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## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

**Product Name: Digital Media Adapter** 

**Brand Name:** Unication

**Model Name: WS-302** 

**Model Different:** N/A

**ID Number:** LEAWS302

ER/2006/50012 **Report No.:** 

**Issue Date:** Jun 22, 2006

**Rule Part:** FCC §15.247

Prepared for Unication Co., Ltd.

V.A.T: 5F., N. 6, Wu-Kung 5Rd., Hsinchuang City

Taipei, Taiwan

Prepared by SGS Taiwan Ltd.

No. 134, Wu Kung Rd., Wuku Industrial Zone,

Taipei County, Taiwan.





Testing Laboratory 0513

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### VERIFICATION OF COMPLIANCE

**Applicant:** Unication Co., Ltd.

V.A.T: 5F., N. 6, Wu-Kung 5Rd., Hsinchuang City Taipei, Taiwan

**Product Name:** Digital Media Adapter

**Brand Name:** Unication

Model No.: WS-302

**Model Difference:** N/A

FCC ID: LEAWS302

**File Number:** ER/2006/50012

**Date of test:** May 23. 2006 ~ Jun 22, 2006

Date of EUT Received: May 23. 2006

## 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:	Jason We	Date	Jun. 22, 2006	
_	Jason Wu			
Prepared By:	Gigi yeh	Date	Jun. 22, 2006	
	Gigi Yeh			
Approved By:	Timent Su	Date	Jun. 22, 2006	
_	Vincent Su			

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### Version

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#### 1. **GENERAL INFORMATION**

## 1.1. Product Description

Product Name:	Digital Mo	Digital Media Adapter				
Brand Name	Unication					
Model Name:	WS-302					
Model Difference:	N/A					
Danier Carrale	5Vdc by AC/DC power adapter					
Power Supply	Model: 3A-181WP05, Supplier: ENG					
Hardware Version	V1.00					

### WLAN:

Frequency Range	2412 – 2462MHz
Channel number	11 channels
Rated Power	802.11b : 14dBm 802.11g :11dBm
Modulation type	DSSS (CCK; DQPSK; DBPSK) / OFDM
Transition Speed:	11/54Mbps
Antenna Designation	Dipole Antenna, 2 dBi

The EUT is compliance with IEEE 802.11 bg Standard.



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

This submittal(s) (test report) is intended for FCC ID: <u>LEAWS302</u> filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

### 1.3. 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.

### 1.4. Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements. Site No. 1(3 &10 meters) Registration Number: 94644, Both OATS and Anechoic chamber (3 meters) was accredited by TAF (0513).

### 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 according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

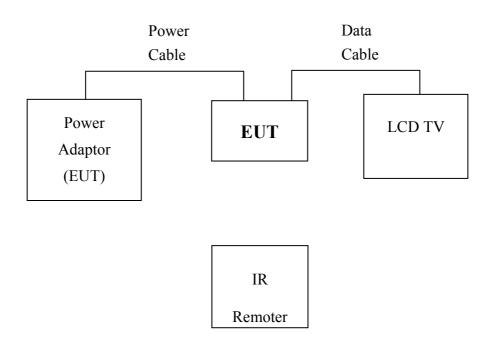


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## 2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System (AC Power Line Conducted Emission)



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

Item	Equipment	Mfr/Brand	Model/ Type No.	FCC ID	Series No.	Data Cable	Power Cord
1.	LCD TV	Inx	19PT	N/A	E90Z3803561	N/A	N/A
2.	Adaptor	Unication	3A-181WP05	N/A	N/A	1.5m Un-Shieded	Un-Shieded
3.	IR Remoter	Unicaton	N/A	N/A	N/A	N/A	N/A
4.	USB Dongle	PCI	BT-01UD2	N/A	33DC10075	N/A	N/A
5.	Test software	N/A	N/A	N/A	N/A	N/A	N/A

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### 3. SUMMARY OF TEST RESULTS

FCC Rules	<b>Description Of Test</b>	Result	
§15.207(a)	AC Power Line Conducted Emission	Compliant	
§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)	Peak Power Density	Compliant	
§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 mode.

Channel low (2412MHz) mid (2437MHz) and high (2462MHz) with 802.11b 11 Mbps and 802.11g 54Mbps data rate, the worst case mode are chosen for full testing.



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### 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

### 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 EUT was plug-in the AC/DC Power adapter. The host system was placed on the center of the back edge on the test table. The peripherals was placed on the side of the host PC system.
  - 3. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 4. The spacing between the peripherals was 10 centimeters. External I/O cables were draped along the edge of the test table and bundle when necessary.
- 5. The host system 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.

<sup>1.</sup> The lower limit shall apply at the transition frequencies

<sup>2.</sup> The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.



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## 5.4. Measurement Equipment Used:

Conducted Emission Test Site						
<b>EQUIPMENT</b>	MFR	MODEL	SERIAL	LAST	CAL DUE.	
TYPE		NUMBER	NUMBER	CAL.		
EMC Analyzer	НР	8594EM	3624A00203	09/02/2005	09/03/2006	
EMI Test Receiver	R&S	ESCS30	828985/004	06/09/2006	06/10/2007	
Transient Limiter	НР	11947A	3107A02062	09/02/2005	09/03/2006	
LISN	Rolf-Heine	NNB-2/16Z	99012	12/31/2005	12/30/2006	
LISN	Rolf-Heine	NNB-2/16Z	99013	12/24/2005	12/23/2006	
Coaxial Cables	N/A	No. 3, 4	N/A	12/01/2005	12/01/2206	

### 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.



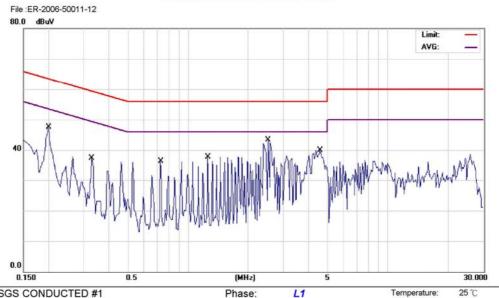
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### AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode	Operation Mode	Test Date	May 25, 2006
Temperature	25 ℃	Test By	Jason
Humidity	62 %	Pol	Line

#### **Conducted Emission Measurement**



Power:

AC 120V/60Hz

Humidity:

Air Pressure:

62 %

Site SGS CONDUCTED #1

Limit: CISPR22 Class B Conduction(QP)

EUT: Digital Media Adapter

M/N: WS-302

Note: Pen-Driver(USB) Playing

No. Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.2000	36.05	10.59	46.64	63.61	-16.97	QP	
2	0.2000	30.23	10.59	40.82	53.61	-12.79	AVG	
3	0.3325	26.39	10.65	37.04	59.39	-22.35	QP	
4	0.3325	22.76	10.65	33.41	49.39	-15.98	AVG	
5	0.7300	25.19	10.59	35.78	56.00	-20.22	QP	
6	0.7300	23.94	10.59	34.53	46.00	-11.47	AVG	
7	1.2600	26.76	10.45	37.21	56.00	-18.79	QP	
8	1.2600	25.91	10.45	36.36	46.00	-9.64	AVG	
9	2.5227	32.28	10.54	42.82	56.00	-13.18	QP	
10 *	2.5227	31.17	10.54	41.71	46.00	-4.29	AVG	
11	4.5800	26.90	10.66	37.56	56.00	-18.44	QP	
12	4.5800	24.36	10.66	35.02	46.00	-10.98	AVG	

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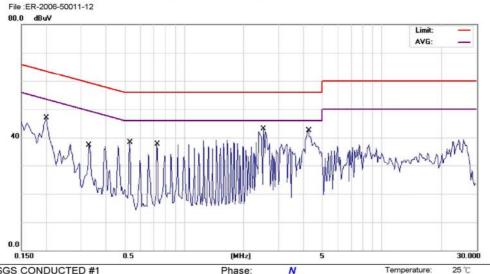
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### AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode	Operation Mode	Test Date	May 25, 2006
Temperature	25 ℃	Test By	Jason
Humidity	62 %	Pol	Neutral

#### **Conducted Emission Measurement**



Power:

AC 120V/60Hz

Humidity:

Air Pressure:

62 %

hpa

Site SGS CONDUCTED #1

Limit: CISPR22 Class B Conduction(QP)

