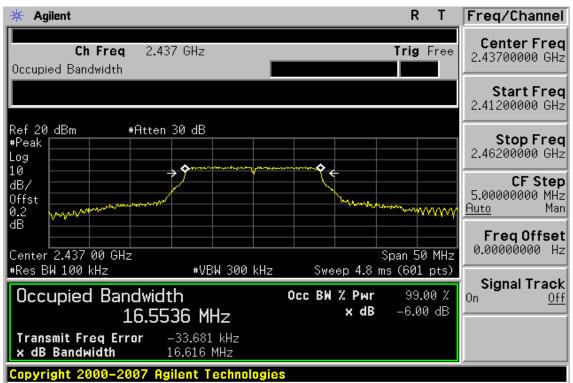




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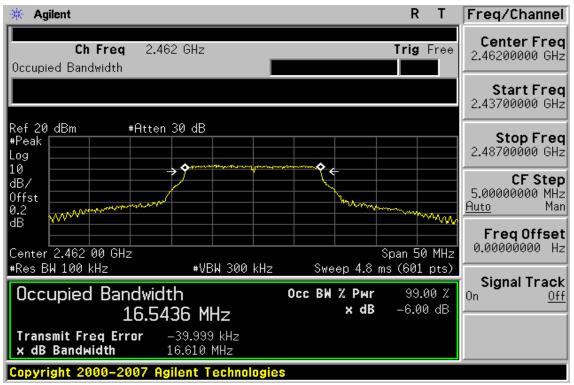


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#### 6dB Band Width Test Data CH-Mid, 802.11g mode

#### 6dB Band Width Test Data CH-High, 802.11g mode



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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 in 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 in15.209(a).

### **8.2. Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set center frequency of spectrum analyzer = operating frequency.
- 4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=30MHz, 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.

### 8.3. Measurement Equipment Used:

Conducted Emission Test Site										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.					
ТҮРЕ		NUMBER	NUMBER	CAL.						
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	07/05/2008	07/04/2009					
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2009	01/04/2010					
Attenuator	Mini-Circuit	BW-S6W5	001	07/05/2008	07/04/2009					
Attenuator	Mini-Circuit	BW-S10W5	001	07/05/2008	07/04/2009					
Attenuator	Mini-Circuit	BW-S20W5	001	07/05/2008	07/04/2009					
Splitter	Agilent	11636B	N/A	07/05/2008	07/04/2009					

# 8.4. Measurement Result

Refer to attach spectrum analyzer data chart.

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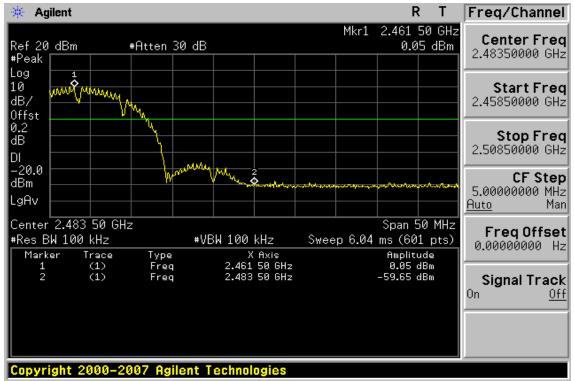
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# Band Edges Test Data CH-Low, 802.11b mode



### Band Edges Test Data CH-High, 802.11b mode

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#### **Radiated Emission:**

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

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(d Bu V)	(dBuV)	CF(dB)	(d Bu V/m)	(dBuV/m)	(d Bu V/m)	dBuV/n	n) ( <b>dB</b> )	
2389.60	45.55		-10.76	34.79		74.00	54.00	-19.21	Peak
Operation	Mode	TX C	H Low 80	)2.11b mod	e	Test	Date	Mar. 25, 2	009
Fundamen	tal Frequei	ncy 2412	MHz			Test	By	Brian	
Temperatu	re	25 °C				Pol		Hor.	
Humidity		65 %							
	Peak	AV		Actu	al FS	Peak	AV		
Freq.	<b>Reading</b>	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(d Bu V)	(dBuV)	CF(dB)	(d Bu V/m)	(dBuV/m)	) (d Bu V/m)(	dBuV/n	n) (dB)	
2389.60	43.21		-10.76	32.45		74.00	54.00	-21.55	Peak

Remark :

- (1) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 6dB 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 ° When measured Peak value is under AV Limit, It doesn't need to measure AV value again.

(3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.

(4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



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#### **Radiated Emission:**

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

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	<b>Reading</b>	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(d Bu V)	(dBuV)	CF(dB)	(d Bu V/m)	(dBuV/m)	) (d Bu V/m)	(dBuV/m	( <b>dB</b> )	
2483.70	41.84		-10.46	31.38		74.00	54.00	-22.62	Peak
2490.60	45.09		-10.40	34.69		74.00	54.00	-19.31	Peak
Operation Fundamen	Mode tal Frequei		CH High 80 MHz	02.11b mod	e	Test Test		Mar. 25, 2 Brian	009
Temperatu	ire	25 °C				Pol		Hor.	
Humidity		65 %							
	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(d Bu V)	(dBuV)	CF(dB)	(d Bu V/m)	(dBuV/m)	) (d Bu V/m)(	(dBuV/n	n) ( <b>dB</b> )	
2483.50	41.77		-10.46	31.31		74.00	54.00	-22.69	Peak

Remark :

- (1) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 6dB 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 ° When measured Peak value is under AV Limit, It doesn't need to measure AV value again.

