

# FCC TEST REPORT

for

**UMPC**

**MODEL: CW0A1, CW0A1 series**

**Test Report Number:**  
**KS080805A05-RP**

Issued for

**First International Computer, Inc**  
NO.300, YangGuang St., NeiHu, Taipei,  
Taiwan, 114

Issued by:

**Compliance Certification Services Inc.**  
**Kun shan Laboratory**  
No.10 Weiye Rd, Innovation park, Eco&Tec,  
Development Zone, Kunshan City, Jiangsu, P.R.O.C  
**TEL: 86-512-57355888**  
**FAX: 86-512-57370818**  
**Issued Date: August 25, 2008**



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 25, 2008	Initial Issue	ALL	Miro chueh



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# 1 TEST CERTIFICATION

**Product:** UMPC

**Model:** CW0A1, CW0A1 series

**Brand:** FIC, EVEREX

**Tested:** From August 15, 2008 to August 25, 2008

**Applicant:** First International Computer, Inc  
NO.300, YangGuang St., NeiHu, Taipei, Taiwan, 114

**Manufacturer:** First International Computer(suzhou), Inc  
Export Processing Zone, No 200, Central Suhong Road, SuZhou Industrial Park JiangSu,  
P.R.China

## APPLICABLE STANDARDS

Standard	Test Type	Standard	Test Type
15.207(a)	Power Line Conducted Emissions	15.247(d) 15.209(a)	<ul style="list-style-type: none"> <li>● Spurious Emissions</li> <li>● Conducted Measurement</li> <li>● Radiated Emissions</li> </ul>
15.247(a)(2)	6dB Bandwidth Measurement	15.247(b)(3) 15.247(b)(4)	Peak Power Measurement
15.247(d)	Band Edges Measurement	15.247(e)	Peak Power Spectral Density

## DEVIATION FROM APPLICABLE STANDARD

None

The above equipment was tested by Compliance Certification Services Inc. 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 the requirements of FCC Rules Part 15.207, 15.209, 15.247.

**Approved by:**

**Reviewed by:**

Miro Chueh  
EMC Manager  
Compliance Certification Service Inc.

Lin Zhang  
EMC Section Manager  
Compliance Certification Service Inc.



## 2 TEST RESULT SUMMARY

APPLICABLE STANDARDS			
Standard	Test Type	Result	Remark
15.247(a)(2)	6dB Bandwidth Measurement	Pass	Meet the requirement of limit.
15.247(b)(3) 15.247(b)(4)	Peak Power Measurement	Pass	Meet the requirement of limit.
15.247(d)	Band Edges Measurement	Pass	Meet the requirement of limit.
15.247(e)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.247(d) 15.209(a)	Spurious Emissions ● Conducted Measurement ● Radiated Emissions	Pass	Meet the requirement of limit.
15.207(a)	Power line Conducted Emissions	Pass	Meet the requirement of limit.

Note: 1. The test result judgment is decided by the limit of test standard  
2. The information of measurement uncertainty is available upon the customer's request.



### 3 EUT DESCRIPTION

<b>Product</b>	UMPC
<b>Trade Name</b>	FIC, EVEREX
<b>Model Number</b>	CW0A1, CW0A1 series
<b>Model Discrepancy</b>	All the above models are identical except the model designation for different market.
<b>Wireless LAN module Model Number</b>	AW-GE703H
<b>Wireless LAN module Brand name</b>	AzureWave
<b>Power Adapter Power Rating</b>	Powered from an AC/DC power adapter (1)Model name: ADP-40MH AD Manufacturer: DELTA Input: AC 100-240V, 50-60Hz, 1.2A Output: DC 20V, 2A (2)Model name: 0225C2040 Manufacturer: LISHIN Input: AC 100-240V, 50-60Hz, 1.7A Output: DC 20V, 2.0A
<b>AC Power Cord Type</b>	Unshielded, 1.8m (Detachable) to Power Adapter
<b>DC Power Cable Type</b>	Unshielded, 1.8m (Non-Detachable) at Power Adapter with a core
<b>Frequency Range</b>	2412 ~ 2462 MHz
<b>Transmit Power</b>	IEEE 802.11b:17.15dBm IEEE 802.11g:13.30dBm
<b>Modulation Technique</b>	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) + OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
<b>Transmit Data Rate</b>	IEEE 802.11b: 11, 5.5, 2, 1 Mbps IEEE 802.11g: 54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps
<b>Number of Channels</b>	IEEE 802.11b , IEEE 802.11g :11 Channels
<b>Antenna Specification</b>	0.57dBi gain (Max)

**Note:** 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

2. This submittal(s) (test report) is intended for FCC ID: **EUNCW0A1A** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



## **4 TEST METHODOLOGY**

### **4.1. DESCRIPTION OF TEST MODES**

The EUT had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

IEEE802.11b: Channel low(2412MHz), Channel middle(2437MHz) and Channel high (2462MHz) with preliminary test 11, 5.5, 2, and 1, After the preliminary scan , the following test mode 11Mbps highest data rate (the worst case) are chosen for the final testing.

IEEE802.11g: Channel low(2412MHz), Channel middle(2437MHz) and Channel high(2462MHz) with preliminary test 54/48/36/24/18/12/9/6, After the preliminary scan , the following test mode 6Mbps data rate (the worst case) are chosen for the final testing.



## 5 SETUP OF EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	LCD Monitor	SDM-HX7 3	9014264	DoC	SONY	Shielded, 1.8m with a Core	Un-Shielded, 1.5m
2	HDD-1	IC25N01 0ATDA04- 0	173W3644	DoC	IBM	Shielded, 1.5m	N/A
3	HDD-2	IC25N01 0ATDA04- 0	173W3646	DoC	IBM	Shielded, 1.5m	N/A
4	Speaker-1	CD-371	N/A	DoC	JINLIAN	Un-Shielded, 2.0m	N/A
5	Notebook	M285	1824064-1B	DoC	LEO	LAN cable: Shielded 10m	Shielded, 1.8m

**Note:**

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

### 5.2. CONFIGURATION OF SYSTEM UNDER TEST

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.





## 6 FACILITIES AND ACCREDITATIONS

### 6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at  
 **No.10Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, P.R.O.C**

The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

<b>USA</b>	FCC,A2LA
<b>Japan</b>	VCCI
<b>Canada</b>	INDUSTRY CANADA,
<b>Taiwan</b>	TAF

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsemc.com>.

### 6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in ETR 028:

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	+/- 1.13dB
Radiated emissions	30MHz ~ 200MHz	+/- 3.84dB
	200MHz ~1000MHz	+/- 3.82dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



## 7 LIMITS AND RESULTS

### 7.1. POWER LINE CONDUCTED EMISSIONS MEASUREMENT

#### 7.1.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dBµV)	
	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 in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### TEST INSTRUMENTS

Conducted Emission				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC Analyzer	Agilent	E7402A	US41160329	03/05/2009
V (V-LISN)	Schwarzbeck	NNLK 8129	8129-143	05/06/2009
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	SN:05012	05/06/2009
TRANSIENT LIMITER	SCHAFFNER	CFL9206	1710	04/18/2009
RF Current Probe	FCC	F-65A	147	05/06/2009

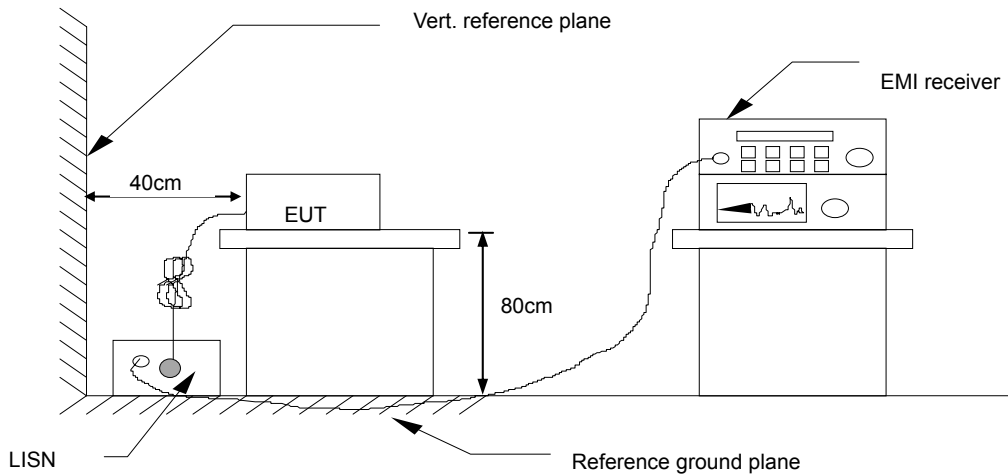
- NOTE:**
- 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  - 2. N.C.R = No Calibration Request.



**7.1.2. TEST PROCEDURES** (please refer to measurement standard)

- The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.

**7.1.3. TEST SETUP**



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**7.1.4. Data Sample:**

Frequency (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Correction factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
XXX	37.58	35.11	10.10	47.68	45.21	63.49	53.49	-15.81	-8.28	L1

Frequency (MHz) = Emission frequency in MHz  
 Reading (dBuV) = Uncorrected Analyzer/Receiver reading  
 Correction factor (dB) = Insertion loss of LISN  
 Limit (dBuV) = Limit stated in standard  
 Margin (dB) = Reading (dBuV) – Limit (dBuV)  
 Note = Current carrying line of reading



7.1.5. TEST RESULTS

Adapter :DELTA

Model No.	CW0A1	Test Mode	Normal Link
Environmental Conditions	25deg.C,43% RH, 991 hPa	6dB BANDWIDTH	9 kHz
Tested by:	JEFF		

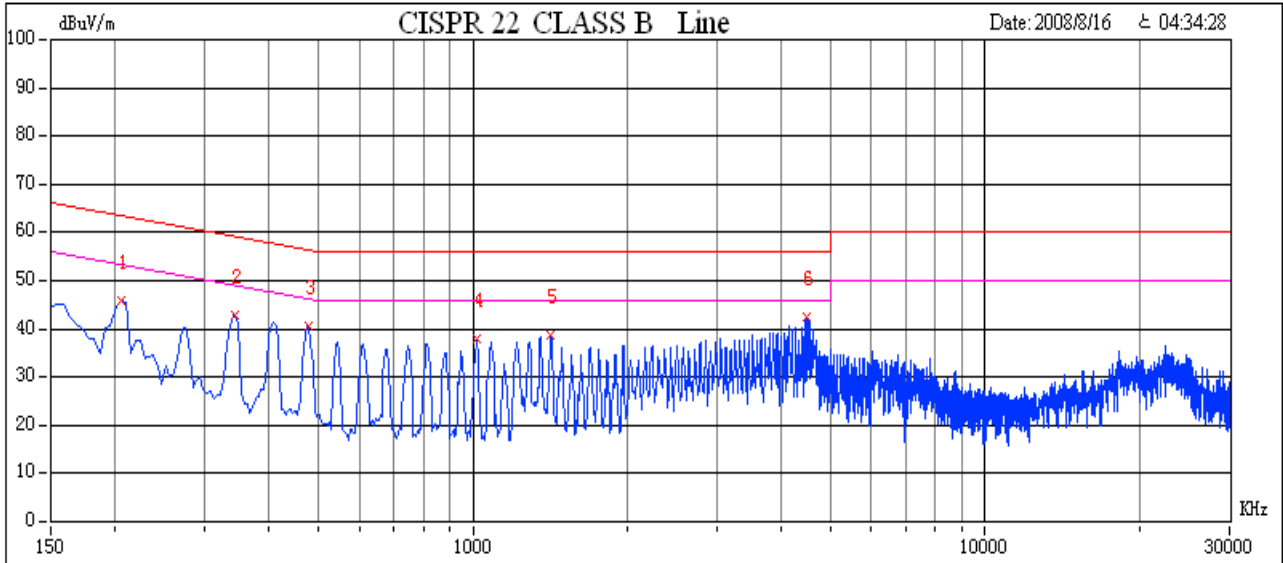
Freq. (MHz)	Q.P. Raw reading (dBuV)	AVG Raw reading (dBuV)	Correction factor(dB)	Q.P. Amptd. (dBuV)	AVG Amptd. (dBuV)	Q.P. Limit (dB uV)	AVG Limit (dBuV)	Q.P. Margin (dB)	AVG Margin (dB)	Line/Neutral
0.204	31.78	24.59	12.65	44.43	37.24	64.44	54.44	-20.01	-17.20	Line
0.338	29.45	28.33	12.88	42.33	41.21	60.61	50.61	-18.28	-9.40	Line
0.473	27.22	26.01	12.96	40.18	38.97	56.76	46.76	-16.58	-7.79	Line
1.012	20.99	18.31	13.08	34.07	31.39	56.00	46.00	-21.93	-14.61	Line
1.420	21.56	15.16	13.15	34.71	28.31	56.00	46.00	-21.29	-17.69	Line
4.465	26.87	16.97	13.59	40.46	30.56	56.00	46.00	-15.54	-15.44	Line
0.202	34.73	25.37	11.57	46.30	36.94	64.51	54.51	-18.21	-17.57	Neutral
0.335	29.94	28.50	11.68	41.62	40.18	60.70	50.70	-19.08	-10.52	Neutral
0.472	25.82	24.13	11.71	37.53	35.84	56.79	46.79	-19.26	-10.95	Neutral
1.352	23.46	21.16	11.84	35.30	33.00	56.00	46.00	-20.70	-13.00	Neutral
3.921	23.41	17.08	12.13	35.54	29.21	56.00	46.00	-20.46	-16.79	Neutral
4.531	26.80	17.68	12.19	38.99	29.87	56.00	46.00	-17.01	-16.13	Neutral