EUT: Digital Media Adapter

M/N: WS-302

Note: Pen-Driver(USB) Playing

No.	Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2000	35.37	10.59	45.96	63.61	-17.65	QP	
2		0.2000	27.43	10.59	38.02	53.61	-15.59	AVG	
3		0.3325	26.41	10.65	37.06	59.39	-22.33	QP	
4		0.3325	23.83	10.65	34.48	49.39	-14.91	AVG	
5		0.5309	27.02	10.71	37.73	56.00	-18.27	QP	
6		0.5309	26.27	10.71	36.98	46.00	-9.02	AVG	
7		0.7300	26.11	10.59	36.70	56.00	-19.30	QP	
8		0.7300	25.54	10.59	36.13	46.00	-9.87	AVG	
9		2.5226	32.36	10.54	42.90	56.00	-13.10	QP	
10	*	2.5226	31.36	10.54	41.90	46.00	-4.10	AVG	
11		4.2480	28.93	10.65	39.58	56.00	-16.42	QP	
12		4.2480	24.51	10.65	35.16	46.00	-10.84	AVG	

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### 6. PEAK OUTPUT POWER MEASUREMENT

## 6.1. Standard Applicable

According to  $\S15.247(a)(2)$ , (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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### 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 Spectrum analyzer. Set the RBW = 1MHz and VBW = 3MHz. Turn on the channel power function and set the integration bandwidth = 26dB bandwidth.
- 3. Max hold the spectrum. Record the max. reading.
- 4. Repeat above procedures until all frequency measured were complete.

## 6.3. Measurement Equipment Used:

	Conducted Emission Test Site								
<b>EQUIPMENT</b>	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2006	03/28/2007				
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006				
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2005	11/10/2006				
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A				
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006				
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006				
Splitter	Agilent	11636B	51818	01/05/2006	01/04/2007				



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### 6.4. Measurement Result

## **Test Results (802.11b):**

СН	Frequency (MHz)	Reading Power ( dBm)	Cable Loss (dB)	Output Power (dBm)	Limit (dBm)	Result
LOW	2412.00	13.35	0.00	13.35	30	PASS
MID	2437.00	13.67	0.00	13.67	30	PASS
HIGH	2462.00	12.35	0.00	12.35	30	PASS

### Test Results (802.11g):

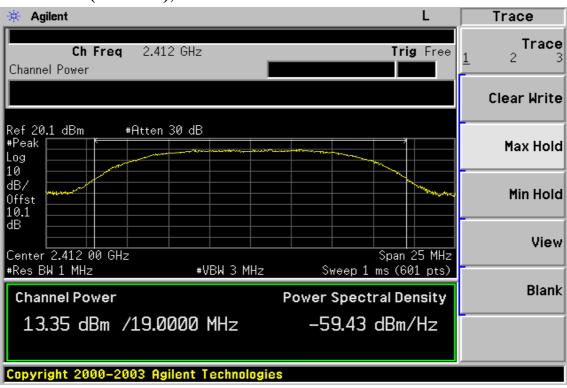
СН	Frequency (MHz)	Reading Power ( dBm)	Cable Loss (dB)	Output Power (dBm)	Limit (dBm)	Result
LOW	2412.00	10.03	0.00	10.03	30	PASS
MID	2437.00	10.60	0.00	10.60	30	PASS
HIGH	2462.00	9.26	0.00	9.26	30	PASS



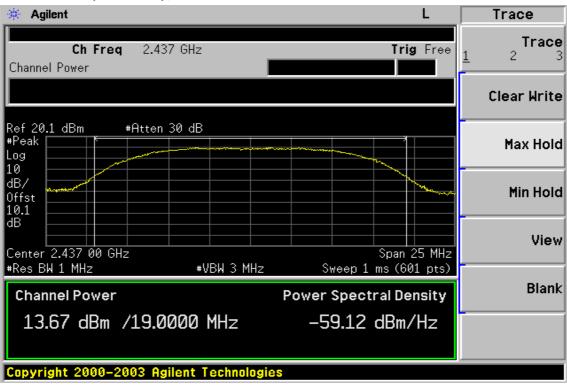
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## Peak Power Plot (CH Low), 802.11b mode



## Peak Power Plot (CH Mid), 802.11b mode



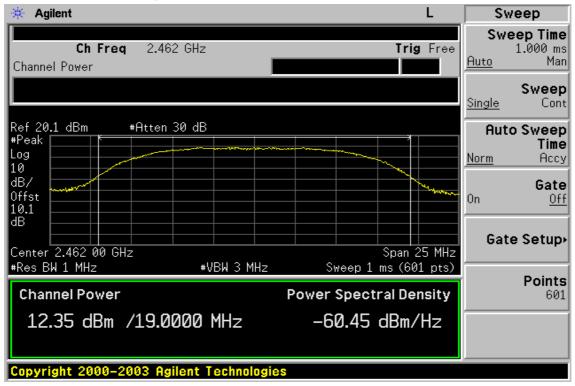
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# Peak Power Plot (CH High), 802.11b mode

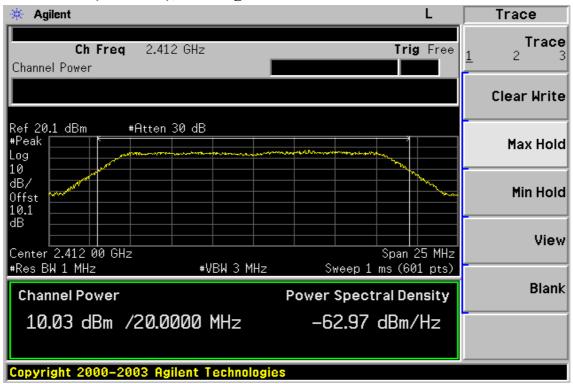




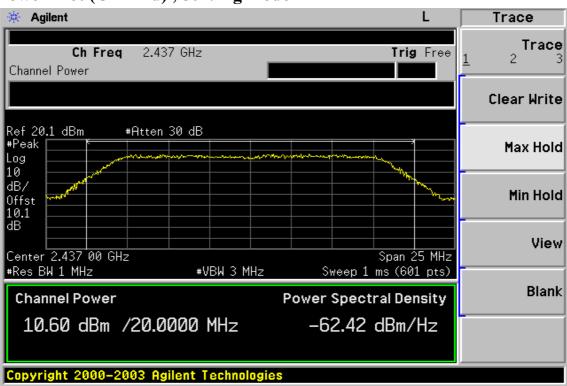
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## Peak Power Plot (CH Low), 802.11g mode



## Peak Power Plot (CH Mid), 802.11g mode



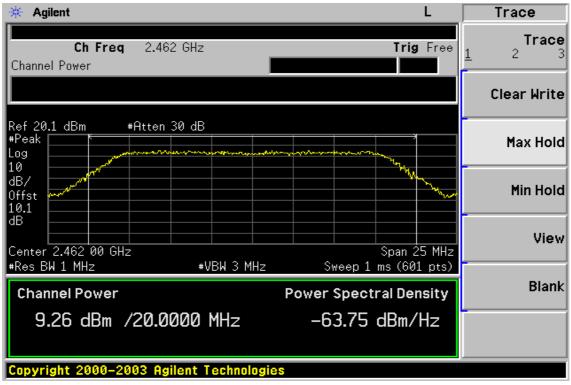
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# Peak Power Plot (CH High), 802.11g mode





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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 3.antenna port to the spectrum analyzer.
- 3.Set the spectrum analyzer as RBW=1% 6dB 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.