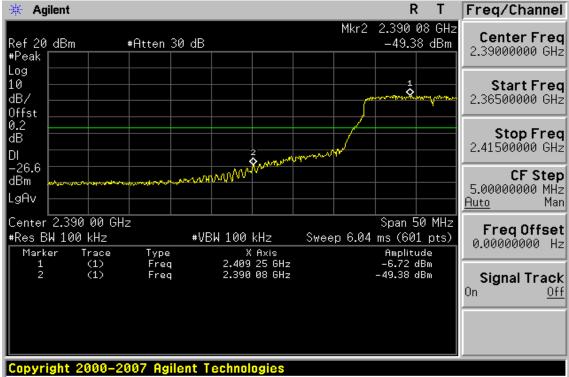
(3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.

(4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



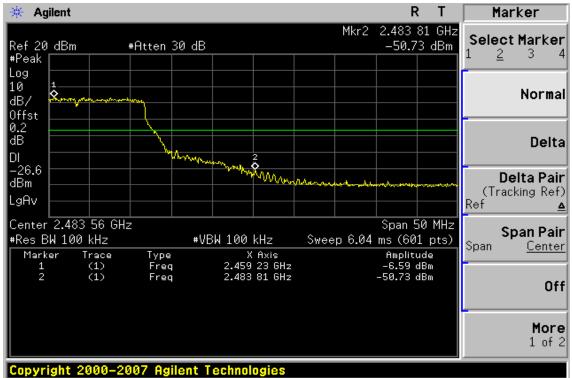
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Band Edges Test Data CH-High, 802.11g mode

t (886-2) 2299-3279



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#### **Radiated Emission:**

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

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(d Bu V)	(dBuV)	CF(dB)	(d Bu V/m)	(dBuV/m)	(d Bu V/m)(	dBuV/n	n) ( <b>dB</b> )	
2390.00	46.85		-10.76	36.09		74.00	54.00	-17.91	Peak
Operation Fundament Temperatu Humidity	tal Frequer		MHz	)2.11g mod	e	Test Test Pol	By	Mar. 25, 20 Brian Hor.	09
	Peak	AV		Actu	ial FS	Peak	AV		
Freq.	<b>Reading</b>	R ead ing	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	) (d Bu V/m)	(dBuV/n	n) (dB)	

2390.10	44.47	 -10.76	33.71	 74.00	54.00	-20.29	Peak

#### Remark:

- (1) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 6dB 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 ° When measured Peak value is under AV Limit, It doesn't need to measure AV value again.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



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#### **Radiated Emission:**

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

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	<b>Reading</b>	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(d Bu V)	(dBuV)	CF(dB)	(d Bu V/m)	(dBuV/m)	(d Bu V/m)	(dBuV/m	( <b>dB</b> )	
2483.45	43.58		-10.46	33.12		74.00	54.00	-20.88	Peak
2491.35	47.44		-10.40	37.04		74.00	54.00	-16.96	Peak
Operation Fundament Temperatu	tal Frequei		MHz	02.11g mod	e	Test Test Pol	By	Mar. 25, 20 Brian Hor.	009
Humidity		65 %							
	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(d Bu V)	(dBuV)	CF(dB)	(d Bu V/m)	(dBuV/m)	) (d Bu V/m)(	(dBuV/m	<b>)</b> ( <b>dB</b> )	
2483.70	41.98		-10.46	31.52		74.00	54.00	-22.48	Peak

#### Remark:

- (1) Data of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 6dB 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 ° When measured Peak value is under AV Limit, It doesn't need to measure AV value again.
- (3) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting : 1GHz- 26GHz, 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(c), 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. EUT Setup

- 1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-2003.
- 2. The EUT was put in the front of the test table. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 3. The spacing between the peripherals was 10 centimeters.
- 4. External I/O cables were draped along the edge of the test table and bundle when necessary.

### 9.3. Measurement Procedure

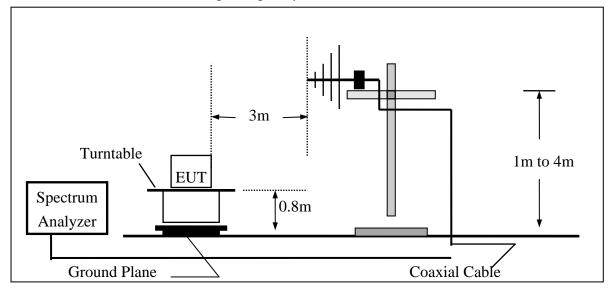
- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 4. Maximum procedure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



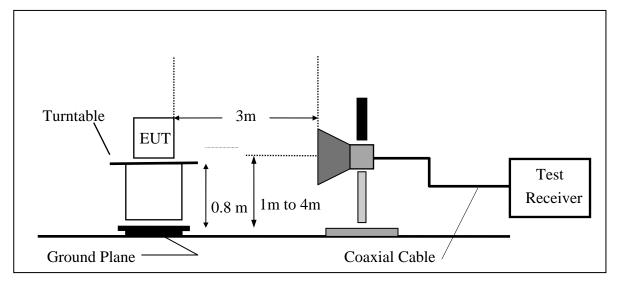
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# 9.4. Test SET-UP (Block Diagram of Configuration)