REMARKS: L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

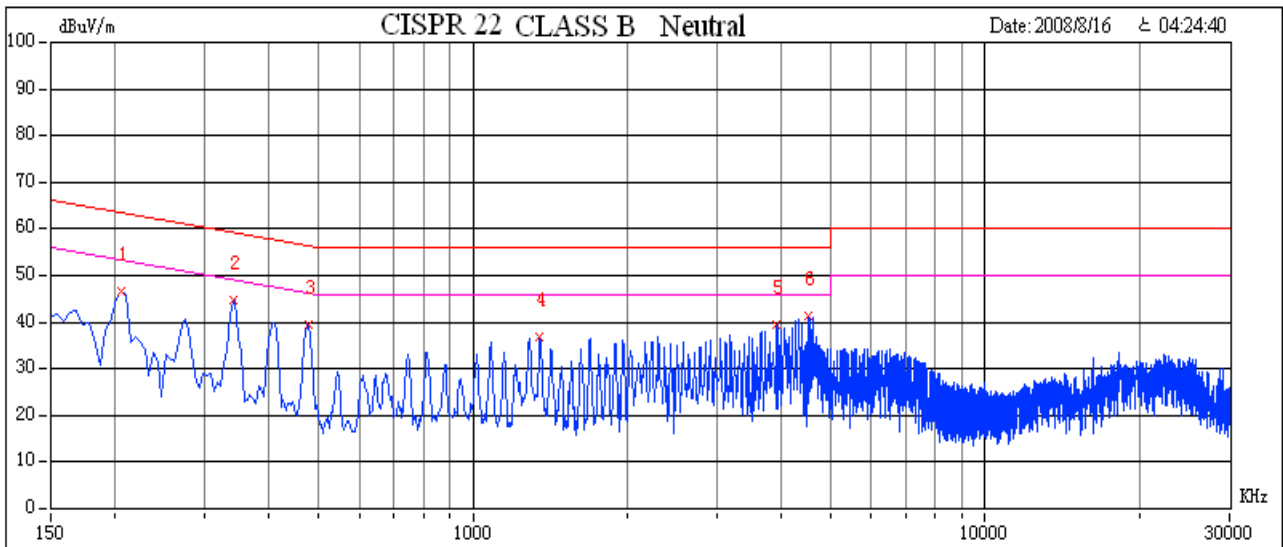


**Test Plots**

**Conducted emissions (Line 1)**



**Conducted emissions (Line 2)**





**Adapter :LI SHIN**

<b>Model No.</b>	<b>CW0A1</b>	<b>Test Mode</b>	<b>Normal Link</b>
<b>Environmental Conditions</b>	<b>25deg.C,43% RH, 991 hPa</b>	<b>6dB BANDWIDTH</b>	<b>9 kHz</b>
<b>Tested by:</b>	<b>JEFF</b>		

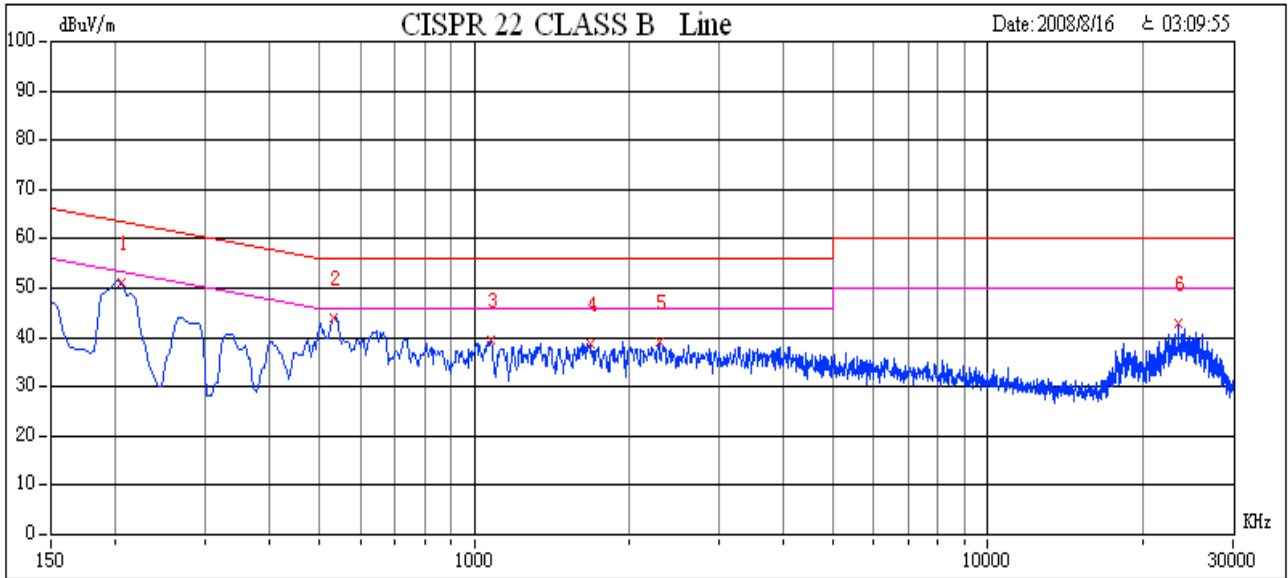
Freq. (MHz)	Q.P. Raw reading (dBuV)	AVG Raw reading (dBuV)	Correction factor(dB)	Q.P. Amptd. (dBuV)	AVG Amp td. (dBuV)	Q.P. Lim it (dBuV)	AVG Limit (dBuV)	Q.P. Margin (dB)	AVG Margin (dB)	Line/Neut ral
0.201	36.86	26.98	12.64	49.50	39.62	64.54	54.54	-15.04	-14.92	Line
0.531	29.99	25.06	12.98	42.97	38.04	56.00	46.00	-13.03	-7.96	Line
1.071	24.00	15.64	13.09	37.09	28.73	56.00	46.00	-18.91	-17.27	Line
1.679	23.09	13.40	13.20	36.29	26.60	56.00	46.00	-19.71	-19.40	Line
2.281	22.77	12.83	13.29	36.06	26.12	56.00	46.00	-19.94	-19.88	Line
23.493	19.19	10.82	14.66	33.85	25.48	60.00	50.00	-26.15	-24.52	Line
0.189	30.47	10.49	11.54	42.01	22.03	64.87	54.87	-22.86	-32.84	Neutral
0.267	26.64	15.66	11.64	38.28	27.30	62.65	52.65	-24.37	-25.35	Neutral
0.528	28.19	20.72	11.73	39.92	32.45	56.00	46.00	-16.08	-13.55	Neutral
0.602	27.18	20.86	11.74	38.92	32.60	56.00	46.00	-17.08	-13.40	Neutral
4.201	17.01	6.63	12.16	29.17	18.79	56.00	46.00	-26.83	-27.21	Neutral
23.644	19.11	10.91	13.87	32.98	24.78	60.00	50.00	-27.02	-25.22	Neutral

**REMARKS:**L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

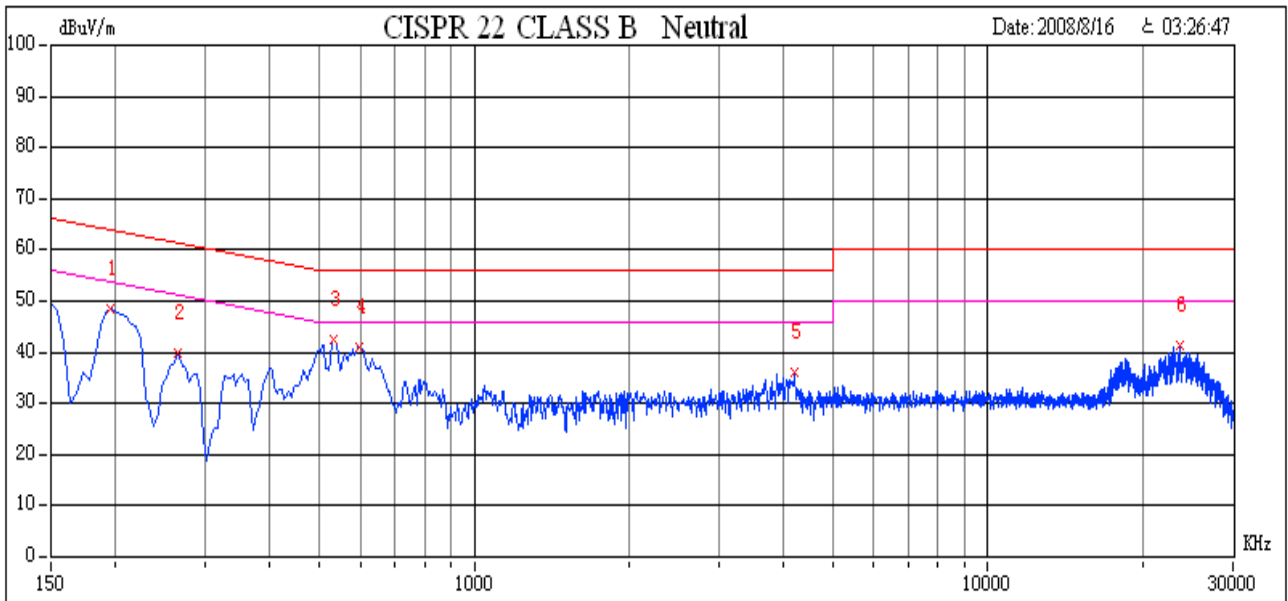


**Test Plots**

**Conducted emissions (Line 1)**



**Conducted emissions (Line 2)**







## 7.2. SPURIOUS EMISSIONS MEASUREMENT

### 7.2.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

### 7.2.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2008

### 7.2.3. TEST PROCEDURE (please refer to measurement standard)

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site. The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz. Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.



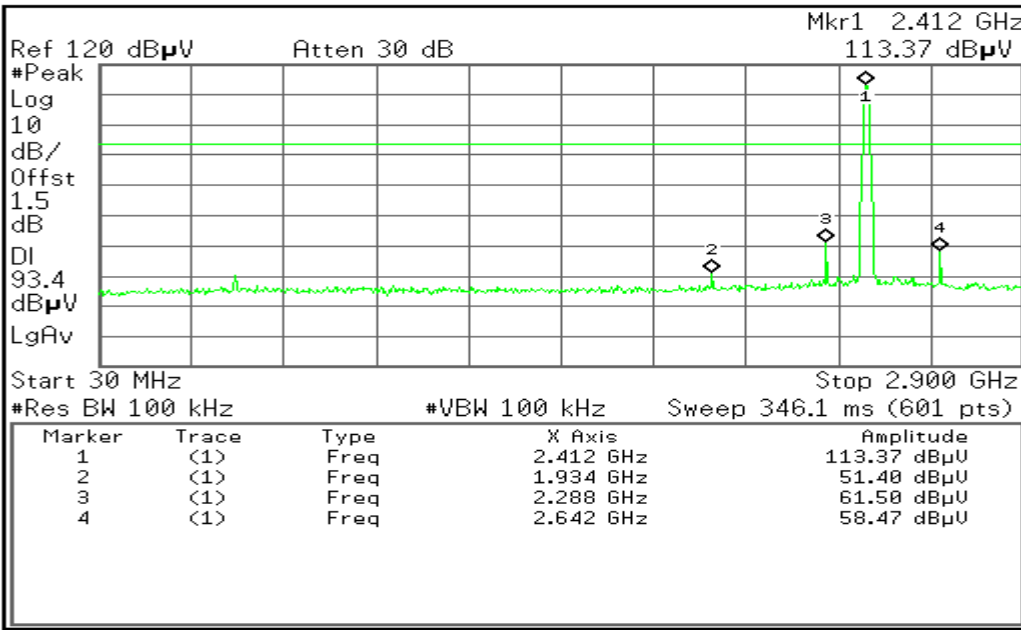
7.2.4. TEST RESULTS

Test Plot (IEEE 802.11b mode)

CH Low

30MHz ~ 2.9GHz

Agilent 14:10:34 Aug 20, 2008

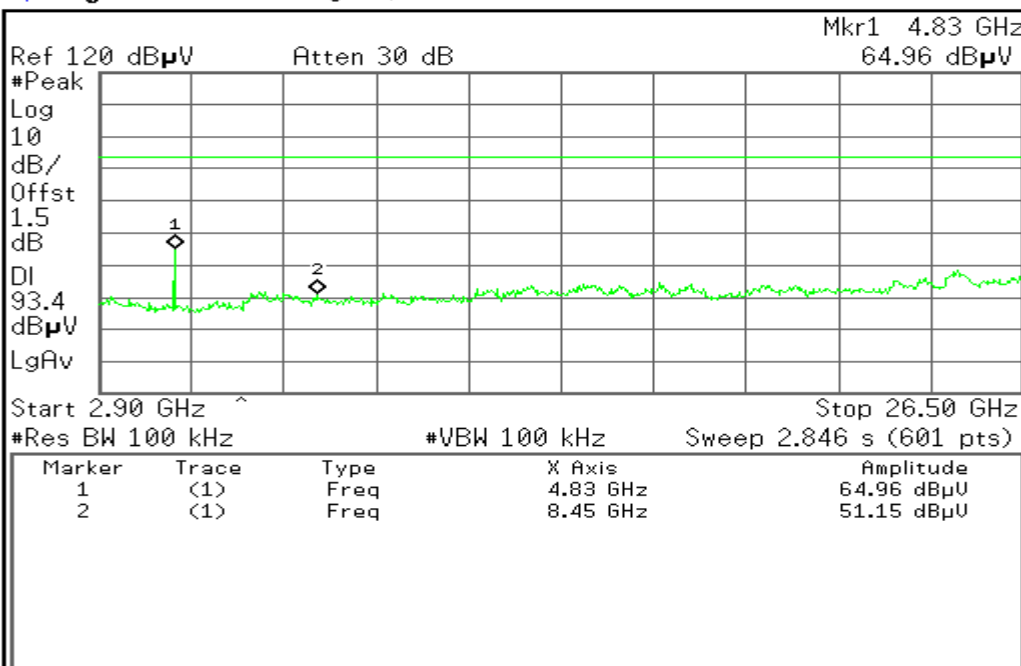


Marker			
Select Marker	1	2	3 4
Normal			
Delta			
Delta Pair (Tracking Ref)			
Span Pair Center			
Off			
More 1 of 2			

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2.9GHz ~ 26.5GHz

Agilent 14:11:19 Aug 20, 2008



Marker			
Select Marker	1	2	3 4
Normal			
Delta			
Delta Pair (Tracking Ref)			
Span Pair Center			
Off			
More 1 of 2			

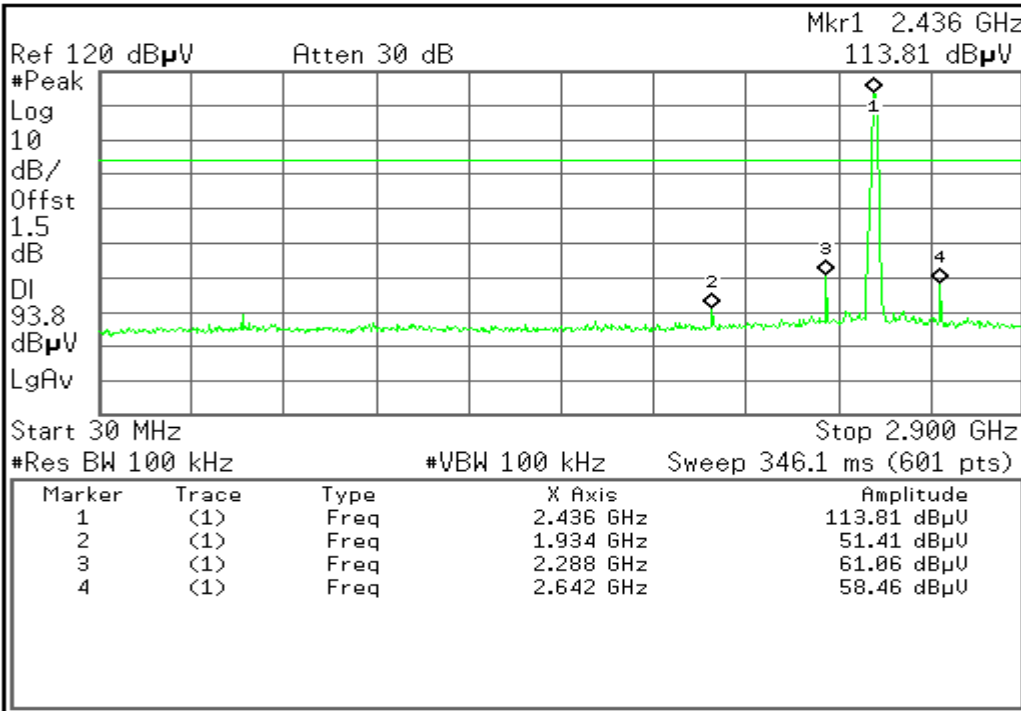
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**CH Mid**