## 7.3. Measurement Equipment Used:

	Conduct	ed Emission T	<b>Test Site</b>		
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2006	03/28/2007
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006
Splitter	Agilent	11636B	51818	01/05/2006	01/04/2007



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### 7.4. Measurement Result

Test Results (802.11b):

СН	Bandwidth (MHz)	Limit Bandwidth (KHz)	Result
2412	12.294	> 500	PASS
2437	12.157	> 500	PASS
2462	12.144	> 500	PASS

### Test Results (802.11g):

СН	Bandwidth (MHz)	Limit Bandwidth (KHz)	Result
2412	16.607	> 500	PASS
2437	16.635	> 500	PASS
2462	16.567	> 500	PASS

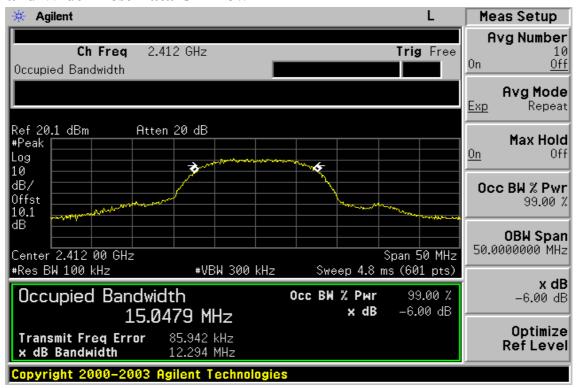


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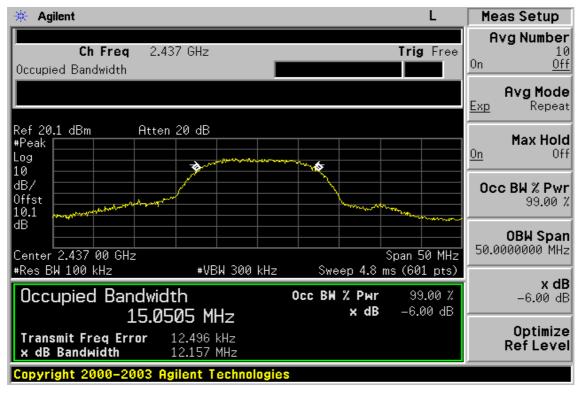
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### 802.11b

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



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



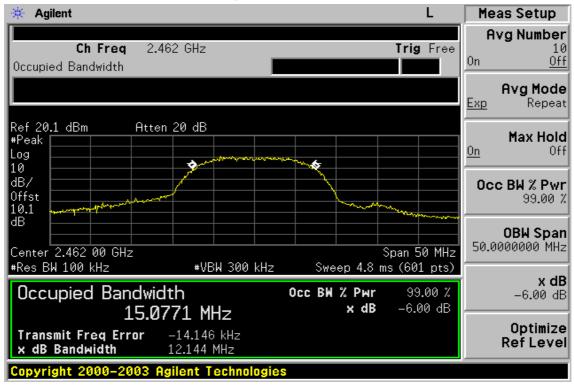
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# 6dB Band Width Test Data CH-High



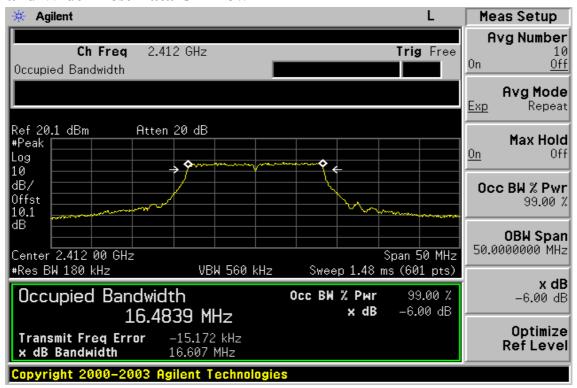


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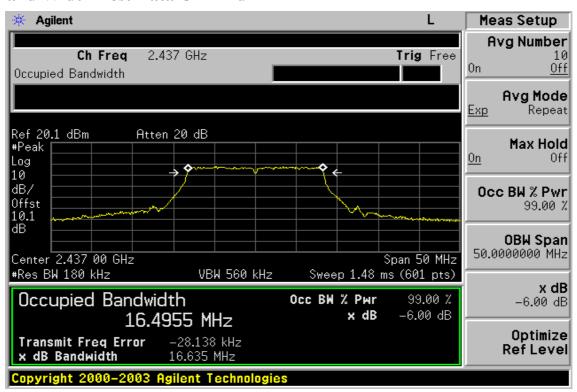
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### 802.11g

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



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



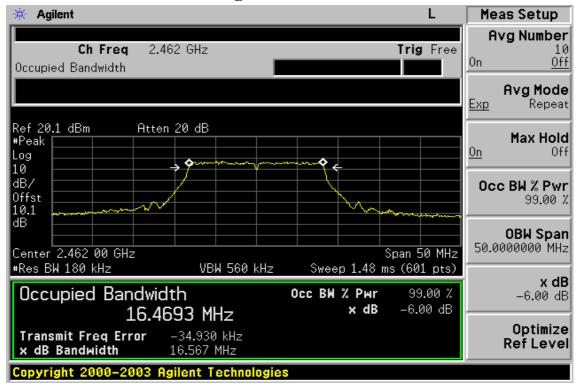
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# 6dB Band Width Test Data CH-High





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### 8. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

## 8.1. Standard Applicable

According to §15.247(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=300KHz, Span=50MHz, Sweep = auto
- 5. Mark Peak, 2.390GHz and 2.483.5GHz and highest level in the restricted bands.
- 6. Repeat above procedures until all frequency measured were complete.

## 8.3. Measurement Equipment Used:

Conducted Emission Test Site								
<b>EQUIPMENT</b>	MFR	MODEL	SERIAL	LAST	CAL DUE.			
TYPE		NUMBER	NUMBER	CAL.				
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2006	03/28/2007			
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006			
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A			
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006			
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006			
Splitter	Agilent	11636B	51818	01/05/2006	01/04/2007			

### 8.4. Measurement Result

Refer to attach spectrum analyzer data chart.



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### 802.11b

# **Band Edges Test Data CH-Low**



## **Band Edges Test Data CH-High**



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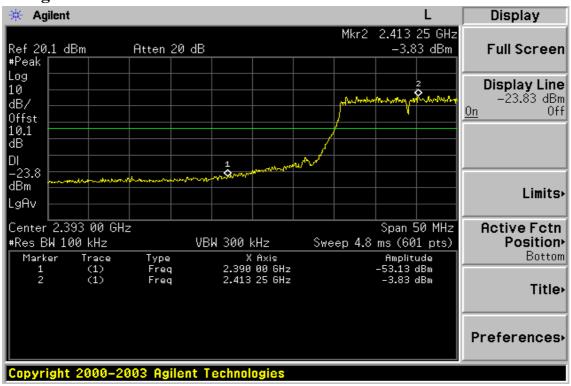


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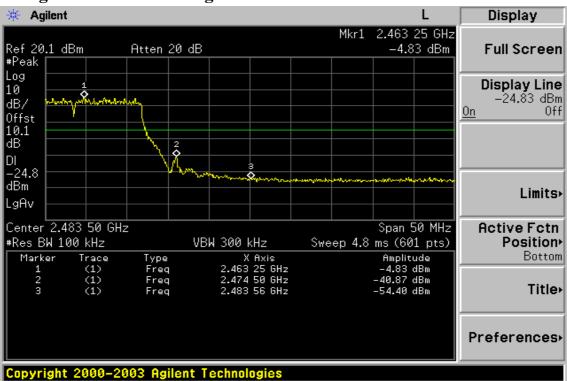
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### 802.11g

## **Band Edges Test Data CH-Low**



## **Band Edges Test Data CH-High**



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### Radiated Emission:801.11b

Operation Mode TX CH Low Test Date May 25, 2006 Fundamental Frequency 2412 MHz Test By Jason **Tmperature** Pol Ver.

25 °C Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
(NATT )	(ID T/)	(ID II)	CE(ID)	(JD X7/)	(JDX7/)	(dD.,V/m)	(JD17/)	(ID)	
(MHz)	(aBuv)	(dBuV)	CF(aB)	(dBuV/m)	(aBuv/m <sub>)</sub>	) (abuv/m)	j(abuv/m <sub>)</sub>	(dB)	

Operation Mode TX CH Low Test Date May 25, 2006 Fundamental Frequency 2412 MHz Test By Jason

Pol Temperature Hor. 25 °C

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m	(dB)	
2390.00	44.85		-3.04	41.81		74.00	54.00	-12.19	Peak

- (1) Datas 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 o
- (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:802.11b

Operation Mode TX CH High Test Date May 25, 2006

Fundamental Frequency 2462 MHz Test By Jason Temperature Pol Ver. 25 °C

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
/2 FTT \									
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	) (dBuV/m)	(dBuV/m	(dB)	

Operation Mode TX CH High Test Date May 25, 2006

Fundamental Frequency 2462 MHz Test By Jason Pol Temperature Hor. 25 °C

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m	(dB)	
2483.55	44.31		-3.04	41.27		74.00	54.00	-12.73	Peak

- (1) Datas 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 o
- (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:801.11g

Operation Mode TX CH Low Test Date May 25, 2006

Fundamental Frequency 2412 MHz Test By Jason Tmperature 25  $^{\circ}\mathrm{C}$  Pol Ver.