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



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



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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			
Loop antenna	MESSTEC	FLA30	03/10086	06/06/2007	06/05/2009			
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			

### 9.5. Measurement Equipment Used:

### 9.6. Field Strength Calculation

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

 $\mathbf{FS} = \mathbf{RA} + \mathbf{AF} + \mathbf{CL} - \mathbf{AG}$ 

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

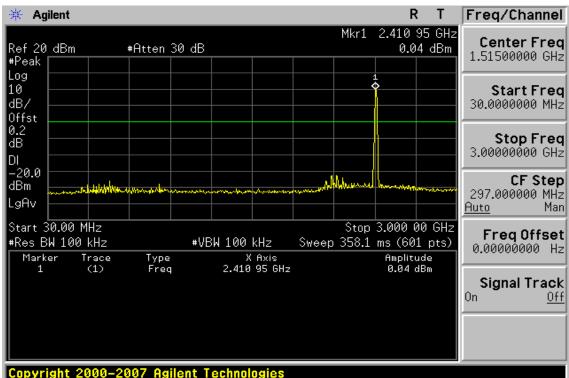
### 9.7. Measurement Result

Refer to attach tabular data sheets.

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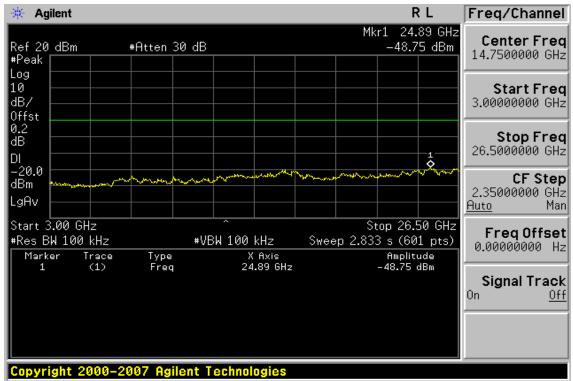


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# Conducted Spurious Emission Measurement Result (802.11b) Ch Low 30MHz – 3GHz





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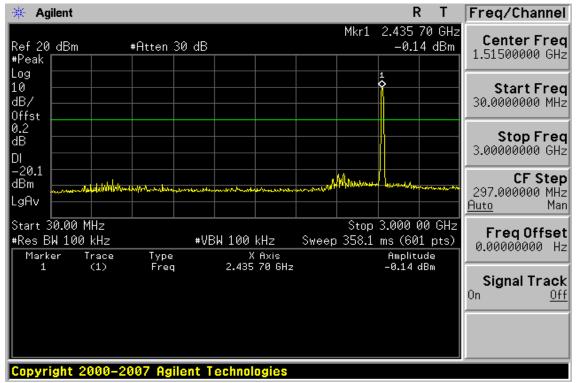
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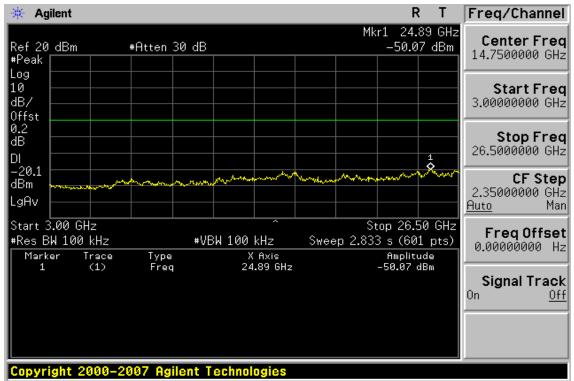


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# Ch Mid 30MHz – 3GHz



### Ch Mid 3GHz – 26.5GHz

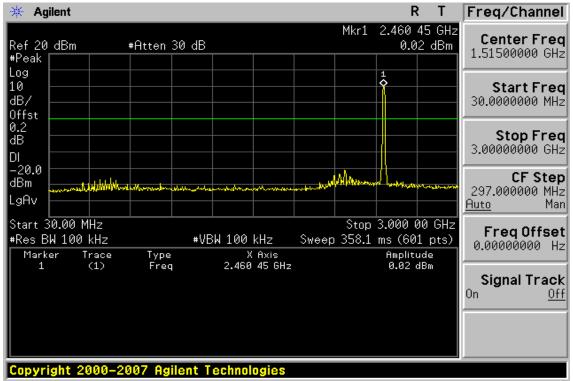


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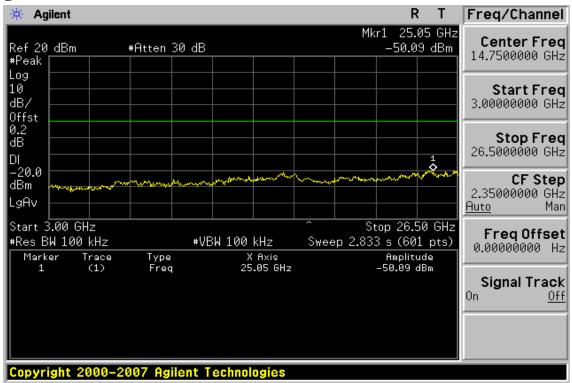