**30MHz ~ 2.9GHz**

Agilent 14:08:36 Aug 20, 2008



**Marker**

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Span Center

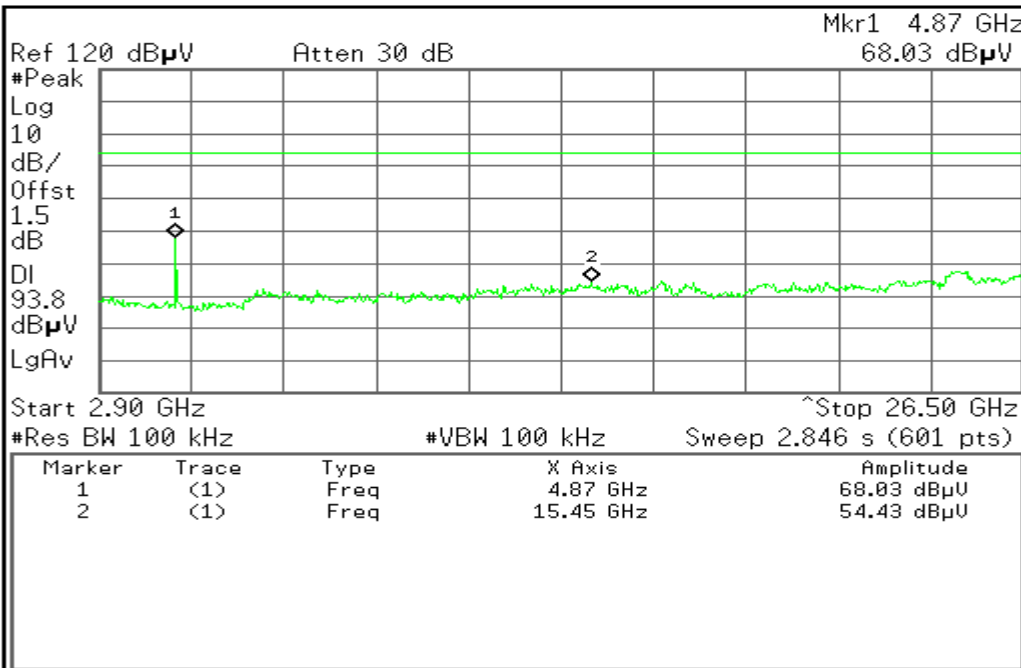
Off

More 1 of 2

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**2.9GHz ~ 26.5GHz**

Agilent 14:09:21 Aug 20, 2008



**Marker**

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Span Center

Off

More 1 of 2

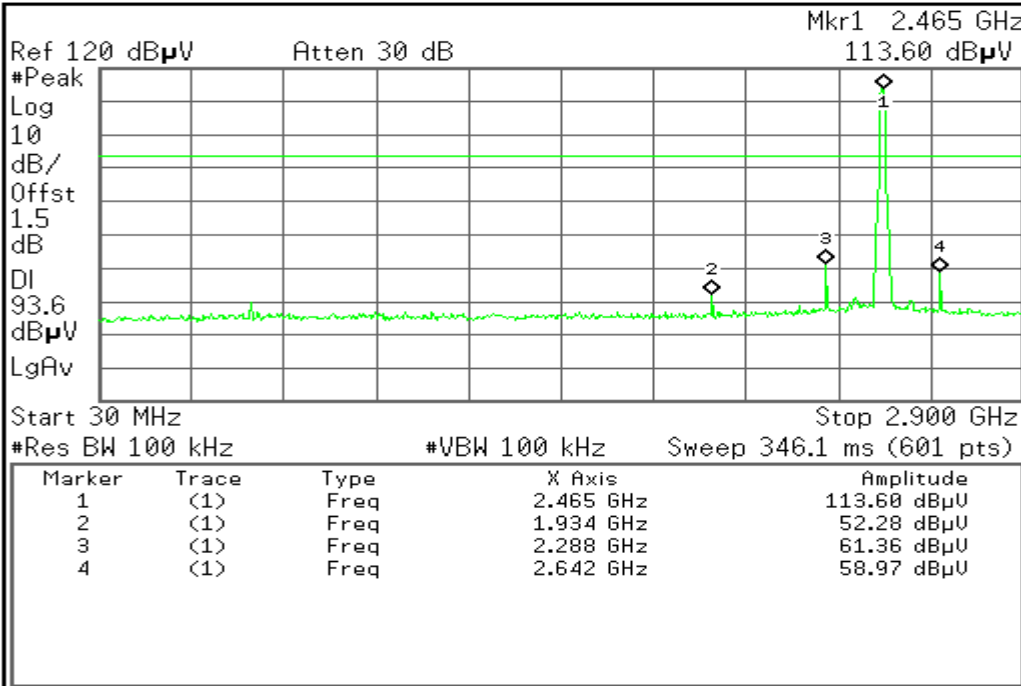
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**CH High**

**30MHz ~ 2.9GHz**

Agilent 14:06:21 Aug 20, 2008



**Marker**

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Center

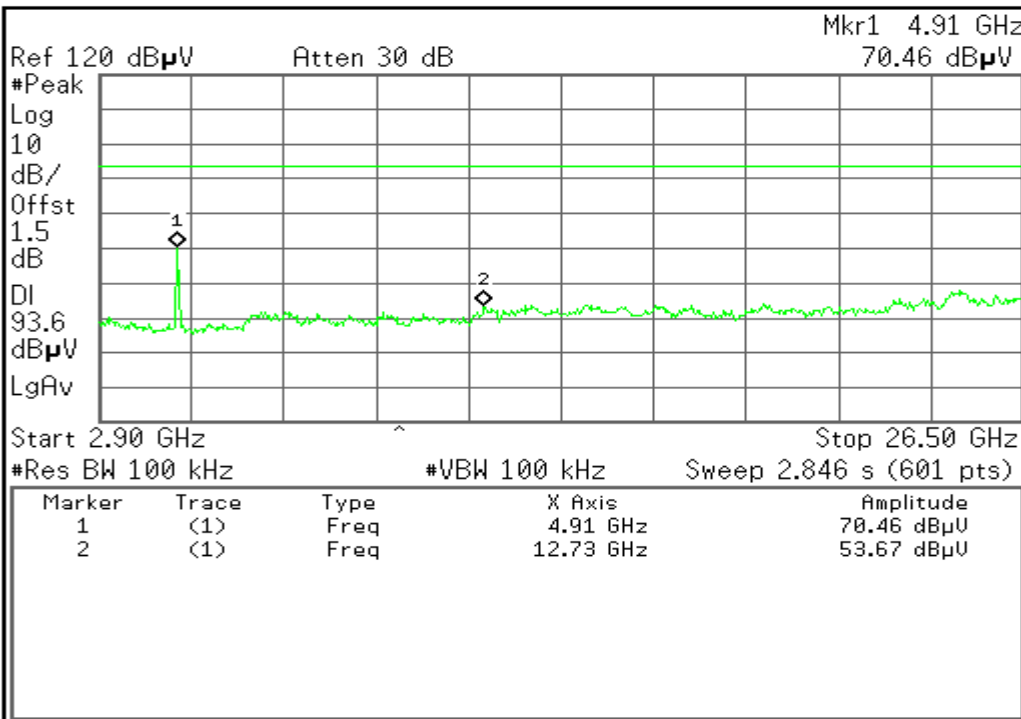
Off

More 1 of 2

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**2.9GHz ~ 26.5GHz**

Agilent 14:07:01 Aug 20, 2008



**Marker**

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Center

Off

More 1 of 2

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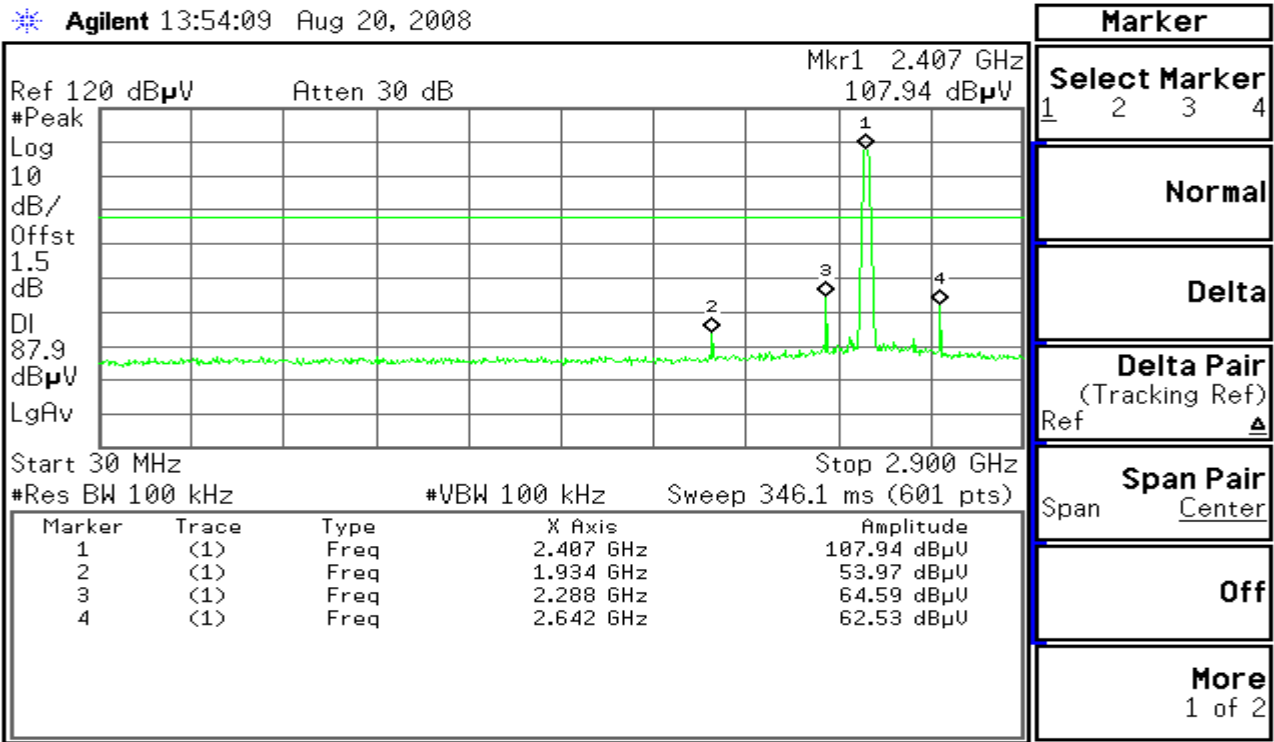


Test Plot (IEEE 802.11g mode)