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	) (dBuV/m)	(dBuV/m)	(dB)	

Operation Mode TX CH Low Test Date May 25, 2006

Fundamental Frequency 2412 MHz Test By Jason Temperature 25  $^{\circ}$ C Pol Hor. Humidity 65  $^{\circ}$ 

Peak AV **Actual FS** Peak  $\mathbf{AV}$ Freq. Reading Reading Ant./CL Peak AVLimit Limit Margin Remark (MHz) (dBuV) (dBuV) CF(dB) (dBuV/m) (dBuV/m) (dBuV/m) (dB) 2390.00 44.82 -3.0441.78 74.00 54.00 -12.22Peak

- (1) Datas 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  $\circ$
- (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:802.11g

Operation Mode TX CH High Test Date May 25, 2006

Fundamental Frequency 2462 MHz Test By Jason Temperature Pol Ver. 25 °C

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m	(dB)	
2483.55	45.28		-3.04	42.24		74.00	54.00	-11.76	Peak

Operation Mode TX CH High Test Date May 25, 2006

Fundamental Frequency 2462 MHz Test By Jason Temperature 25 °C Pol Hor.

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m	(dBuV/m)	(dB)	
2483.55	44.09		-3.04	41.05		74.00	54.00	-12.95	Peak

- (1) Datas 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 o
- (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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## SURIOUS 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.

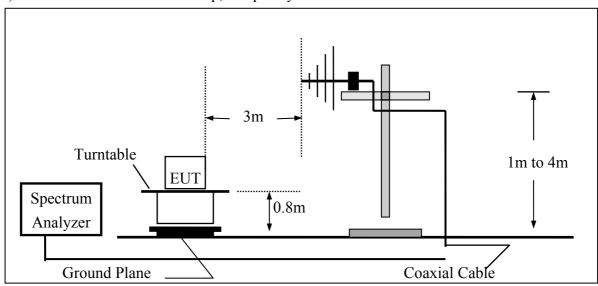


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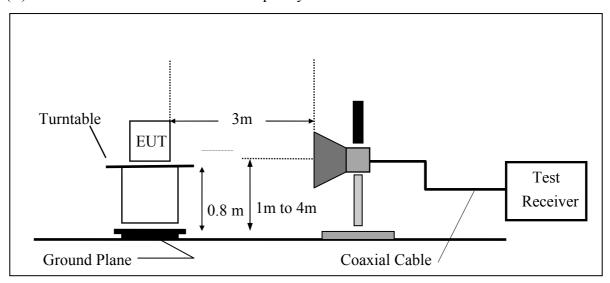
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## 9.4. Test SET-UP (Block Diagram of Configuration)

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



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





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# 9.5. Measurement Equipment Used:

	966 Chamber										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.						
TYPE		NUMBER	NUMBER	CAL.							
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2006	03/28/2007						
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2005	08/26/2006						
Bilog Antenna	SCHWAZBECK	VULB9160	152	06/03/2006	06/02/2007						
Horn antenna	Schwarzbeck	BBHA 9120D	309/320	08/16/2005	08/15/2006						
Horn antenna	Schwarzbeck	BBHA 9170	184/185	07/04/2005	07/03/2006						
Pre-Amplifier	HP	8447D	2944A09469	07/19/2005	07/18/2006						
Pre-Amplifier	HP	8449B	3008A00578	02/26/2006	02/25/2007						
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	10/09/2005	10/08/2006						
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	10/09/2005	10/08/2006						
Site NSA	SGS	966 chamber	N/A	11/17/2005	11/16/2006						

# 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:

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

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

#### 9.7. Measurement Result

Refer to attach tabular data sheets.

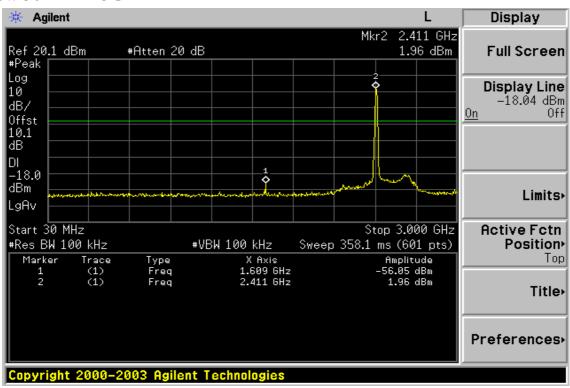
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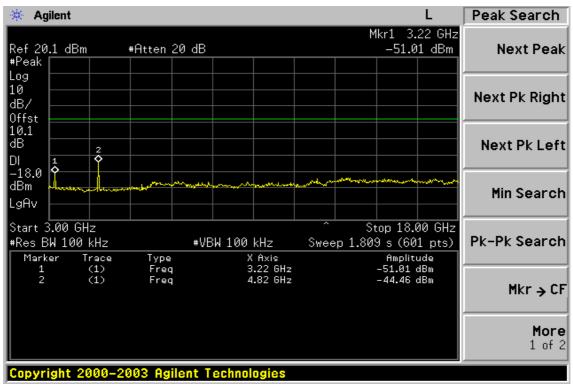
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# **Conducted Spurious Emission Measurement Result: 802.11b** Ch Low 30MHz - 3GHz



#### Ch Low 3GHz – 18GHz



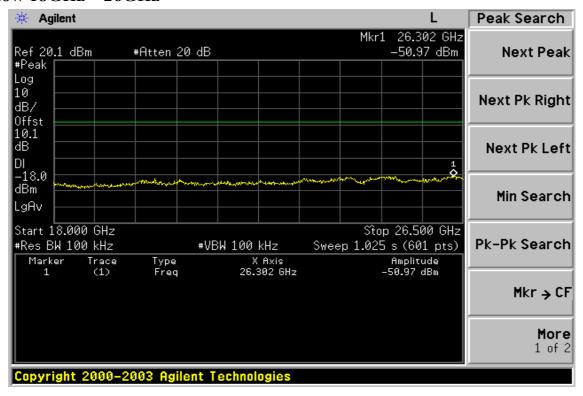
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## Ch Low 18GHz - 26GHz

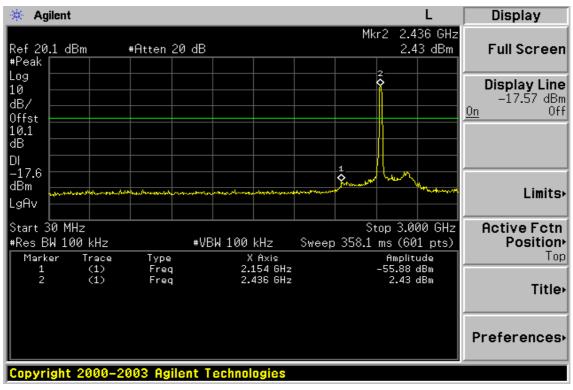




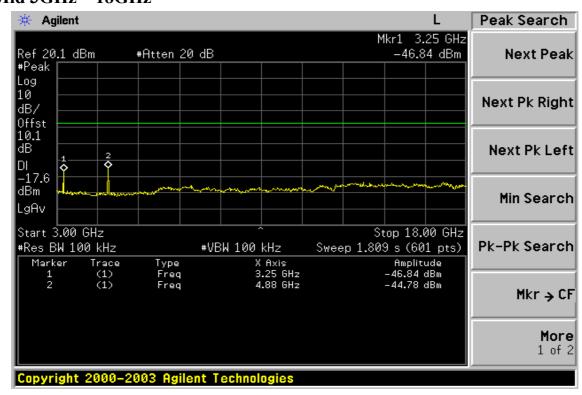
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## Ch Mid 30MHz - 3GHz



## Ch Mid 3GHz – 18GHz



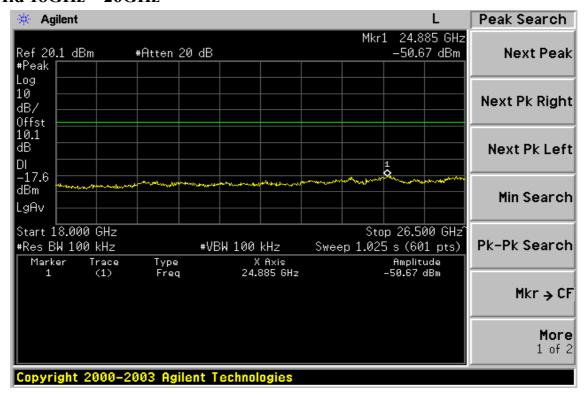
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# Ch Mid 18GHz – 26GHz