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# Ch High 30MHz – 3GHz



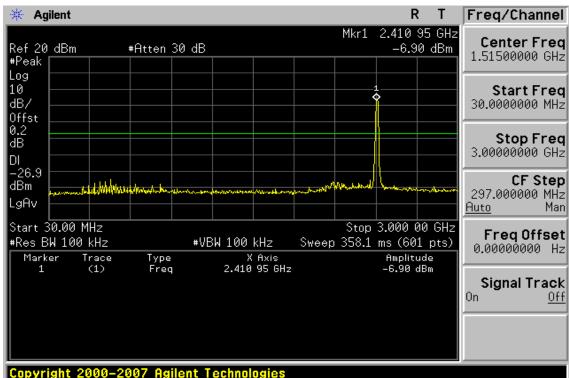
#### Ch High 3GHz – 26.5GHz



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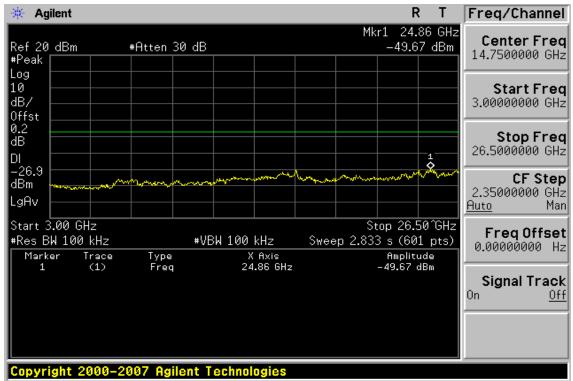


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# Conducted Spurious Emission Measurement Result (802.11g) Ch Low 30MHz – 3GHz





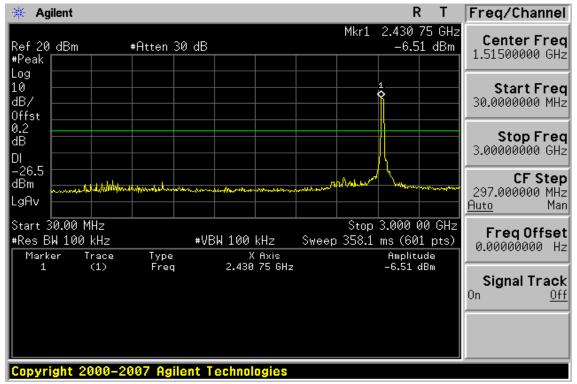
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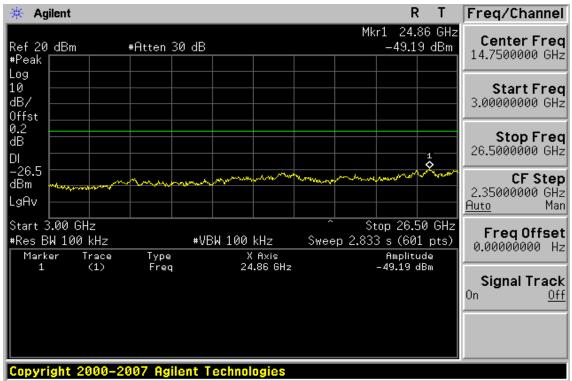


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# Ch Mid 30MHz – 3GHz



# Ch Mid 3GHz – 26.5GHz

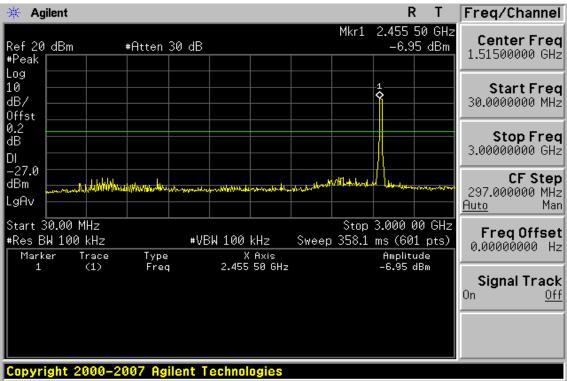


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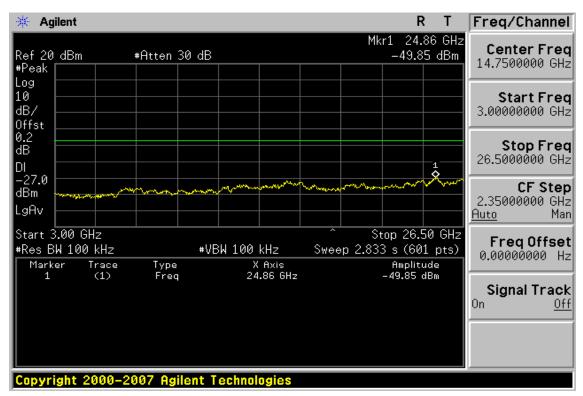


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# Ch High 30MHz – 3GHz



# 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 1Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2412MHz	Test By	Brian
Temperature	25 °C	Pol	Ver./Hor
Humidity	60 %		