CH Low

30MHz ~ 2.9GHz

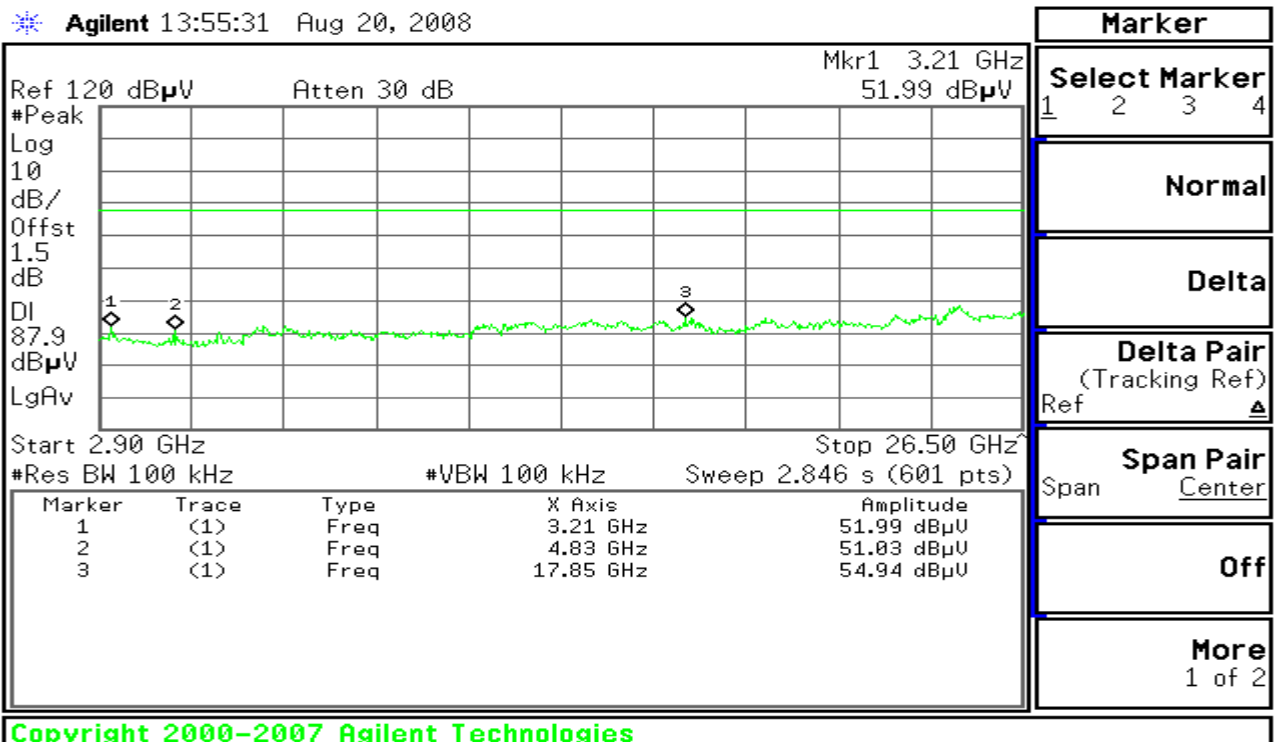
Agilent 13:54:09 Aug 20, 2008



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2.9GHz ~ 26.5GHz

Agilent 13:55:31 Aug 20, 2008



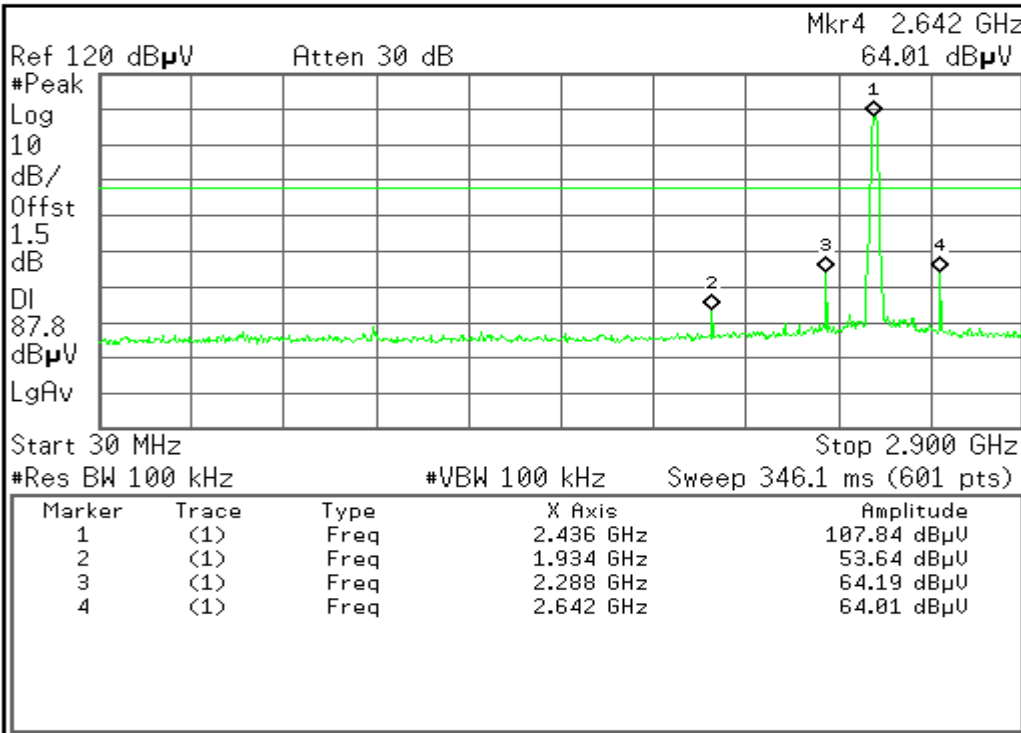
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CH Mid

30MHz ~ 2.9GHz

Agilent 13:57:01 Aug 20, 2008



**Marker**

Select Marker  
1 2 3 4

Normal

Delta

Delta Pair  
(Tracking Ref)  
Ref ▲

Span Pair  
Span Center

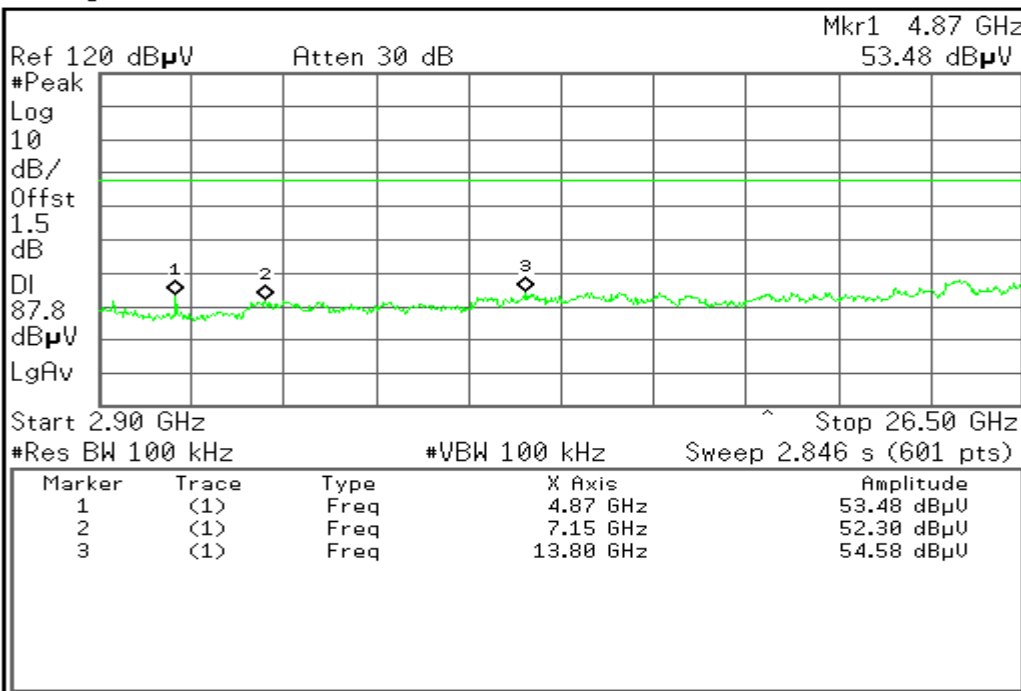
Off

More  
1 of 2

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2.9GHz ~ 26.5GHz

Agilent 13:58:24 Aug 20, 2008



**Marker**

Select Marker  
1 2 3 4

Normal

Delta

Delta Pair  
(Tracking Ref)  
Ref ▲

Span Pair  
Span Center

Off

More  
1 of 2

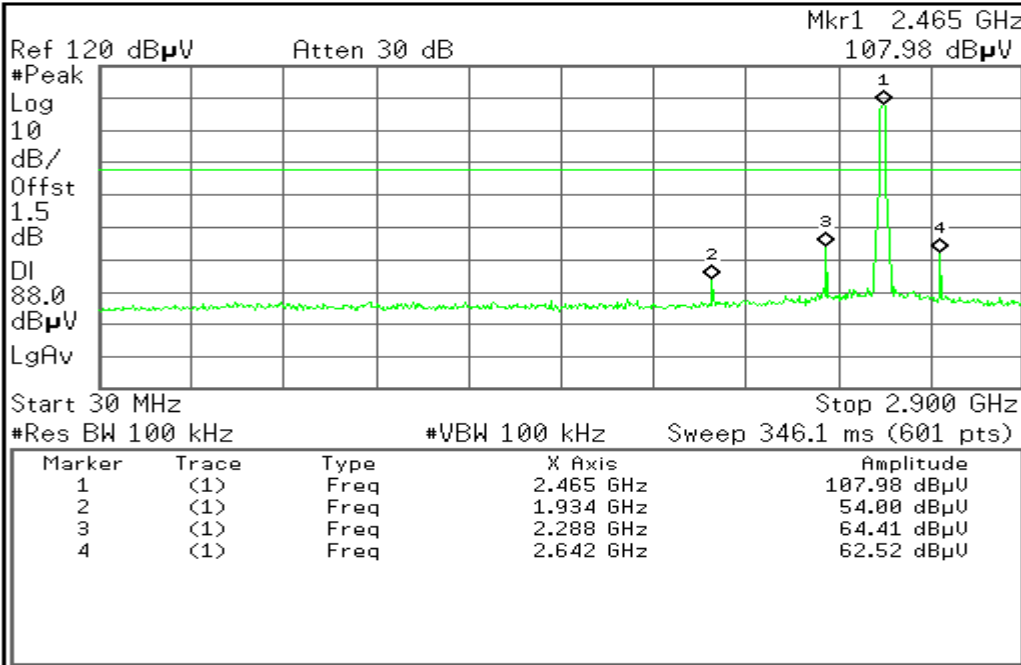
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**CH High**

**30MHz ~ 2.9GHz**

Agilent 14:02:26 Aug 20, 2008

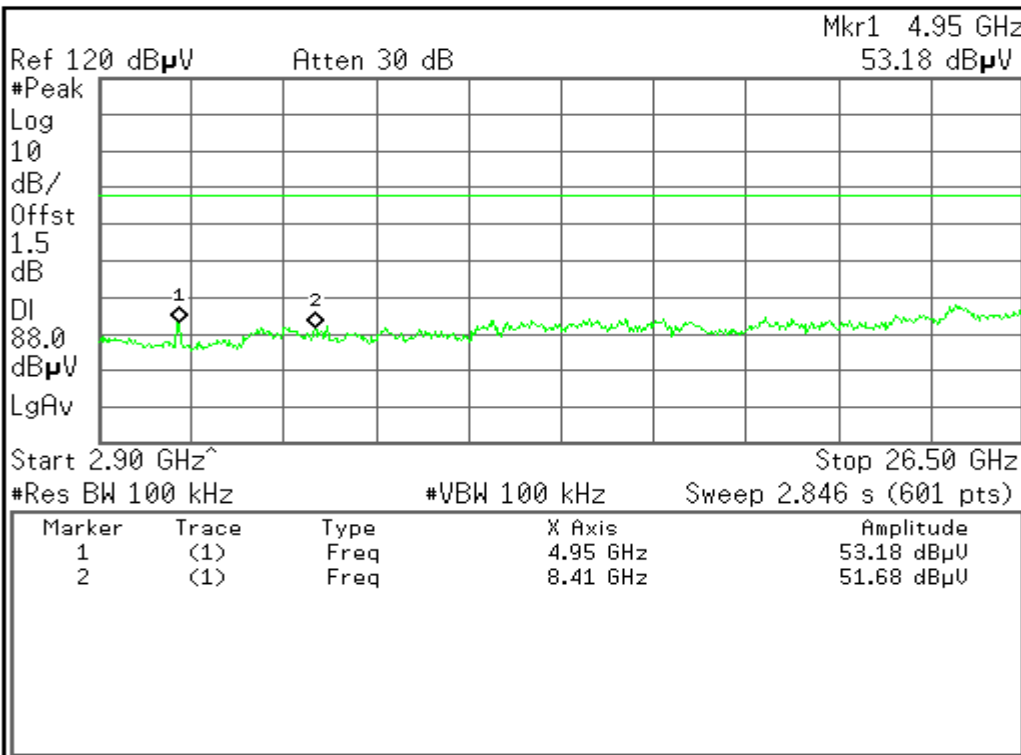


Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref) Ref ▲				
Span Pair Center				
Off				
More 1 of 2				

File Operation Status, A:\SCREN063.GIF file saved

**2.9GHz ~ 26.5GHz**

Agilent 14:03:18 Aug 20, 2008



Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref) Ref ▲				
Span Pair Center				
Off				
More 1 of 2				

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7.2.5. Radiated Emissions

7.2.5.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

**NOTE:** (1) The lower limit shall apply at the transition frequencies.  
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).





7.2.5.2. TEST INSTRUMENTS

3M Semi Anechoic Chamber (977)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2008
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2009
EMI Test Receiver	R&S	ESPI3	101026	11/11/2008
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	12/13/2008
Pre-Amplifier	Miteq	NSP4000-NF	870731	01/28/2009
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2008
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	02/01/2009
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	12/19/2008
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Site NSA	CCS	N/A	N/A	04/06/2009

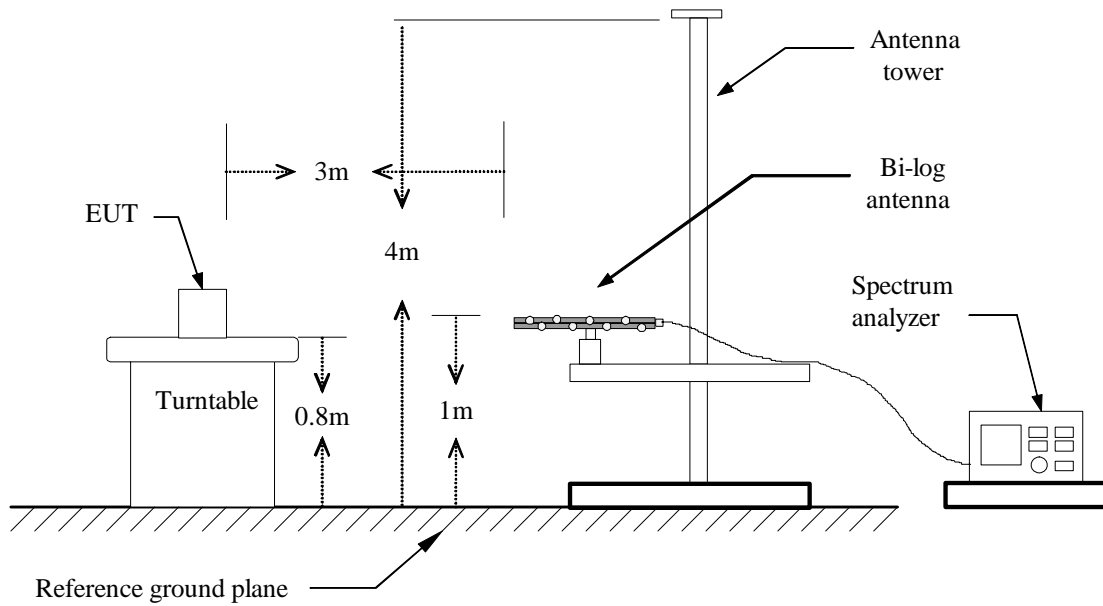
- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 2. The FCC Site Registration number is 93105,90471.  
 4. N.C.R = No Calibration Required.

7.2.5.3. TEST PROCEDURE (please refer to measurement standard)

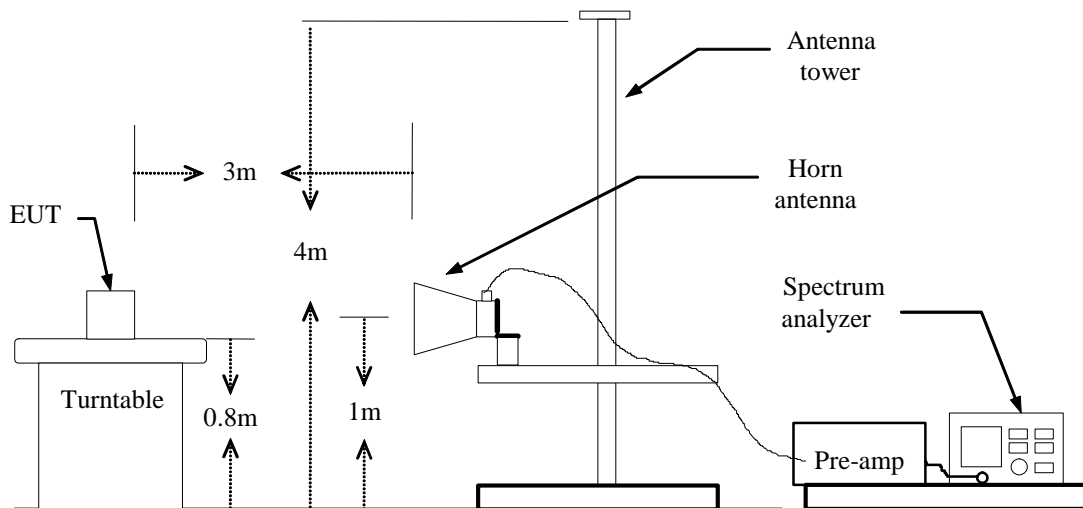
- The EUT is placed on a turntable, which is 0.8m above ground plane.
- The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- Set the spectrum analyzer in the following setting as:  
 Below 1GHz:  
     RBW=100kHz / VBW=300kHz / Sweep=AUTO  
 Above 1GHz:  
     (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO  
     (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
- Repeat above procedures until the measurements for all frequencies are complete.