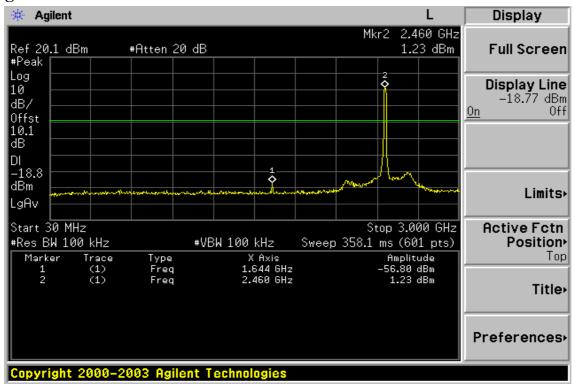




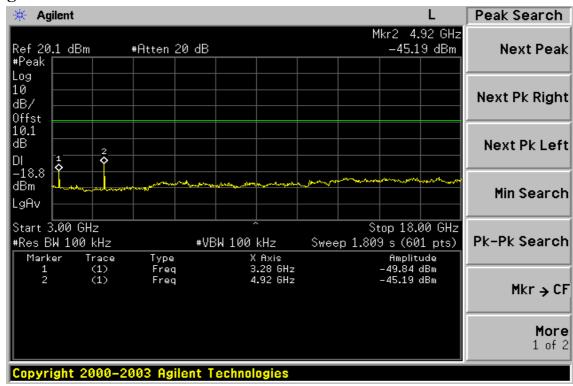
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# Ch High 30MHz – 3GHz



# Ch High 3GHz – 18GHz



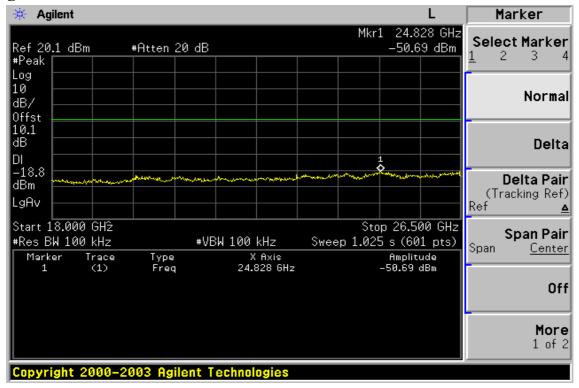
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# Ch High 18GHz – 26GHz



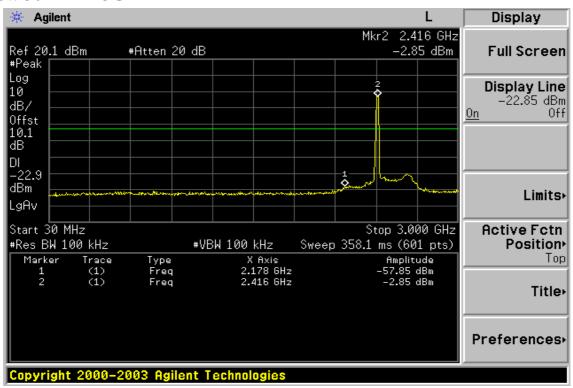
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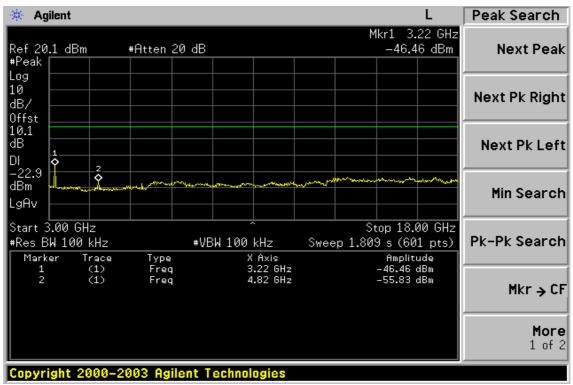
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# Conducted Spurious Emission Measurement Result: 802.11g Ch Low 30MHz – 3GHz



#### Ch Low 3GHz – 18GHz



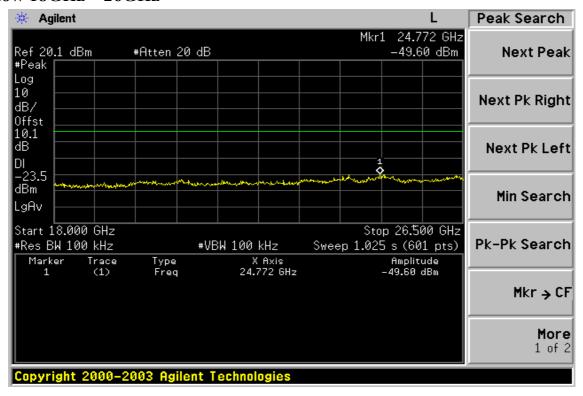
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## Ch Low 18GHz - 26GHz

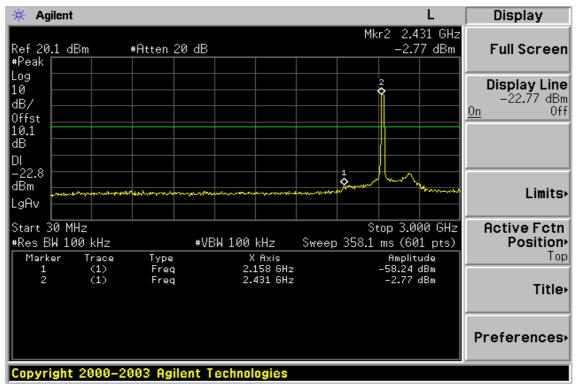




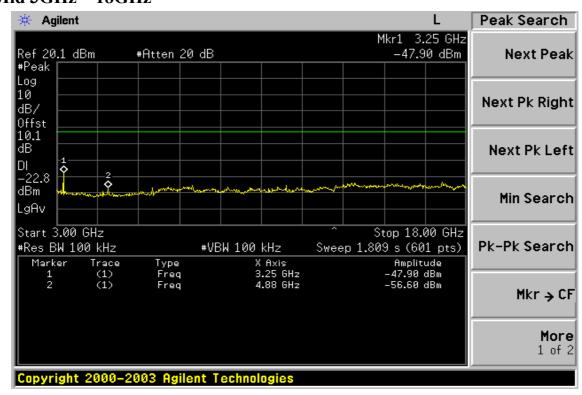
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## Ch Mid 30MHz - 3GHz



## Ch Mid 3GHz – 18GHz



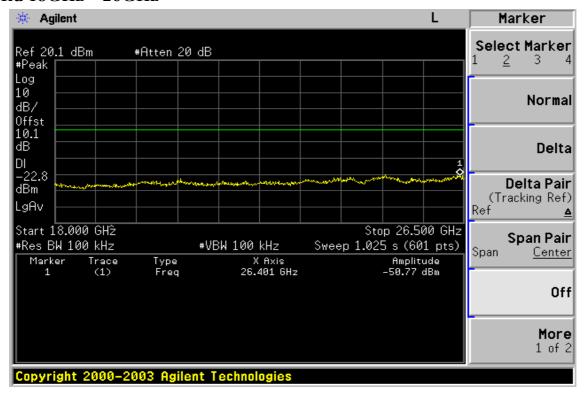
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## Ch Mid 18GHz – 26GHz