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
85.29	V	Peak	61.68	-30.75	30.93	40.00	-9.07
240.49	V	Peak	57.96	-29.89	28.07	46.00	-17.93
293.84	V	Peak	55.97	-28.67	27.30	46.00	-18.70
798.24	V	Peak	51.67	-20.21	31.46	46.00	-14.54
909.79	V	Peak	55.46	-18.87	36.59	46.00	-9.41
960.23	V	Peak	49.23	-18.36	30.87	54.00	-23.13
184.23	Н	Peak	58.96	-30.00	28.96	43.50	-14.54
227.88	Н	Peak	58.21	-30.24	27.97	46.00	-18.03
295.78	Н	Peak	57.16	-28.63	28.53	46.00	-17.47
798.24	Н	Peak	50.94	-20.21	30.73	46.00	-15.27
909.79	Н	Peak	56.29	-18.87	37.42	46.00	-8.58
960.23	Н	Peak	50.49	-18.36	32.13	54.00	-21.87

### Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz  $\,\circ\,$
- (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 1Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2437MHz	Test By	Brian
Temperature	<b>25</b> ℃	Pol	Ver./Hor
Humidity	60 %		

	Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
_	(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
	58.13	V	Peak	56.88	-26.67	30.21	40.00	-9.79
	240.49	V	Peak	58.85	-29.89	28.96	46.00	-17.04
	293.84	V	Peak	55.48	-28.67	26.81	46.00	-19.19
	798.24	V	Peak	51.97	-20.21	31.76	46.00	-14.24
	909.79	V	Peak	49.31	-18.87	30.44	46.00	-15.56
	960.23	V	Peak	47.93	-18.36	29.57	54.00	-24.43
	179.38	Н	Peak	56.90	-29.22	27.68	43.50	-15.82
	232.73	Н	Peak	57.80	-30.08	27.72	46.00	-18.28
	295.78	Н	Peak	57.66	-28.63	29.03	46.00	-16.97
	431.58	Н	Peak	51.67	-25.29	26.38	46.00	-19.62
	798.24	Н	Peak	53.00	-20.21	32.79	46.00	-13.21
	960.23	Н	Peak	50.77	-18.36	32.41	54.00	-21.59

### Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz  $\circ$
- (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 1Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2462MHz	Test By	Brian
Temperature	<b>25</b> ℃	Pol	Ver./Hor
Humidity	60 %		

	Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
_	(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
	58.13	V	Peak	56.39	-26.67	29.72	40.00	-10.28
	85.29	V	Peak	59.99	-30.75	29.24	40.00	-10.76
	240.49	V	Peak	58.41	-29.89	28.52	46.00	-17.48
	293.84	V	Peak	56.57	-28.67	27.90	46.00	-18.10
	798.24	V	Peak	51.54	-20.21	31.33	46.00	-14.67
	909.79	V	Peak	56.47	-18.87	37.60	46.00	-8.40
	179.38	Н	Peak	57.63	-29.22	28.41	43.50	-15.09
	293.84	Н	Peak	57.44	-28.67	28.77	46.00	-17.23
	431.58	Н	Peak	51.89	-25.29	26.60	46.00	-19.40
	798.24	Н	Peak	51.70	-20.21	31.49	46.00	-14.51
	909.79	Н	Peak	56.40	-18.87	37.53	46.00	-8.47
	960.23	Н	Peak	50.13	-18.36	31.77	54.00	-22.23

- (1) Measuring frequencies from 30 MHz to the 1GHz  $\circ$
- (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 6Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2412MHz	Test By	Brian
Temperature	25 °C	Pol	Ver./Hor
Humidity	60 %		

	Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
_	(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
	56.19	V	Peak	58.23	-26.51	31.72	40.00	-8.28
	140.58	V	Peak	56.93	-27.44	29.49	43.50	-14.01
	227.88	V	Peak	61.15	-30.24	30.91	46.00	-15.09
	383.08	V	Peak	51.96	-26.33	25.63	46.00	-20.37
	798.24	V	Peak	52.95	-20.21	32.74	46.00	-13.26
	909.79	V	Peak	56.82	-18.87	37.95	46.00	-8.05
	184.23	Н	Peak	61.10	-30.00	31.10	43.50	-12.40
	225.94	Н	Peak	60.69	-30.36	30.33	46.00	-15.67
	274.44	Н	Peak	58.97	-29.18	29.79	46.00	-16.21
	798.24	Н	Peak	51.05	-20.21	30.84	46.00	-15.16
	906.88	Н	Peak	53.18	-18.90	34.28	46.00	-11.72
	960.23	Н	Peak	49.92	-18.36	31.56	54.00	-22.44

### Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz  $\circ$
- (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 6Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2437MHz	Test By	Brian
Temperature	25 °C	Pol	Ver./Hor
Humidity	60 %		

	Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
_	(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
	58.13	V	Peak	58.40	-26.67	31.73	40.00	-8.27
	85.29	V	Peak	60.76	-30.75	30.01	40.00	-9.99
	140.58	V	Peak	57.18	-27.44	29.74	43.50	-13.76
	240.49	V	Peak	59.04	-29.89	29.15	46.00	-16.85
	798.24	V	Peak	52.37	-20.21	32.16	46.00	-13.84
	906.88	V	Peak	52.58	-18.90	33.68	46.00	-12.32
	184.23	Н	Peak	59.84	-30.00	29.84	43.50	-13.66
	227.88	Н	Peak	59.69	-30.24	29.45	46.00	-16.55
	295.78	Н	Peak	57.19	-28.63	28.56	46.00	-17.44
	798.24	Н	Peak	50.80	-20.21	30.59	46.00	-15.41
	909.79	Н	Peak	55.31	-18.87	36.44	46.00	-9.56
	960.23	Н	Peak	50.59	-18.36	32.23	54.00	-21.77

### Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz  $\,\circ\,$
- (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 6Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2462MHz	Test By	Brian
Temperature	25 °C	Pol	Ver./Hor
Humidity	60 %		

Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
V	Peak	58.56	-26.67	31.89	40.00	-8.11
V	Peak	60.29	-30.75	29.54	40.00	-10.46
V	Peak	59.41	-29.89	29.52	46.00	-16.48
V	Peak	52.22	-20.21	32.01	46.00	-13.99
V	Peak	56.56	-18.90	37.66	46.00	-8.34
V	Peak	49.38	-18.36	31.02	54.00	-22.98
Н	Peak	58.55	-29.22	29.33	43.50	-14.17
Н	Peak	59.71	-30.24	29.47	46.00	-16.53
Н	Peak	57.82	-28.63	29.19	46.00	-16.81
Н	Peak	50.87	-20.21	30.66	46.00	-15.34
Н	Peak	55.26	-18.90	36.36	46.00	-9.64
Н	Peak	49.62	-18.36	31.26	54.00	-22.74
	H/V V V V V V H H H H H	Ant.Pol.ModeH/V(PK/QP)VPeakVPeakVPeakVPeakVPeakVPeakHPeakHPeakHPeakHPeakHPeakHPeakHPeakHPeakHPeakHPeakHPeakHPeakHPeakHPeakHPeak	Ant.Pol. Mode Reading   H/V (PK/QP) (dBuV)   V Peak 58.56   V Peak 60.29   V Peak 59.41   V Peak 52.22   V Peak 56.56   V Peak 56.56   V Peak 56.56   V Peak 59.41   H Peak 56.56   V Peak 56.56   V Peak 59.71   H Peak 59.71   H Peak 57.82   H Peak 50.87   H Peak 50.87   H Peak 50.26	Ant.Pol. Mode Reading Factor   H/V (PK/QP) (dBuV) (dB)   V Peak 58.56 -26.67   V Peak 60.29 -30.75   V Peak 59.41 -29.89   V Peak 52.22 -20.21   V Peak 56.56 -18.90   V Peak 49.38 -18.36   H Peak 59.71 -30.24   H Peak 59.71 -30.24   H Peak 57.82 -28.63   H Peak 50.87 -20.21   H Peak 50.87 -20.21   H Peak 50.87 -20.21   H Peak 50.87 -20.21   H Peak 55.26 -18.90	Ant.Pol.ModeReadingFactorActual FSH/V(PK/QP)(dBuV)(dB)(dBuV/m)VPeak58.56-26.6731.89VPeak60.29-30.7529.54VPeak59.41-29.8929.52VPeak52.22-20.2132.01VPeak56.56-18.9037.66VPeak49.38-18.3631.02HPeak59.71-30.2429.47HPeak57.82-28.6329.19HPeak50.87-20.2130.66HPeak55.26-18.9036.36	Ant.Pol.ModeReadingFactorActual FSLimit3mH/V(PK/QP)(dBuV)(dB)(dBuV/m)(dBuV/m)VPeak58.56-26.6731.8940.00VPeak60.29-30.7529.5440.00VPeak59.41-29.8929.5246.00VPeak52.22-20.2132.0146.00VPeak56.56-18.9037.6646.00VPeak49.38-18.3631.0254.00HPeak58.55-29.2229.3343.50HPeak57.82-28.6329.1946.00HPeak50.87-20.2130.6646.00HPeak50.87-20.2130.6646.00HPeak55.26-18.9036.3646.00

### Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz  $\circ$
- (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 1Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2412MHz	Test By	Brian
Temperature	23 °C	Pol	Ver.
Humidity	54 %		

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )	
4824.00	53.28		-6.01	47.27		75.00	54.00	-6.73	Peak
7236.00									
9648.00									
12060.00									
14472.00									
16884.00									
19296.00									
21708.00									
24120.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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 1Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2412MHz	Test By	Brian
Temperature	23 °C	Pol	Hor
Humidity	54 %		

		Peak	AV		Actu	al FS	Peak	AV		
	Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
_	(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
	4824.00	53.72		-6.01	47.71		75.00	54.00	-6.29	Peak
	7236.00									
	9648.00									
	12060.00									
	14472.00									
	16884.00									
	19296.00									
	21708.00									
	24120.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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 1Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2437MHz	Test By	Brian
Temperature	23 °C	Pol	Ver
Humidity	54 %		