**7.2.5.4. TEST SETUP**

**Below 1 GHz**



**Above 1 GHz**



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



7.2.5.5. Data Sample:

**Below 1 GHz**

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Remark) (dBuV)	Correction Factor (dB/m)	Result (Remark) (dBuV/m)	Limit (Peak) (dBuV/m)	Margin (dB)	Remark
xxx	V	12.12	10.21	22.33	37.00	-14.67	Peak

**Above 1 GHz**

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
xxx	V	65.45	63.00	-11.12	54.33	51.88	74.00	54.00	-2.12	AVG

- Frequency (MHz) = Emission frequency in MHz
- Ant.Pol. (H/V) = Antenna polarization
- Reading (dBuV) = Uncorrected Analyzer / Receiver reading
- Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
- Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)
- Limit (dBuV/m) = Limit stated in standard
- Margin (dB) = Remark Result (dBuV/m) – Limit (dBuV/m)
- Peak = Peak Reading
- QP = Quasi-peak Reading
- AVG = Average Reading



7.2.5.6. TEST RESULTS

**Below 1 GHz**

Operation Mode: Normal Link

Test Date: August 21, 2008

Temperature: 26°C

Tested by: jeff

Humidity: 52 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
110.34	V	Peak	40.91	-10.02	30.89	43.5	-12.61
164.19	V	Peak	42.17	-9.96	32.21	43.5	-11.29
178.76	V	Peak	44.31	-10.73	33.58	43.5	-9.92
192.32	V	Peak	43.58	-10.67	32.91	43.5	-10.59
365.94	V	Peak	44.65	-5.44	39.21	46.0	-6.79
854.11	V	Peak	35.64	3.08	38.72	46.0	-7.28
160.33	H	Peak	41.08	-9.74	31.34	43.5	-12.16
204.77	H	Peak	43.02	-10.03	32.99	43.5	-10.51
222.08	H	Peak	46.51	-10.29	36.22	46.0	-9.78
288.32	H	Peak	43.78	-7.72	36.06	46.0	-9.94
600.21	H	Peak	41.85	-1.03	40.82	46.0	-5.18
853.13	H	Peak	34.77	3.08	37.85	46.0	-8.15

**REMARKS:**

1. Measuring frequencies from 30 MHz to the 1GHz, No emission found between lowest internal used/generated frequency to 30 MHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).



Above 1 GHz

Operation Mode: TX / IEEE 802.11b / CH Low

Test Date: August 21, 2008

Temperature: 26°C

Tested by: jeff

Humidity: 52% RH

Polarity: Ver. / Hor.

Table with 11 columns: Frequency (MHz), Ant.Pol. (H/V), Reading (Peak) (dBuV), Reading (Average) (dBuV), Correction Factor (dB/m), Result (Peak) (dBuV/m), Result (Average) (dBuV/m), Limit (Peak) (dBuV/m), Limit (Average) (dBuV/m), Margin (dB), Remark. Rows include data for frequencies 2288.13, 4825.00, 7233.45, 2288.15, 4823.33, and 7236.56.

REMARKS:

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11b / CH Mid  
Temperature: 26°C  
Humidity: 52% RH

Test Date: August 21, 2008  
Tested by: jeff  
Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2288.22	V	47.94	37.05	4.24	52.18	41.29	74.00	54.00	-12.71	average
4874.67	V	47.08	35.27	11.08	58.16	46.35	74.00	54.00	-7.65	average
7312.45	V	36.06	23.88	18.22	54.28	42.1	74.00	54.00	-11.90	average
2288.17	H	46.65	36.78	4.24	50.89	41.02	74.00	54.00	-12.98	average
4875.00	H	46.68	33.24	11.08	57.76	44.32	74.00	54.00	-9.68	average
7311.34	H	34.67	21.52	18.22	52.89	39.74	74.00	54.00	-14.26	average

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11b / CH High  
Temperature: 26°C  
Humidity: 52 % RH

Test Date: August 21, 2008  
Tested by: jeff  
Polarity: Ver. / Hor.

Frequency (MHz)	Ant.Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
2288.35	V	47.67	36.03	4.24	51.91	40.27	74.00	54.00	-13.73	average
4924.67	V	46.78	33.93	11.15	57.93	45.08	74.00	54.00	-8.92	average
7388.66	V	35.77	23.29	17.99	53.76	41.28	74.00	54.00	-12.72	average
2288.17	H	45.65	35.75	4.24	49.89	39.99	74.00	54.00	-14.01	average
4925.00	H	45.28	32.12	11.15	56.43	43.27	74.00	54.00	-10.73	average
7389.97	H	33.21	20.76	17.99	51.20	38.75	74.00	54.00	-15.25	average

REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. 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.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11g / CH Low
Temperature: 26°C
Humidity: 52 % RH

Test Date: August 21, 2008
Tested by: jeff
Polarity: Ver. / Hor.

Table with 11 columns: Frequency (MHz), Ant. Pol. (H/V), Reading (Peak) (dBuV), Reading (Average) (dBuV), Correction Factor (dB/m), Result (Peak) (dBuV/m), Result (Average) (dBuV/m), Limit (Peak) (dBuV/m), Limit (Average) (dBuV/m), Margin (dB), Remark. Contains data for frequencies 2288.32, 4824.33, 7234.56, 2288.16, 4825.00, 7235.43.

REMARKS:

- 7. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
8. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
9. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
10. 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.
11. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
12. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).





Operation Mode: TX / IEEE 802.11g / CH Mid
Temperature: 26°C
Humidity: 52 % RH

Test Date: August 21, 2008
Tested by: jeff
Polarity: Ver. / Hor.

Table with 11 columns: Frequency (MHz), Ant. Pol. (H/V), Reading (Peak) (dBuV), Reading (Average) (dBuV), Correction Factor (dB/m), Result (Peak) (dBuV/m), Result (Average) (dBuV/m), Limit (Peak) (dBuV/m), Limit (Average) (dBuV/m), Margin (dB), Remark. Contains data for frequencies 2288.17, 4873.67, 7312.56, 2288.23, 4875.00, 7315.42.

REMARKS:

- 7. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
8. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
9. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
10. 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.
11. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
12. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11g / CH High
Temperature: 26°C
Humidity: 52 % RH

Test Date: August 21, 2008
Tested by: jeff
Polarity: Ver. / Hor.

Table with 11 columns: Frequency (MHz), Ant. Pol. (H/V), Reading (Peak) (dBuV), Reading (Average) (dBuV), Correction Factor (dB/m), Result (Peak) (dBuV/m), Result (Average) (dBuV/m), Limit (Peak) (dBuV/m), Limit (Average) (dBuV/m), Margin (dB), Remark. Contains data for frequencies 2288.12, 4925.00, 7385.00, 2288.21, 4924.53, 7383.45.

REMARKS:

- 7. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
8. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
9. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
10. 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.
11. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
12. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



### 7.3. 6dB BANDWIDTH MEASUREMENT

#### 7.3.1. LIMITS

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 500 kHz.

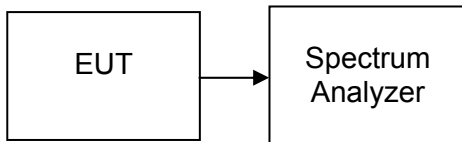
#### 7.3.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2008

#### 7.3.3. TEST PROCEDURES (please refer to measurement standard)

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100kHz, VBW = RBW, Span = 20MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

#### 7.3.4. TEST SETUP





7.3.5. TEST RESULTS

No non-compliance noted

**Test Data**

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	11110	>500	PASS
Mid	2437	11090		PASS
High	2462	11111		PASS

**Test Data**

Test mode: IEEE 802.11g

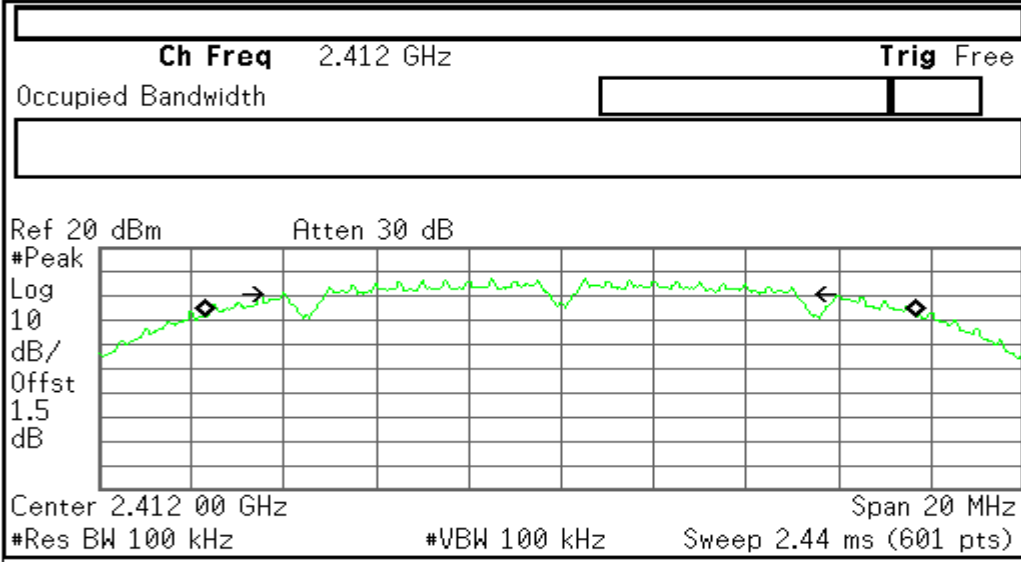
Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	16354	>500	PASS
Mid	2437	16355		PASS
High	2462	16370		PASS



Test Plot (IEEE 802.11b mode)

6dB Bandwidth (CH Low)

Agilent 14:15:23 Aug 20, 2008



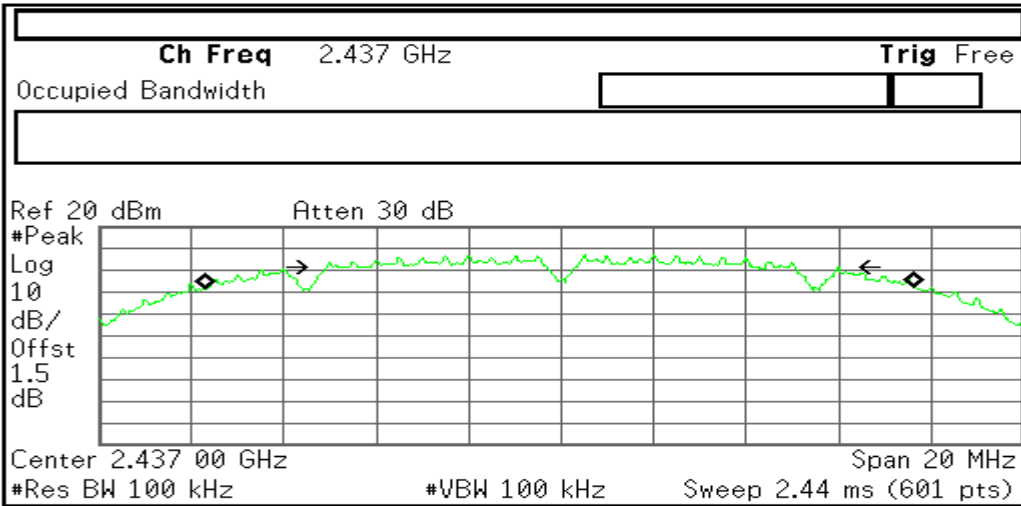
Marker
Select Marker 1 2 3 4
Normal
Delta
Delta Pair (Tracking Ref) Ref ▲
Span Pair Span Center
Off
More 1 of 2

Occupied Bandwidth	Occ BW % Pwr	99.00 %
15.3705 MHz	x dB	-6.00 dB
Transmit Freq Error		-10.637 kHz
x dB Bandwidth		11.110 MHz

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6dB Bandwidth (CH Mid)

Agilent 14:16:02 Aug 20, 2008



Marker
Select Marker 1 2 3 4
Normal
Delta
Delta Pair (Tracking Ref) Ref ▲
Span Pair Span Center
Off
More 1 of 2

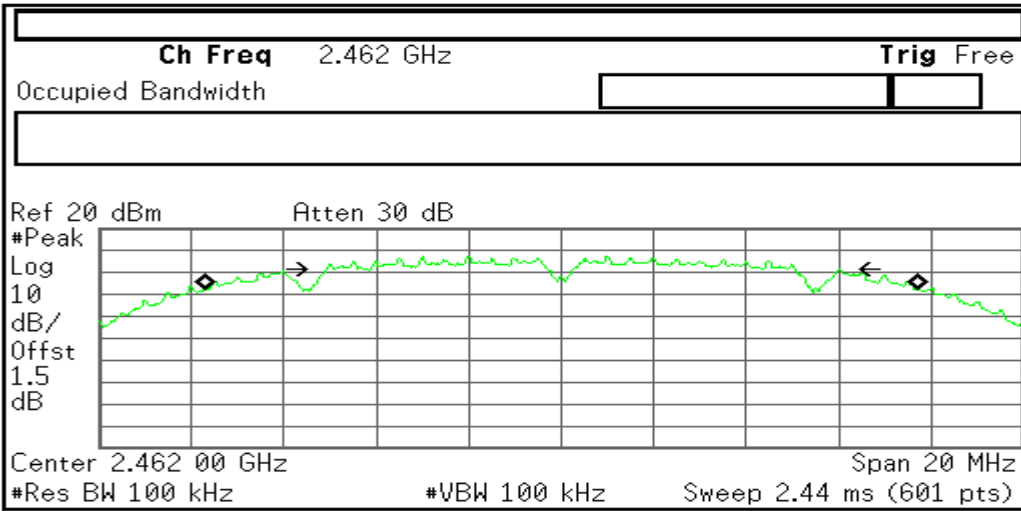
Occupied Bandwidth	Occ BW % Pwr	99.00 %
15.3210 MHz	x dB	-6.00 dB
Transmit Freq Error		-37.336 kHz
x dB Bandwidth		11.090 MHz