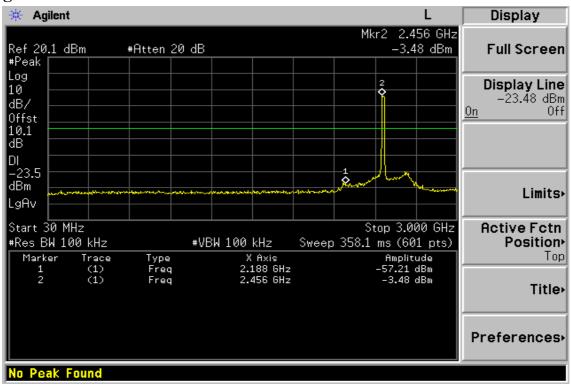
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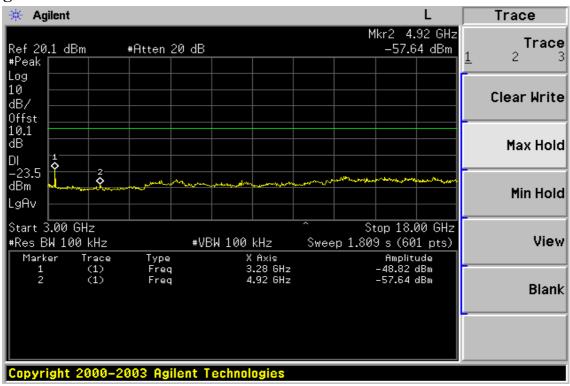
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# Ch High 30MHz – 3GHz



# Ch High 3GHz – 18GHz



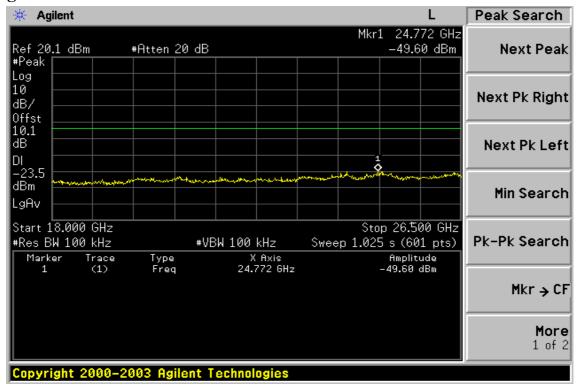
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# Ch High 18GHz – 26GHz



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# **Radiated Spurious Emission Measurement Result (below 1GHz)**

Operation Mode 802.11b TX CH Low Test Date May 25, 2006

Fundamental Frequency 2412MHz Test By Jason Temperature Pol Ver./Hor 25 °C

Humidity 65 %

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
46.49	V	Peak	43.68	-14.63	29.05	40.00	-10.95
111.48	V	Peak	48.09	-16.25	31.84	43.50	-11.66
201.69	V	Peak	48.62	-16.63	31.99	43.50	-11.51
332.64	V	Peak	48.50	-12.43	36.07	46.00	-9.93
667.29	V	Peak	37.13	-6.12	31.01	46.00	-14.99
775.93	V	Peak	38.01	-3.95	34.06	46.00	-11.94
832.19	V	Peak	35.73	-3.06	32.67	46.00	-13.33
934.04	V	Peak	34.89	-1.91	32.98	46.00	-13.02
67.83	Н	Peak	43.89	-15.88	28.01	40.00	-11.99
150.28	Н	Peak	41.39	-13.39	28.00	43.50	-15.50
201.69	Н	Peak	42.63	-16.63	26.00	43.50	-17.50
252.13	Н	Peak	45.10	-15.26	29.84	46.00	-16.16
332.64	Н	Peak	44.99	-12.43	32.56	46.00	-13.44
494.63	Н	Peak	39.02	-9.34	29.68	46.00	-16.32
594.54	Н	Peak	37.92	-7.72	30.20	46.00	-15.80
667.29	Н	Peak	36.66	-6.12	30.54	46.00	-15.46

- (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) Datas 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)

Operation Mode 802.11b TX CH Mid **Test Date** May 25, 2006

Fundamental Frequency 2437MHz Test By Jason Temperature Pol Ver./Hor 25 °C

Humidity 65 %

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
46.49	V	Peak	44.95	-14.63	30.32	40.00	-9.68
114.39	V	Peak	47.48	-16.00	31.48	43.50	-12.02
201.69	V	Peak	48.95	-16.63	32.32	43.50	-11.18
252.13	V	Peak	45.19	-15.26	29.93	46.00	-16.07
332.64	V	Peak	48.90	-12.43	36.47	46.00	-9.53
775.93	V	Peak	38.81	-3.95	34.86	46.00	-11.14
31.94	Н	Peak	44.10	-15.22	28.88	40.00	-11.12
41.64	Н	Peak	43.50	-14.67	28.83	40.00	-11.17
67.83	Н	Peak	42.84	-15.88	26.96	40.00	-13.04
150.28	Н	Peak	43.10	-13.39	29.71	43.50	-13.79
332.64	Н	Peak	44.49	-12.43	32.06	46.00	-13.94
528.58	Н	Peak	41.07	-8.83	32.24	46.00	-13.76
754.59	Н	Peak	35.70	-4.36	31.34	46.00	-14.66

- (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) Datas 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)

Operation Mode 802.11b TX CH High Test Date May 25, 2006

Fundamental Frequency 2462MHz Test By Jason Temperature 25 °C Pol Ver./Hor

Humidity 65 %

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
46.49	V	Peak	42.66	-14.63	28.03	40.00	-11.97
114.39	V	Peak	46.85	-16.00	30.85	43.50	-12.65
201.69	V	Peak	49.08	-16.63	32.45	43.50	-11.05
252.13	V	Peak	45.72	-15.26	30.46	46.00	-15.54
332.64	V	Peak	48.03	-12.43	35.60	46.00	-10.40
754.59	V	Peak	37.46	-4.36	33.10	46.00	-12.90
775.93	V	Peak	38.19	-3.95	34.24	46.00	-11.76
41.64	Н	Peak	44.34	-14.67	29.67	40.00	-10.33
114.39	Н	Peak	42.41	-16.00	26.41	43.50	-17.09
148.34	Н	Peak	44.41	-13.43	30.98	43.50	-12.52
295.78	Н	Peak	41.60	-13.55	28.05	46.00	-17.95
332.64	Н	Peak	44.80	-12.43	32.37	46.00	-13.63
528.58	Н	Peak	39.60	-8.83	30.77	46.00	-15.23
754.59	Н	Peak	36.39	-4.36	32.03	46.00	-13.97

- (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) Datas 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)

Operation Mode 802.11b TX CH Low Test Date May 25, 2006

Fundamental Frequency 2412MHz Test By Jason Temperature 25 °C Pol Ver.

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak	AV (dRuV/m)	Limit	Limit (dBuV/m)	Margin (dB)	
` ′		,	` /		(uDu v/III)			· · ·	D 1
3203.5	47.79		-1.63	46.16		74.00	54.00	-7.84	Peak
4815.5	40.10		3.01	43.11		74.00	54.00	-10.89	Peak
4824.0									
7236.0	37.07		8.38	45.45		74.00	54.00	-8.55	Peak
9648.0									
12060.0									
14472.0									
16884.0									
19296.0									
21708.0									
24120.0									

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

Operation Mode 802.11b TX CH Low Test Date May 25, 2006

Fundamental Frequency 2412MHz Test By Jason Temperature 25  $^{\circ}$ C Pol Hor

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	_
1318.5	45.40		-8.06	37.34		74.00	54.00	-16.66	Peak
3203.5	43.01		-1.63	41.38		74.00	54.00	-12.62	Peak
6668.0	34.88		7.90	42.78		74.00	54.00	-11.22	Peak
4824.0									
7236.0									
9648.0									
12060.0									
14472.0									
16884.0									
19296.0									
21708.0									
24120.0									

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

Operation Mode 802.11b TX CH Mid Test Date May 25, 2006

Fundamental Frequency 2437 MHz Test By Jason Temperature  $25 \, ^{\circ}\text{C}$  Pol Ver

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
3236.0	45.06		-1.55	43.51		74.00	54.00	-10.49	Peak
6635.0	35.96		7.83	43.79		74.00	54.00	-10.21	Peak
4874.0	39.27		3.12	42.39		74.00	54.00	-11.61	Peak
7311.0									
9748.0									
12185.0									
14622.0									
17059.0									
19496.0									
21933.0									
24370.0									

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

Operation Mode 802.11b TX CH Mid Test Date May 25, 2006

Fundamental Frequency 2437MHz Test By Jason Temperature 25 °C Pol Hor

Humidity 65 %

	Peak	AV		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
1318.5	44.12		-9.48	34.64		74.00	54.00	-19.36	Peak
2423.5	37.52		-3.26	34.26		74.00	54.00	-19.74	Peak
4874.0									
7311.0									
9748.0									
12185.0									
14622.0									
17059.0									
19496.0									
21933.0									
24370.0									