		Peak	AV		Actu	al FS	Peak	AV		
	Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
_	(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )	
	4874.00	52.15		-5.97	46.18		75.00	54.00	-7.82	Peak
	7311.00									
	9748.00									
	12185.00									
	14622.00									
	17059.00									
	19496.00									
	21933.00									
	24370.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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 1Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2437MHz	Test By	Brian
Temperature	23 °C	Pol	Hor
Humidity	54 %		

		Peak	AV		Actu	al FS	Peak	AV		
	Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
_	(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )	
	4874.00	52.47		-5.97	46.50		75.00	54.00	-7.50	Peak
	7311.00									
	9748.00									
	12185.00									
	14622.00									
	17059.00									
	19496.00									
	21933.00									
	24370.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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 1Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2462MHz	Test By	Brian
Temperature	23 °C	Pol	Ver
Humidity	54 %		

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )	
4924.00	51.96		-5.91	46.05		75.00	54.00	-7.95	Peak
7386.00									
9848.00									
12310.00									
14772.00									
17234.00									
19696.00									
22158.00									
24620.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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 1Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2462MHz	Test By	Brian
Temperature	23 °C	Pol	Hor
Humidity	54 %		

	Peak	AV		Actu	al 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)	
4924.00	50.55		-5.91	44.64		75.00	54.00	-9.36	Peak
7386.00									
9848.00									
12310.00									
14772.00									
17234.00									
19696.00									
22158.00									
24620.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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 6Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2412MHz	Test By	Brian
Temperature	<b>25</b> ℃	Pol	Ver.
Humidity	60 %		

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )	
4824.00	52.75		-6.01	46.74		74.00	54.00	-7.26	Peak
7236.00									
9648.00									
12060.00									
14472.00									
16884.00									
19296.00									
21708.00									
24120.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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.



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

Operation Mode	802.11g TX CH Low 6Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2412MHz	Test By	Brian
Temperature	23 °C	Pol	Hor
Humidity	54 %		

	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)
4824.00	52.78		-6.01	46.77		74.00	54.00	-7.23
7236.00								
9648.00								
12060.00								
14472.00								
16884.00								
19296.00								
21708.00								
24120.00								

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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 6Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2437MHz	Test By	Brian
Temperature	23 °C	Pol	Ver
Humidity	54 %		

		Peak	AV		Actu	al FS	Peak	AV		
	Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
_	(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
	4874.00	51.99		-5.97	46.02		74.00	54.00	-7.98	Peak
	7311.00									
	9748.00									
	12185.00									
	14622.00									
	17059.00									
	19496.00									
	21933.00									
	24370.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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 6Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2437MHz	Test By	Brian
Temperature	23 °C	Pol	Hor
Humidity	54 %		

	Peak	AV		Actu	al FS	Peak	AV		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	
	(uDu v)	(uDuv)	CF(uD)	(uDu v/III)	(uDu V/III)	(uDu V/III)	(uDu V/III)	( <b>uD</b> )	
4874.00	52.13		-5.97	46.16		74.00	54.00	-7.84	Peak
7311.00									
9748.00									
12185.00									
14622.00									
17059.00									
19496.00									
21933.00									
24370.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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 6Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2462MHz	Test By	Brian
Temperature	23 °C	Pol	Ver
Humidity	54 %		

		Peak	AV		Actu	al FS	Peak	AV		
	Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
_	(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
	4924.00	51.89		-5.91	45.98		74.00	54.00	-8.02	Peak
	7386.00									
	9848.00									
	12310.00									
	14772.00									
	17234.00									
	19696.00									
	22158.00									
	24620.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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 6Mbps	Test Date	Mar. 25, 2009
Fundamental Frequency	2462MHz	Test By	Brian
Temperature	23 °C	Pol	Hor
Humidity	54 %		

	Peak	AV		Actu	al 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)	
4924.00	51.04		-5.91	45.13		74.00	54.00	-8.87	Peak
7386.00									
9848.00									
12310.00									
14772.00									
17234.00									
19696.00									
22158.00									
24620.00									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (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  $\circ$
- (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.



# **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 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 = 1.5MHz, Sweep=100s
- 4. Record the max. reading.
- 5. Repeat above procedures until all frequency measured were complete.

Conducted Emission Test Site								
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.			
ТҮРЕ		NUMBER	NUMBER	CAL.				
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	07/05/2008	07/04/2009			
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2009	01/04/2010			
Attenuator	Mini-Circuit	BW-S6W5	001	07/05/2008	07/04/2009			
Attenuator	Mini-Circuit	BW-S10W5	001	07/05/2008	07/04/2009			
Attenuator	Mini-Circuit	BW-S20W5	001	07/05/2008	07/04/2009			

# **10.3. Measurement Equipment Used:**

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# **10.4. Measurement Result**

## 802.11b, 1M

СН	<b>RF</b> Power Density	Cable loss	<b>RF</b> Power Density	Maximum Limit
	Reading (dBm)	(dB)	Level (dBm)	(dBm)
2412	-15.35	0.00	-15.35	8
2437	-15.55	0.00	-15.55	8
2462	-15.68	0.00	-15.68	8