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### 6dB Bandwidth (CH High)

Agilent 14:16:38 Aug 20, 2008



Marker			
Select Marker	1	2	3 4
Normal			
Delta			
Delta Pair (Tracking Ref)			
Ref	▲		
Span Pair			
Span	Center		
Off			
More 1 of 2			

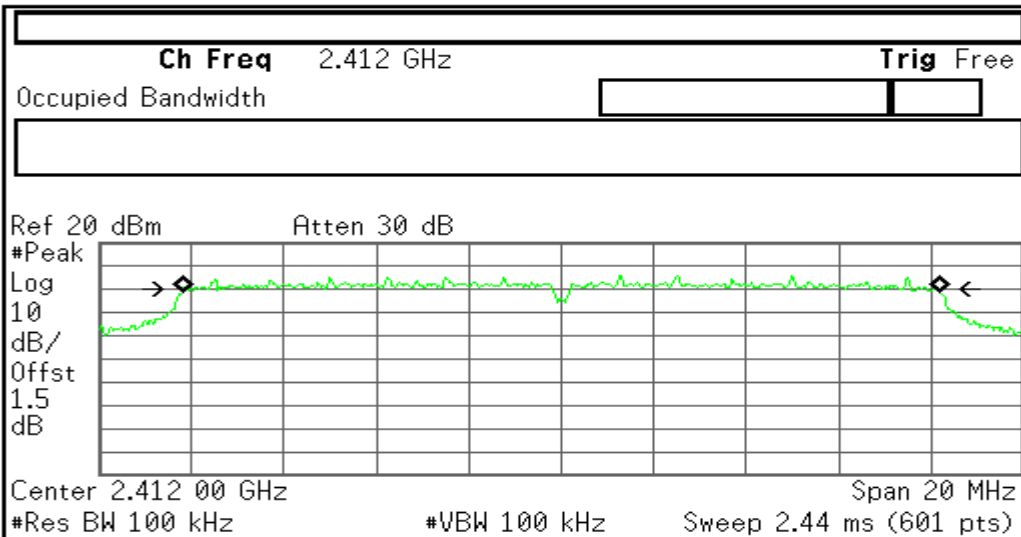
<b>Occupied Bandwidth</b>		<b>Occ BW % Pwr</b>	99.00 %
15.3930 MHz		<b>x dB</b>	-6.00 dB
<b>Transmit Freq Error</b>	-4.519 kHz		
<b>x dB Bandwidth</b>	11.111 MHz		

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### Test Plot (IEEE 802.11g mode)

### 6dB Bandwidth (CH Low)

Agilent 14:20:38 Aug 20, 2008



Marker			
Select Marker	1	2	3 4
Normal			
Delta			
Delta Pair (Tracking Ref)			
Ref	▲		
Span Pair			
Span	Center		
Off			
More 1 of 2			

<b>Occupied Bandwidth</b>		<b>Occ BW % Pwr</b>	99.00 %
16.4144 MHz		<b>x dB</b>	-6.00 dB
<b>Transmit Freq Error</b>	-6.486 kHz		
<b>x dB Bandwidth</b>	16.354 MHz		

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### 6dB Bandwidth (CH Mid)

Agilent 14:19:39 Aug 20, 2008

Ch Freq 2.437 GHz Trig Free

Occupied Bandwidth

Ref 20 dBm Atten 30 dB

#Peak Log 10 dB/Offst 1.5 dB

Center 2.437 00 GHz Span 20 MHz  
#Res BW 100 kHz #VBW 100 kHz Sweep 2.44 ms (601 pts)

<b>Occupied Bandwidth</b>	<b>Occ BW % Pwr</b>	99.00 %
16.4359 MHz	<b>x dB</b>	-6.00 dB
<b>Transmit Freq Error</b>		-7.634 kHz
<b>x dB Bandwidth</b>		16.355 MHz

Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Span Center

Off

More 1 of 2

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### 6dB Bandwidth (CH High)

Agilent 14:19:06 Aug 20, 2008

Ch Freq 2.462 GHz Trig Free

Occupied Bandwidth

Ref 20 dBm Atten 30 dB

#Peak Log 10 dB/Offst 1.5 dB

Center 2.462 00 GHz Span 20 MHz  
#Res BW 100 kHz #VBW 100 kHz Sweep 2.44 ms (601 pts)

<b>Occupied Bandwidth</b>	<b>Occ BW % Pwr</b>	99.00 %
16.4303 MHz	<b>x dB</b>	-6.00 dB
<b>Transmit Freq Error</b>		-359.594 Hz
<b>x dB Bandwidth</b>		16.370 MHz

Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref ▲

Span Pair Span Center

Off

More 1 of 2

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## 7.4. PEAK OUTPUT POWER

### 7.4.1. LIMITS

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(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.

### 7.4.2. TEST INSTRUMENTS

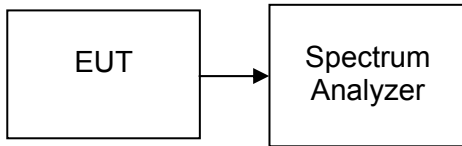
Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	08/15/2009

### 7.4.3. TEST PROCEDURES (please refer to measurement standard)

- 1 Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2 Set RBW = 1 MHz.
- 3 Set VBW ≥ 3 MHz.
- 4 Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode.
- 5 Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to ðhichfree runðhich.
- 6 Trace average 100 traces in power averaging mode.
- 7 Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.



**7.4.4. TEST SETUP**



**7.4.5. TEST RESULTS**

*No non-compliance noted*

**Test Data**

**Test mode: IEEE 802.11b**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	16.68	0.04656	1	PASS
Mid	2437	16.80	0.04786		PASS
High	2462	17.15	0.05188		PASS

**Test mode: IEEE 802.11g**

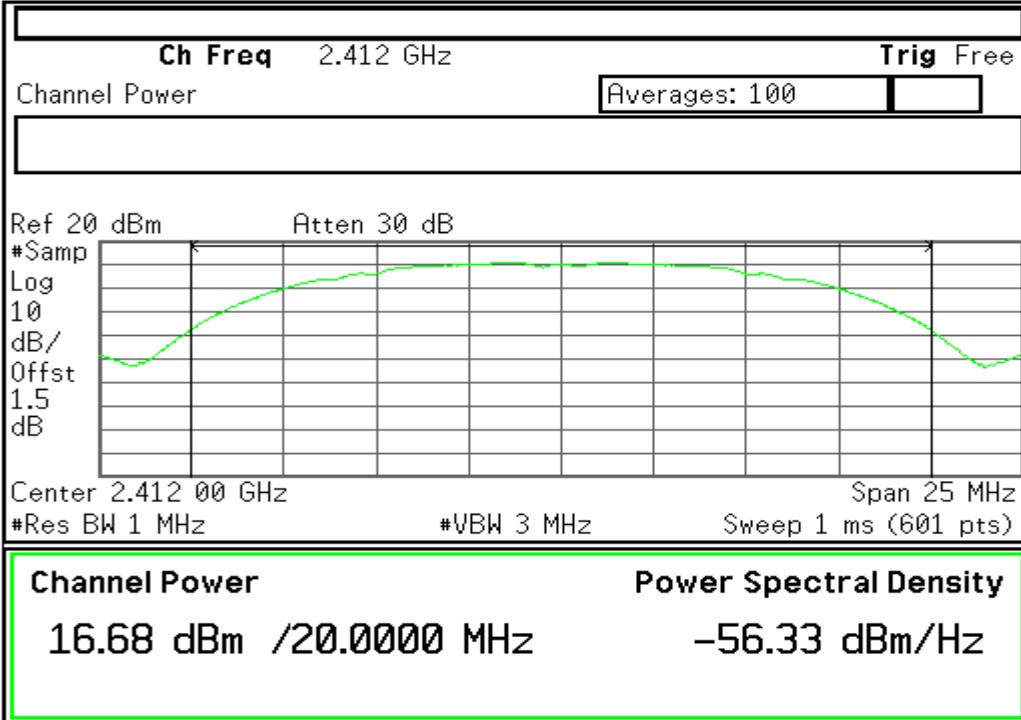
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	13.17	0.02075	1	PASS
Mid	2437	13.05	0.02018		PASS
High	2462	13.30	0.02138		PASS



**Test Plot (IEEE 802.11b mode)**

**Peak Power (CH Low)**

Agilent 11:48:45 Aug 20, 2008

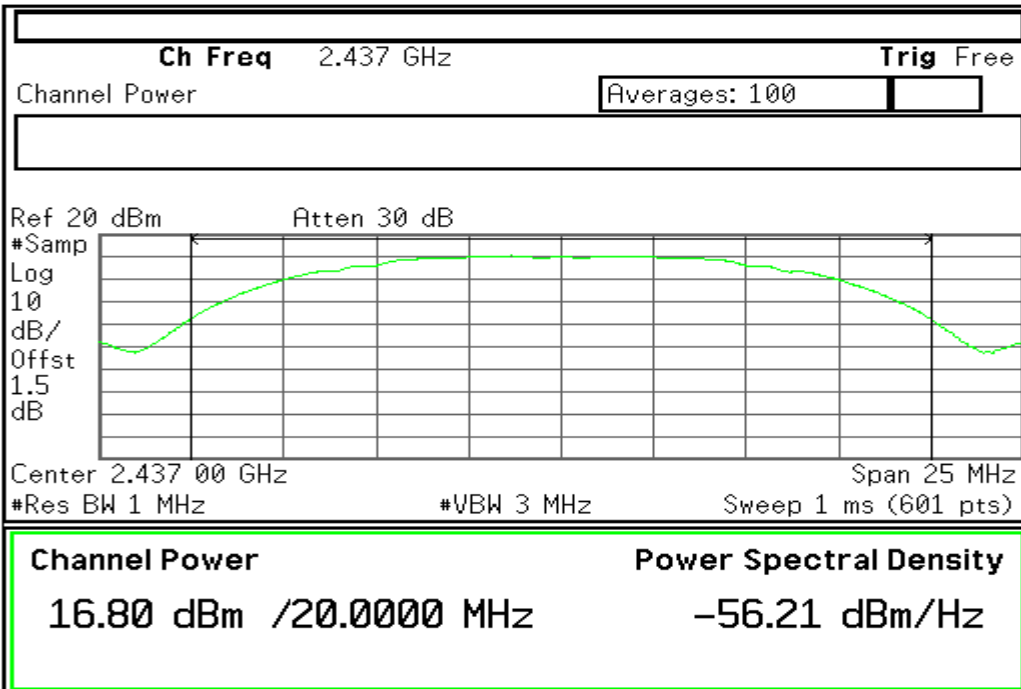


<b>Freq/Channel</b>
<b>Center Freq</b> 2.41200000 GHz
<b>Start Freq</b> 2.39950000 GHz
<b>Stop Freq</b> 2.42450000 GHz
<b>CF Step</b> 2.50000000 MHz Auto Man
<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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**Peak Power (CH Mid)**

Agilent 11:47:55 Aug 20, 2008



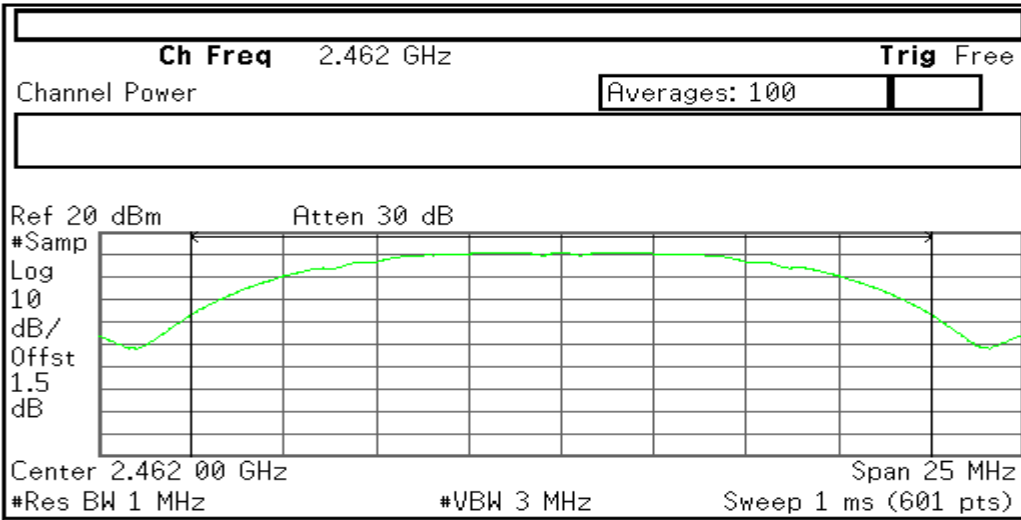
<b>Freq/Channel</b>
<b>Center Freq</b> 2.43700000 GHz
<b>Start Freq</b> 2.42450000 GHz
<b>Stop Freq</b> 2.44950000 GHz
<b>CF Step</b> 2.50000000 MHz Auto Man
<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

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Peak Power (CH High)

Agilent 11:46:58 Aug 20, 2008



Freq/Channel	
Center Freq	2.46200000 GHz
Start Freq	2.44950000 GHz
Stop Freq	2.47450000 GHz
CF Step	2.50000000 MHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

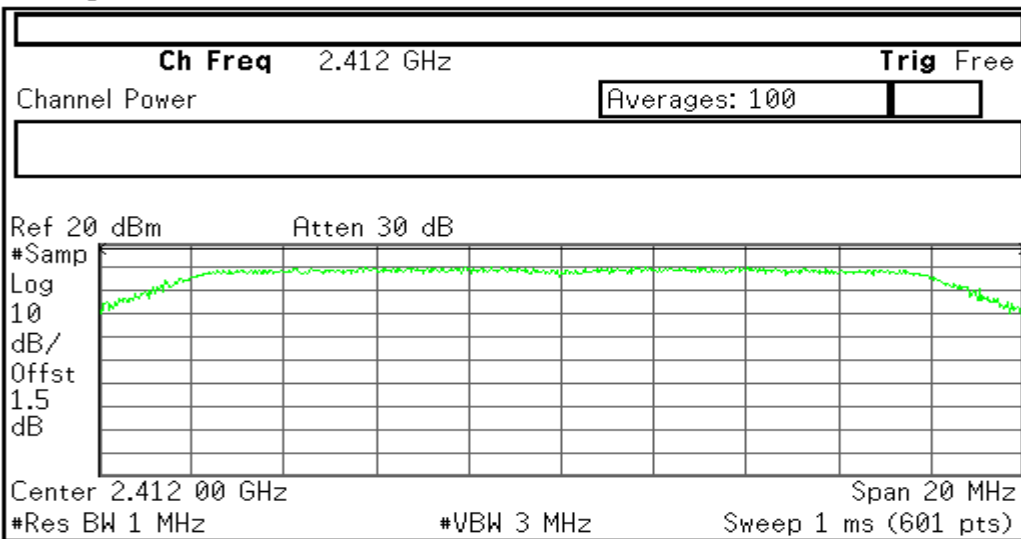
Channel Power	Power Spectral Density
17.15 dBm /20.0000 MHz	-55.86 dBm/Hz