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

Operation Mode 802.11b TX CH High Test Date May 25, 2006

Fundamental Frequency 2462 MHz Test By Jason Temperature  $25 \, ^{\circ}\text{C}$  Pol Ver

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
2456.0	39.36		-3.12	36.24		74.00	54.00	-17.76	Peak
3288.0	43.94		-1.46	42.48		74.00	54.00	-11.52	Peak
4924.0	38.66		3.31	41.97		74.00	54.00	-12.03	Peak
7386.0									
9848.0									
12310.0									
14772.0									
17234.0									
19696.0									
22158.0									
24620.0									

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

Operation Mode 802.11b TX CH High Test Date May 25, 2006

Fundamental Frequency 2462 MHz Test By Jason Temperature  $25 \, ^{\circ}\text{C}$  Pol Hor

Humidity 65 %

	Peak	AV		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
1318.5	43.77		-8.06	35.71		74.00	54.00	-18.29	Peak
1695.5	40.81		-6.39	34.42		74.00	54.00	-19.58	Peak
3288.0	39.17		-1.46	37.71		74.00	54.00	-16.29	Peak
4924.0									
7386.0									
9848.0									
12310.0									
14772.0									
17234.0									
19696.0									
22158.0									
24620.0									

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

Operation Mode 802.11g TX CH Low Test Date May 25, 2006

Fundamental Frequency 2412MHz Test By Jason Temperature Pol Ver./Hor 25 °C

Humidity 65 %

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
46.49	V	Peak	44.71	-14.63	30.08	40.00	-9.92
114.39	V	Peak	46.61	-16.00	30.61	43.50	-12.89
201.69	V	Peak	48.76	-16.63	32.13	43.50	-11.37
252.13	V	Peak	45.74	-15.26	30.48	46.00	-15.52
332.64	V	Peak	48.11	-12.43	35.68	46.00	-10.32
594.54	V	Peak	40.24	-7.72	32.52	46.00	-13.48
775.93	V	Peak	37.77	-3.95	33.82	46.00	-12.18
41.64	Н	Peak	44.04	-14.67	29.37	40.00	-10.63
67.83	Н	Peak	43.02	-15.88	27.14	40.00	-12.86
114.39	Н	Peak	42.70	-16.00	26.70	43.50	-16.80
150.28	Н	Peak	45.28	-13.39	31.89	43.50	-11.61
332.64	Н	Peak	44.19	-12.43	31.76	46.00	-14.24
528.58	Н	Peak	40.84	-8.83	32.01	46.00	-13.99
790.48	Н	Peak	37.59	-3.69	33.90	46.00	-12.10

- (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) Datas 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)

Operation Mode 802.11g TX CH Mid Test Date May 25, 2006

Fundamental Frequency 2437MHz Test By Jason Temperature 25 °C Pol Ver./Hor

Humidity 65 %

	Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
_	(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
	114.39	V	Peak	46.90	-16.00	30.90	43.50	-12.60
	164.74	V	Peak	44.64	-14.63	30.01	43.50	-13.49
	201.69	V	Peak	48.26	-16.63	31.63	43.50	-11.87
	252.13	V	Peak	46.35	-15.26	31.09	46.00	-14.91
	332.64	V	Peak	48.38	-12.43	35.95	46.00	-10.05
	594.54	V	Peak	39.04	-7.72	31.32	46.00	-14.68
	775.93	V	Peak	37.97	-3.95	34.02	46.00	-11.98
	43.58	Н	Peak	44.35	-14.64	29.71	40.00	-10.29
	53.28	Н	Peak	41.78	-14.91	26.87	40.00	-13.13
	150.28	Н	Peak	45.09	-13.39	31.70	43.50	-11.80
	295.78	Н	Peak	42.52	-13.55	28.97	46.00	-17.03
	332.64	Н	Peak	43.99	-12.43	31.56	46.00	-14.44
	528.58	Н	Peak	41.20	-8.83	32.37	46.00	-13.63
	754.59	Н	Peak	37.77	-4.36	33.41	46.00	-12.59

- (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) Datas 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)**

Operation Mode 802.11g TX CH High Test Date May 25, 2006

Fundamental Frequency 2462MHz Test By Jason Temperature Pol Ver./Hor 25 °C

Humidity 65 %

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
46.49	V	Peak	43.28	-14.63	28.65	40.00	-11.35
96.93	V	Peak	46.48	-17.45	29.03	43.50	-14.47
158.04	V	Peak	44.67	-14.12	30.55	43.50	-12.95
201.69	V	Peak	49.46	-16.63	32.83	43.50	-10.67
252.13	V	Peak	44.27	-15.26	29.01	46.00	-16.99
332.64	V	Peak	47.58	-12.43	35.15	46.00	-10.85
594.54	V	Peak	39.16	-7.72	31.44	46.00	-14.56
775.93	V	Peak	37.74	-3.95	33.79	46.00	-12.21
41.64	Н	Peak	44.52	-14.67	29.85	40.00	-10.15
53.28	Н	Peak	42.48	-14.91	27.57	40.00	-12.43
114.39	Н	Peak	41.48	-16.00	25.48	43.50	-18.02
150.28	Н	Peak	43.96	-13.39	30.57	43.50	-12.93
295.79	Н	Peak	42.34	-13.55	28.79	46.00	-17.21
332.64	Н	Peak	43.47	-12.43	31.04	46.00	-14.96
528.58	Н	Peak	40.69	-8.83	31.86	46.00	-14.14
560.59	Н	Peak	39.22	-8.29	30.93	46.00	-15.07
754.59	Н	Peak	37.07	-4.36	32.71	46.00	-13.29

- (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) Datas 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)

802.11g TX CH Low Operation Mode **Test Date** May 25, 2006

Fundamental Frequency 2412MHz Test By Jason **Temperature** Pol Ver. 25 °C

65 % Humidity

	Peak	$\mathbf{AV}$		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)	
3203.5	47.04		-1.63	45.41		74.00	54.00	-8.59	Peak
7058.0	35.72		9.03	44.75		74.00	54.00	-9.25	Peak
4824.0 7236.0									
9648.0									
12060.0									
14472.0									
16884.0									
19296.0									
21708.0									
24120.0									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency o
- (2) Datas 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 o
- (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)

Operation Mode 802.11g TX CH Low Test Date May 25, 2006

Fundamental Frequency 2412MHz Test By Jason Temperature 25  $^{\circ}$ C Pol Hor

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)	
1318.5	43.58		-8.06	35.52		74.00	54.00	-18.48	Peak
6668.0	42.76		5.24	48.00		74.00	54.00	-6.00	Peak
4824.0									
7236.0									
9648.0									
12060.0									
14472.0									
16884.0									
19296.0									
21708.0									
24120.0									
24120.0									

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

Operation Mode 802.11g TX CH Mid Test Date May 25, 2006

Fundamental Frequency 2437 MHz Test By Jason Temperature  $25 \, ^{\circ}\text{C}$  Pol Ver

Humidity 65 %

Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
43.34		-8.06	35.28		74.00	54.00	-18.72	Peak
46.31		-1.55	44.76		74.00	54.00	-9.24	Peak
	Reading (dBuV) 43.34 46.31	Reading dBuV) (dBuV) 43.34 46.31	Reading (dBuV)         Reading (dBuV)         Ant./CL           43.34          -8.06           46.31          -1.55	Reading (dBuV)         Reading (dBuV)         Ant./CL (dBuV/m)         Peak (dBuV/m)           43.34          -8.06         35.28           46.31          -1.55         44.76	Reading (dBuV)         Reading (dBuV)         Ant./CL (dBuV)         Peak (dBuV/m) (dBuV/m)           43.34          -8.06         35.28            46.31          -1.55         44.76	Reading (dBuV)         Reading (dBuV)         Ant./CL (dBuV)         Peak (dBuV/m) (dBuV/m) (dBuV/m)         AV Limit (dBuV/m)           43.34          -8.06         35.28          74.00           46.31          -1.55         44.76          74.00	Reading (dBuV)         Ant./CL (dBuV)         Peak (dBuV/m) (dBuV/m) (dBuV/m) (dBuV/m) (dBuV/m)         Limit (dBuV/m) (dBuV/m) (dBuV/m)         Limit (dBuV/m) (dBuV/m)         Limit (dBuV/m) (dBuV/m)         Available (dBuV/m)	Reading (dBuV)         Ant./CL (dBuV)         Peak (dBuV/m) (dBuV/m) (dBuV/m) (dBuV/m) (dBuV/m) (dBuV/m) (dBuV/m)         Limit (dBuV/m) (dBuV/m) (dBuV/m) (dBuV/m)         Margin (dBuV/m) (dBuV/m)           43.34          -8.06         35.28          74.00         54.00         -18.72           46.31          -1.55         44.76          74.00         54.00         -9.24               74.00         54.00         -9.24