Note: offset 0.2dB for insertion loss

### 802.11g, 6M

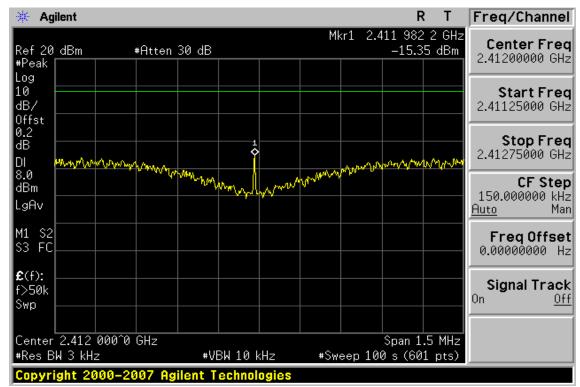
СН	RF Power Density Cable lo		<b>RF</b> Power Density	Maximum Limit
	Reading (dBm)	(dB)	Level (dBm)	(dBm)
2412	-14.35	0.00	-14.35	8
2437	-17.58	0.00	-17.58	8
2462	-16.41	0.00	-16.41	8

Note: offset 0.2dB for insertion loss

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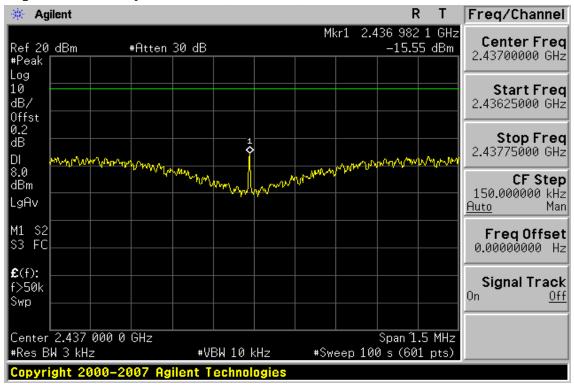


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# 802.11b, Power Spectral Density Test Plot (CH-Low)

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

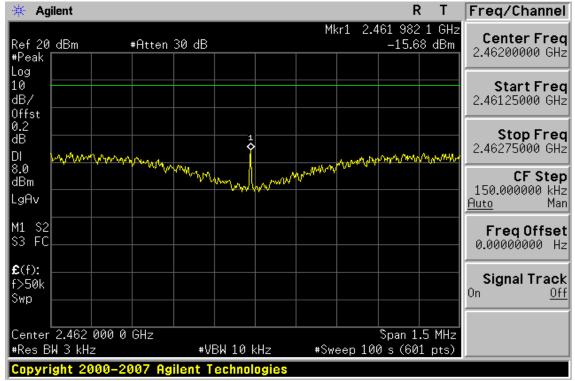


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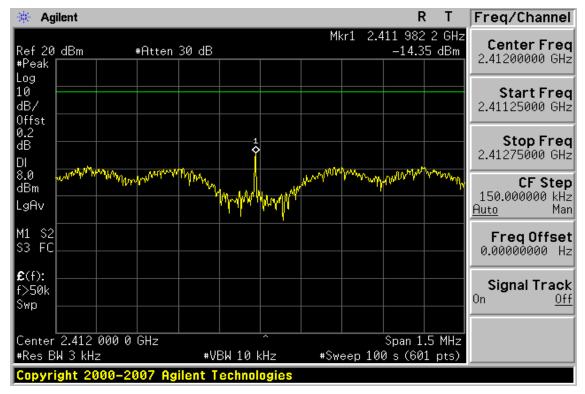


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# **Power Spectral Density Test Plot (CH-High)**



# 802.11g, Power Spectral Density Test Plot (CH-Low)



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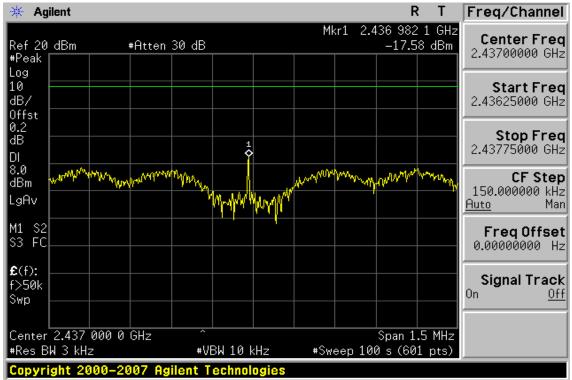
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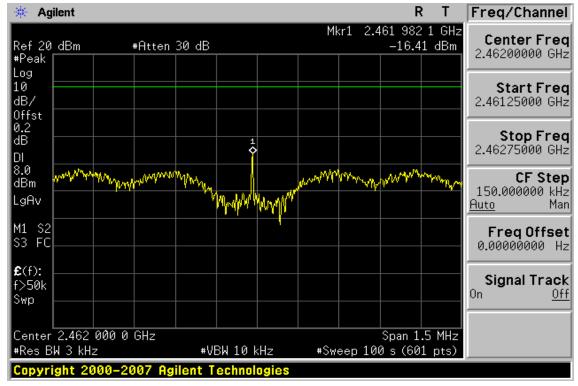


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# **Power Spectral Density Test Plot (CH-Mid)**



# Power Spectral Density Test Plot (CH-High)



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# 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 the 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 2.0dBi, and the antenna connector is designed with reversed SMA type and no consideration of replacement. Please see EUT photo for details.

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