Copyright 2000-2007 Agilent Technologies

Test Plot (IEEE 802.11g mode)

Peak Power (CH Low)

Agilent 11:56:47 Aug 20, 2008



Freq/Channel	
Center Freq	2.41200000 GHz
Start Freq	2.40200000 GHz
Stop Freq	2.42200000 GHz
CF Step	2.00000000 MHz Auto Man
Freq Offset	0.00000000 Hz
Signal Track	On Off

Channel Power	Power Spectral Density
13.17 dBm /20.0000 MHz	-59.84 dBm/Hz

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Peak Power (CH Mid)

Agilent 11:56:11 Aug 20, 2008

Ch Freq 2.437 GHz Trig Free

Channel Power Averages: 100

Ref 20 dBm Atten 30 dB

#Samp Log 10 dB/ Offst 1.5 dB

Center 2.437 00 GHz Span 20 MHz  
#Res BW 1 MHz #VBW 3 MHz Sweep 1 ms (601 pts)

<b>Channel Power</b>	<b>Power Spectral Density</b>
13.05 dBm /20.0000 MHz	-59.96 dBm/Hz

**Freq/Channel**

Center Freq 2.43700000 GHz

Start Freq 2.42700000 GHz

Stop Freq 2.44700000 GHz

CF Step 2.00000000 MHz  
Auto Man

Freq Offset 0.00000000 Hz

Signal Track On Off

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Peak Power (CH High)

Agilent 11:55:30 Aug 20, 2008

Ch Freq 2.462 GHz Trig Free

Channel Power Averages: 100

Ref 20 dBm Atten 30 dB

#Samp Log 10 dB/ Offst 1.5 dB

Center 2.462 00 GHz Span 20 MHz  
#Res BW 1 MHz #VBW 3 MHz Sweep 1 ms (601 pts)

<b>Channel Power</b>	<b>Power Spectral Density</b>
13.30 dBm /20.0000 MHz	-59.71 dBm/Hz

**Freq/Channel**

Center Freq 2.46200000 GHz

Start Freq 2.45200000 GHz

Stop Freq 2.47200000 GHz

CF Step 2.00000000 MHz  
Auto Man

Freq Offset 0.00000000 Hz

Signal Track On Off

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7.5. BAND EDGES MEASUREMENT:

7.5.1. LIMITS

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

7.5.2. TEST INSTRUMENTS

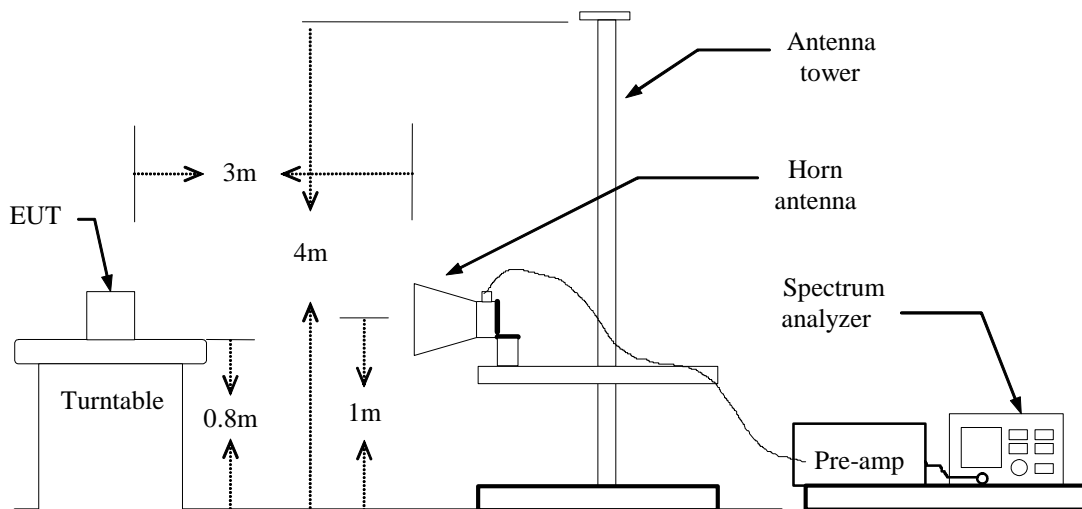
3M Semi Anechoic Chamber (977)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2008
Spectrum Analyzer	Agilent	E4446A	US44300398	07/25/2009
EMI Test Receiver	R&S	ESPI3	101026	11/11/2009
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	12/13/2009
Pre-Amplifier	Miteq	NSP4000-NF	870731	01/28/2009
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2009
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	02/01/2009
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	12/19/2009
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Site NSA	CCS	N/A	N/A	04/06/2009

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 2. The FCC Site Registration number is 93105,90471.  
 4. N.C.R = No Calibration Required.

**7.5.3. TEST PROCEDURES** (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are

**7.5.4. TEST SETUP**





**Test Data**

**Test Plot (IEEE 802.11b mode)**

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak	AV				
					(dBuV/m)	(dBuV/m)				
2390.10	V	47.33	36.41	4.92	52.25	41.33	74	54	-21.75	-12.67
2483.50	V	44.65	34.85	4.92	49.57	39.77	74	54	-24.43	-14.23
2390.10	H	47.13	39.17	4.92	52.05	44.09	74	54	-21.95	-9.91
2483.50	H	45.60	35.92	4.92	50.52	40.84	74	54	-23.48	-13.16



7.5.5. TEST RESULTS

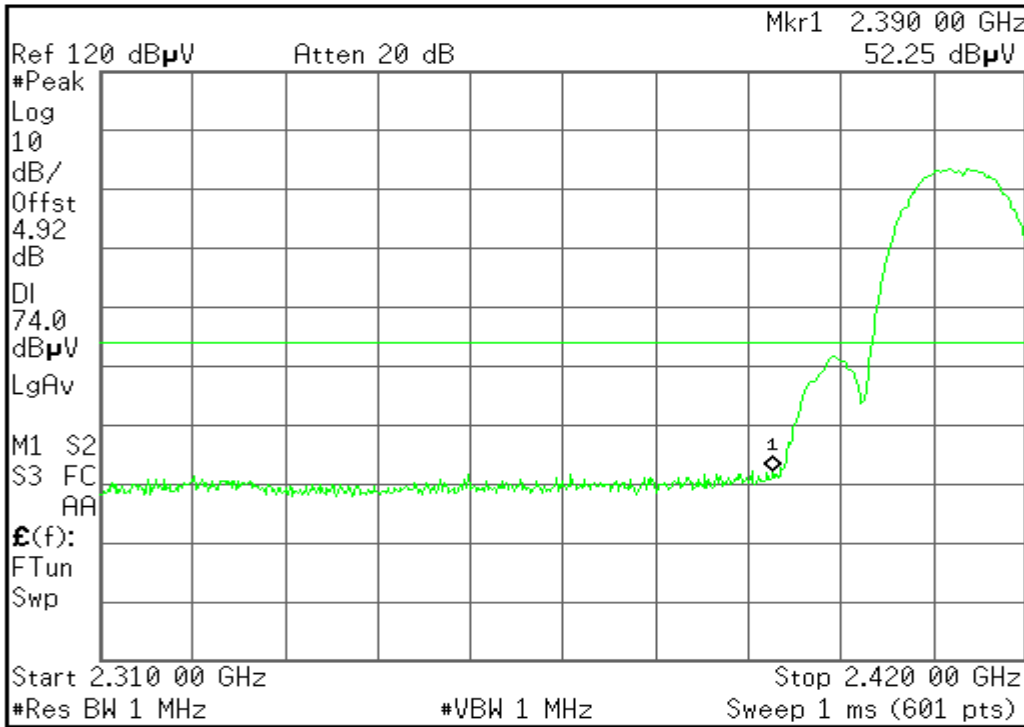
Test Plot (IEEE 802.11b mode)

Band Edges (CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent 15:31:40 Aug 20, 2008



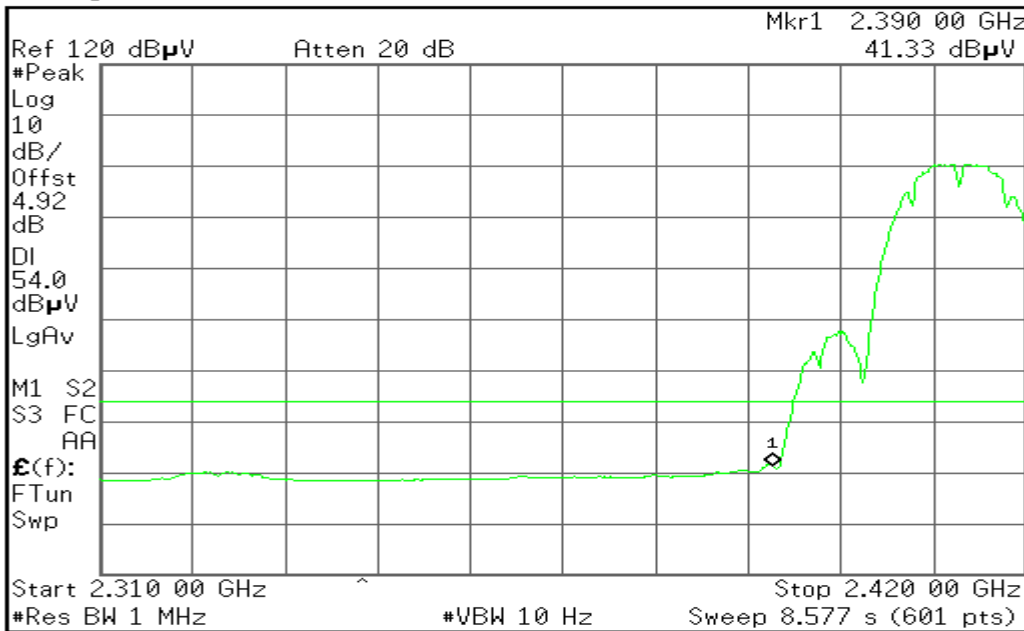
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref) Ref ▲				
Span Pair Span      Center				
Off				
More 1 of 2				

Copyright 2000-2007 Agilent Technologies

Detector mode: Average

Polarity: Vertical

Agilent 15:32:07 Aug 20, 2008



Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref) Ref ▲				
Span Pair Span      Center				
Off				
More 1 of 2				

Copyright 2000-2007 Agilent Technologies

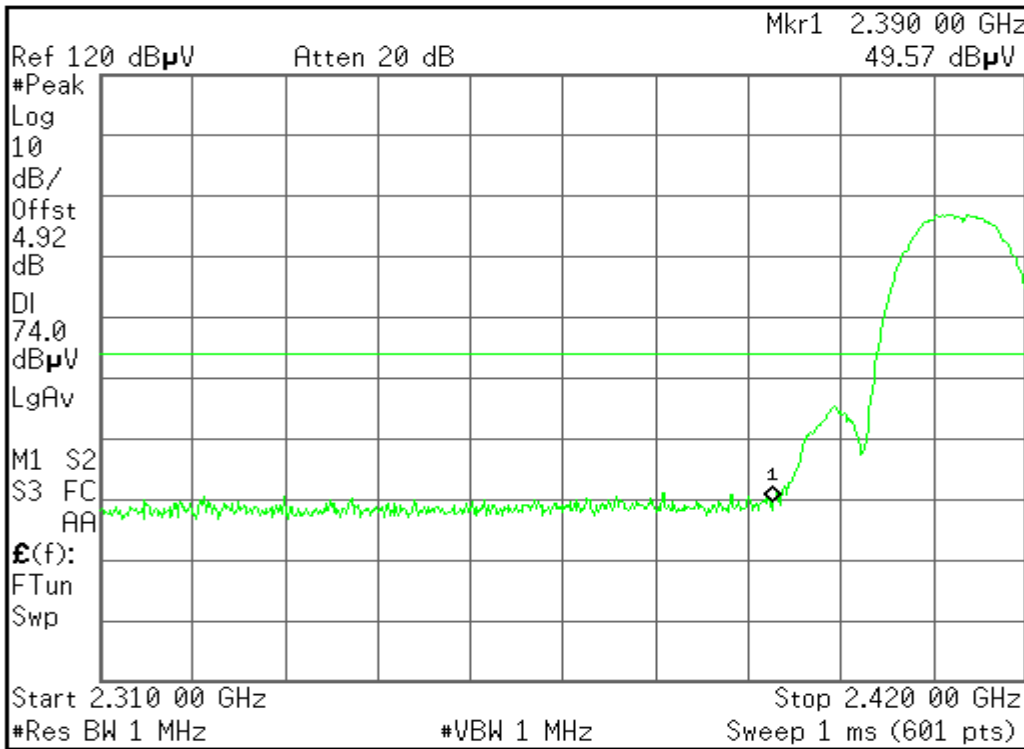




Detector mode: Peak

Polarity: Horizontal

Agilent 15:33:48 Aug 20, 2008



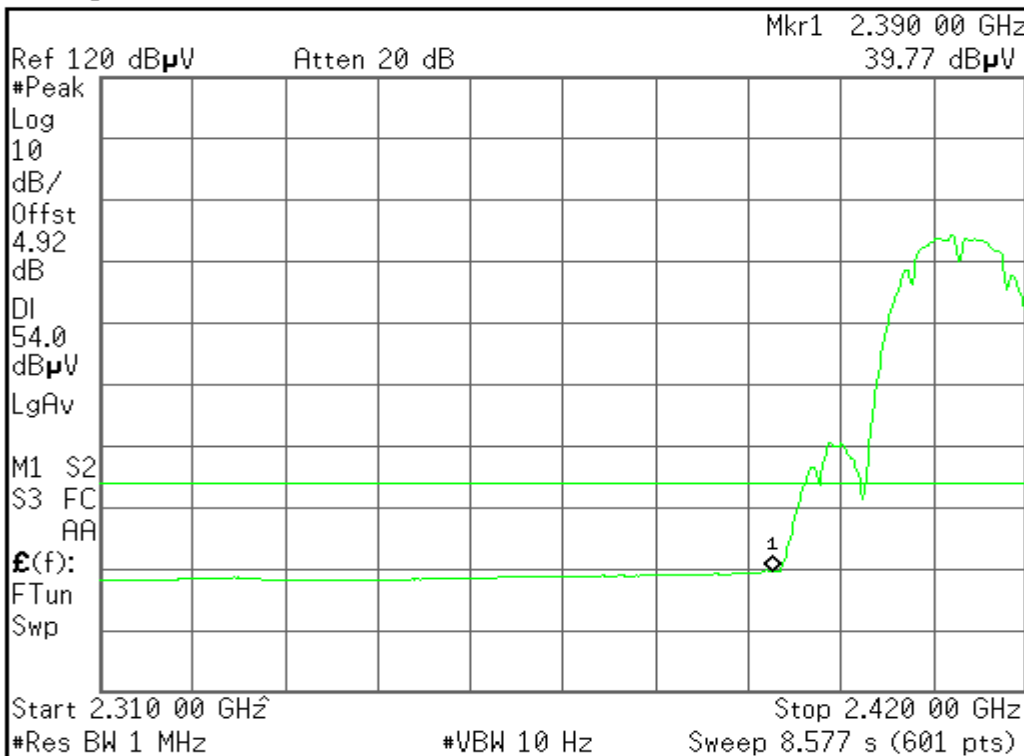
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref	▲			
Span Pair				
Span	Center			
Off				
More				
1 of 2				