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

Operation Mode 802.11g TX CH Mid Test Date May 25, 2006

Fundamental Frequency 2437MHz Test By Jason Temperature 25 °C Pol Hor

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
1318.5	43.59		-8.06	35.53		74.00	54.00	-18.47	Peak
3236.0	42.51		-1.55	40.96		74.00	54.00	-13.04	Peak
4874.0									
7311.0									
9748.0									
12185.0									
14622.0									
17059.0									
19496.0									
21933.0									
24370.0									

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

Operation Mode 802.11g TX CH High Test Date May 25, 2006

Fundamental Frequency  $2462 \mathrm{MHz}$  Test By Jason Temperature  $25~^{\circ}\mathrm{C}$  Pol Ver

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
1318.5	43.87		-8.06	35.81		74.00	54.00	-18.19	Peak
1663.0	42.21		-6.51	35.70		74.00	54.00	-18.30	Peak
3288.0	45.02		-1.46	43.56		74.00	54.00	-10.44	Peak
4924.0									
7386.0									
9848.0									
12310.0									
14772.0									
17234.0									
19696.0									
22158.0									
24620.0									

#### Remark:

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

Operation Mode 802.11g TX CH High Test Date May 25, 2006

Fundamental Frequency  $2462 \mathrm{MHz}$  Test By Jason Temperature  $25~^{\circ}\mathrm{C}$  Pol Hor

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
1318.5	44.43		-8.06	36.37		74.00	54.00	-17.63	Peak
1825.5	39.79		-5.87	33.92		74.00	54.00	-20.08	Peak
3288.0	41.35		-1.46	39.89		74.00	54.00	-14.11	Peak
4924.0									
7386.0									
9848.0									
12310.0									
14772.0									
17234.0									
19696.0									
22158.0									
24620.0									

- (1) Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (2) Datas 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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# 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 = 3KHz, Span = 300KHz, Sweep=100s
- 4. Record the max. reading.
- 5. Repeat above procedures until all frequency measured were complete.

10.3. Measurement Equipment Used:

	Conducted Emission Test Site										
<b>EQUIPMENT</b>	MFR	MODEL	SERIAL	LAST	CAL DUE.						
TYPE		NUMBER	NUMBER	CAL.							
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2006	03/28/2007						
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006						
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2005	11/10/2006						
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A						
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006						
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006						
Splitter	Agilent	11636B	51818	01/05/2006	01/04/2007						



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### 10.4. Measurement Result

### 802.11b

СН	RF Power Density	Cable loss	RF Power Density	Maximum Limit
	Reading (dBm)	(dB)	Level (dBm)	(dBm)
Low	-13.87	0.00	-13.87	8
Mid	-13.66	0.00	-13.66	8
High	-14.64	0.00	-14.64	8

## 802.11g

СН	RF Power Density	Cable loss	RF Power Density	Maximum Limit
	Reading (dBm)	(dB)	Level (dBm)	(dBm)
Low	-20.11	0.00	-20.11	8
Mid	-20.14	0.00	-20.14	8
High	-20.86	0.00	-20.86	8

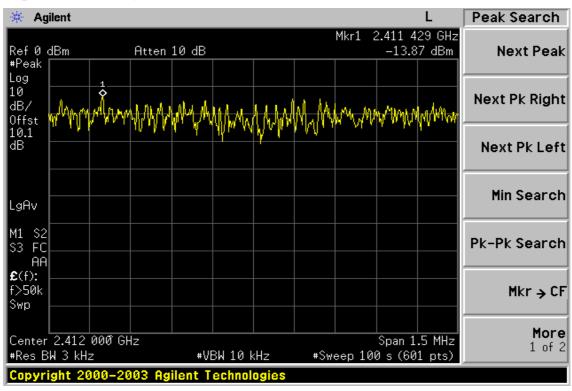


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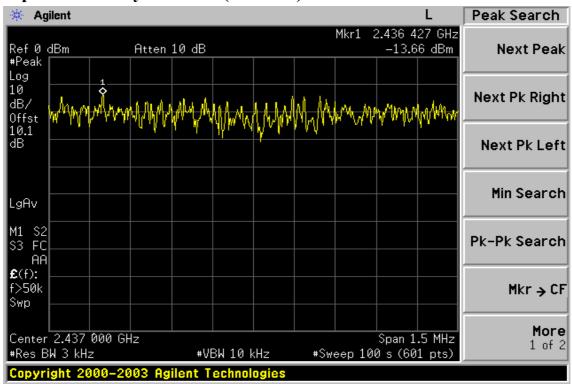
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## 802.11b

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



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



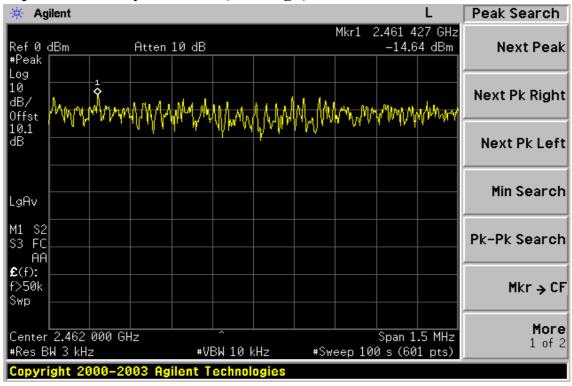
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# **Power Spectral Density Test Plot (CH-High)**



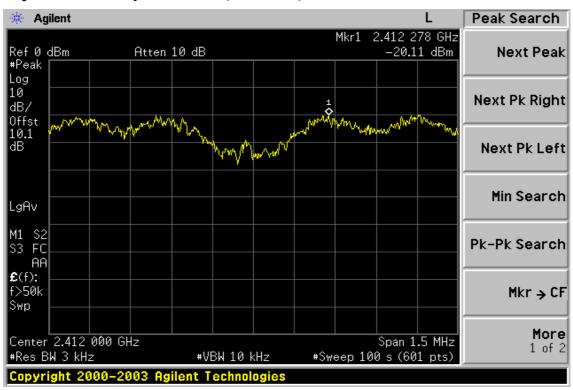


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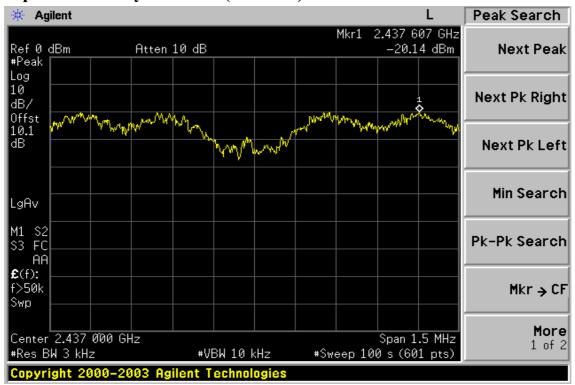
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# 802.11g

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



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



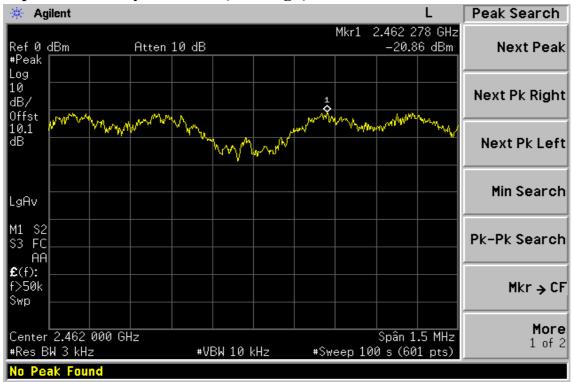
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# **Power Spectral Density Test Plot (CH-High)**



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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 the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak 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.

### 11.2.. Antenna Connected Construction

SGS Taiwan Ltd.

The directional gains of antenna used for transmitting is 2dBi, and the antenna connector is a detachable revised SMA type and no consideration of replacement by end user. Please see EUT photo and antenna specification for details.