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Detector mode: Average

Polarity: Horizontal

Agilent 15:34:22 Aug 20, 2008



Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref	▲			
Span Pair				
Span	Center			
Off				
More				
1 of 2				

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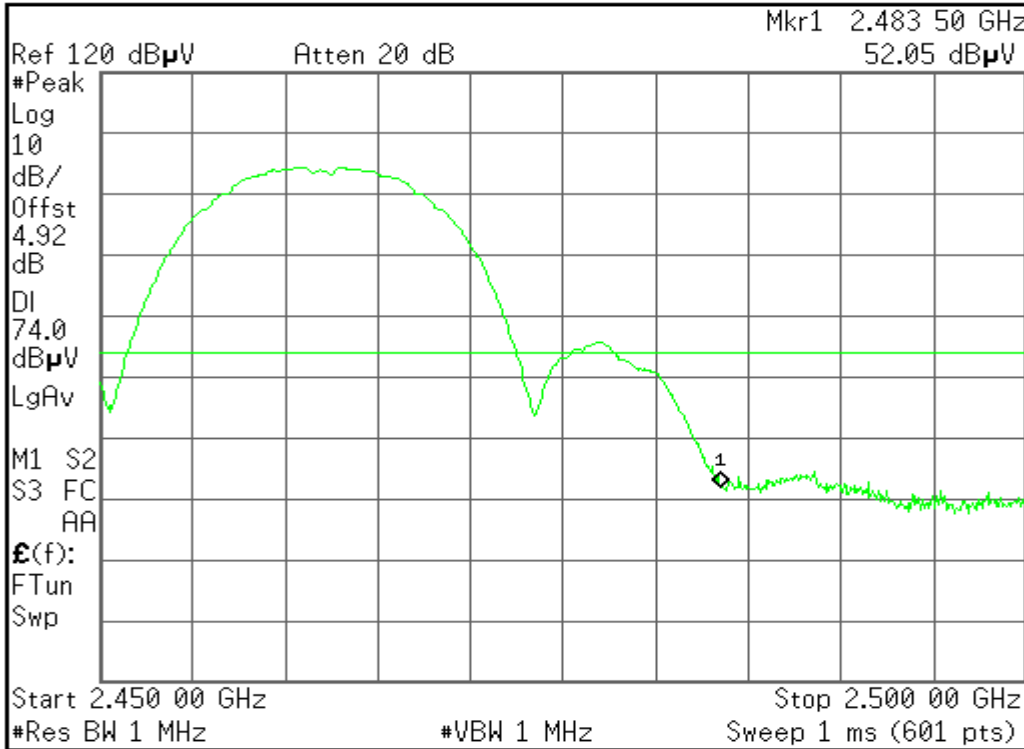


### Band Edges (CH High)

Detector mode: Peak

Polarity: Vertical

Agilent 15:40:30 Aug 20, 2008



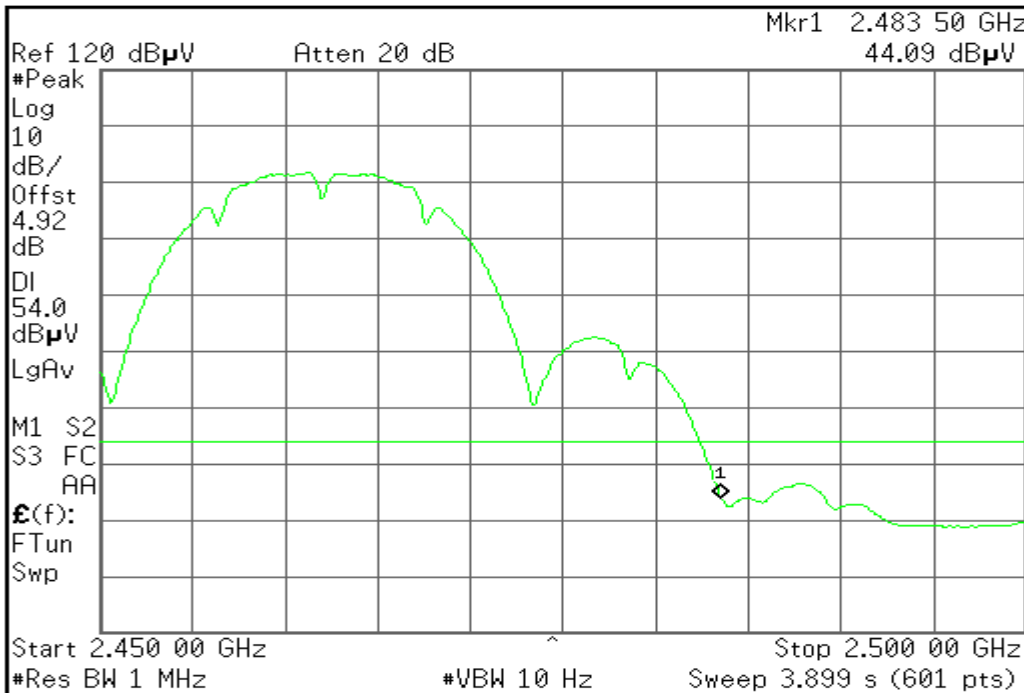
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref) Ref $\Delta$				
Span Pair Span      Center				
Off				
More 1 of 2				

Copyright 2000-2007 Agilent Technologies

Detector mode: Average

Polarity: Vertical

Agilent 15:41:00 Aug 20, 2008



Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref) Ref $\Delta$				
Span Pair Span      Center				
Off				
More 1 of 2				

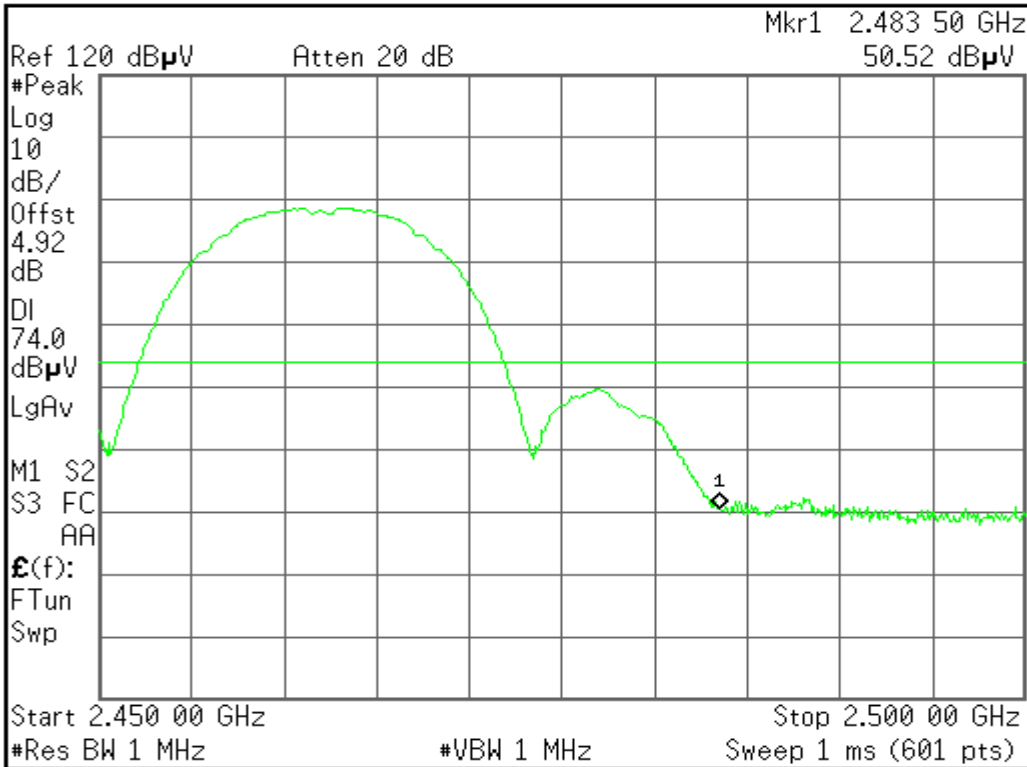
Copyright 2000-2007 Agilent Technologies



Detector mode: Peak

Polarity: Horizontal

Agilent 15:38:41 Aug 20, 2008



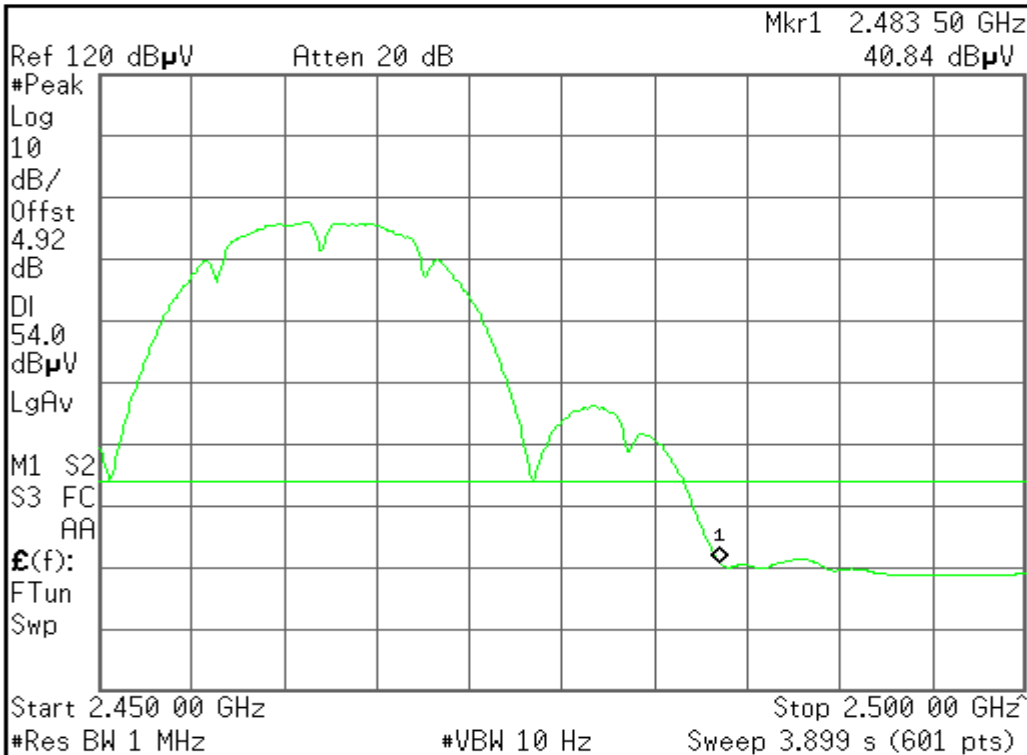
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref	▲			
Span Pair				
Span	Center			
Off				
More 1 of 2				

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Detector mode: Average

Polarity: Horizontal

Agilent 15:39:15 Aug 20, 2008



Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref	▲			
Span Pair				
Span	Center			
Off				
More 1 of 2				

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**Test Data**

**Test Plot (IEEE 802.11g mode)**

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2390.10	V	59.05	40.80	4.92	63.97	45.72	74	54	-10.03	-8.28
2483.50	V	54.33	36.88	4.92	59.25	41.80	74	54	-14.75	-12.20
2390.10	H	65.68	44.23	4.92	70.60	49.15	74	54	-3.40	-4.85
2483.50	H	58.99	39.68	4.92	63.91	44.60	74	54	-10.09	-9.40

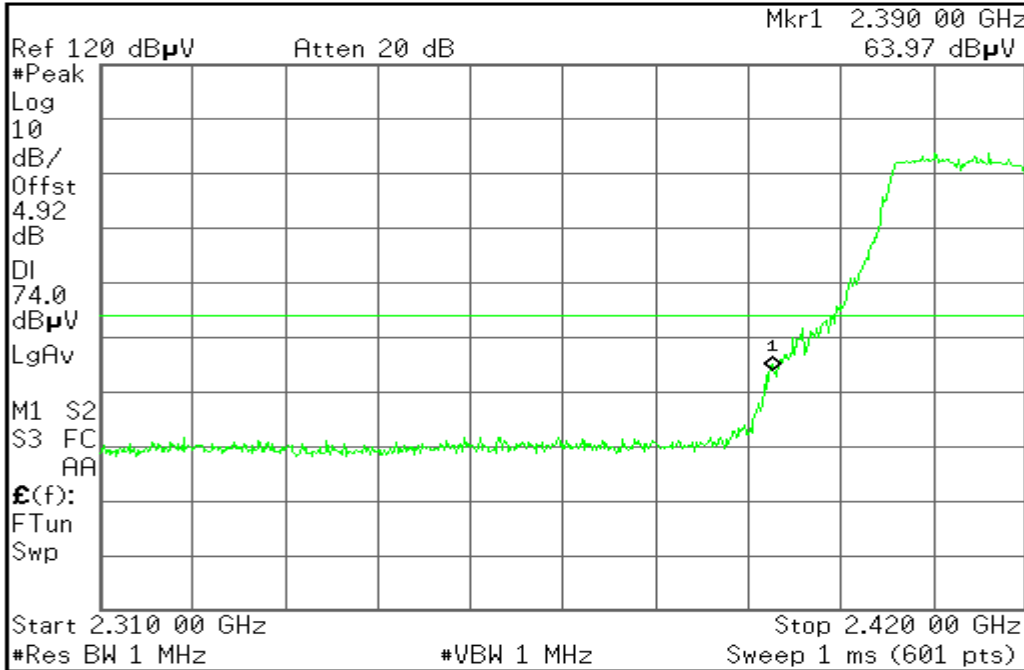


**Test Plot (IEEE 802.11g mode)**  
**Band Edges (CH Low)**

Detector mode: Peak

Polarity: Vertical

Agilent 15:25:53 Aug 20, 2008



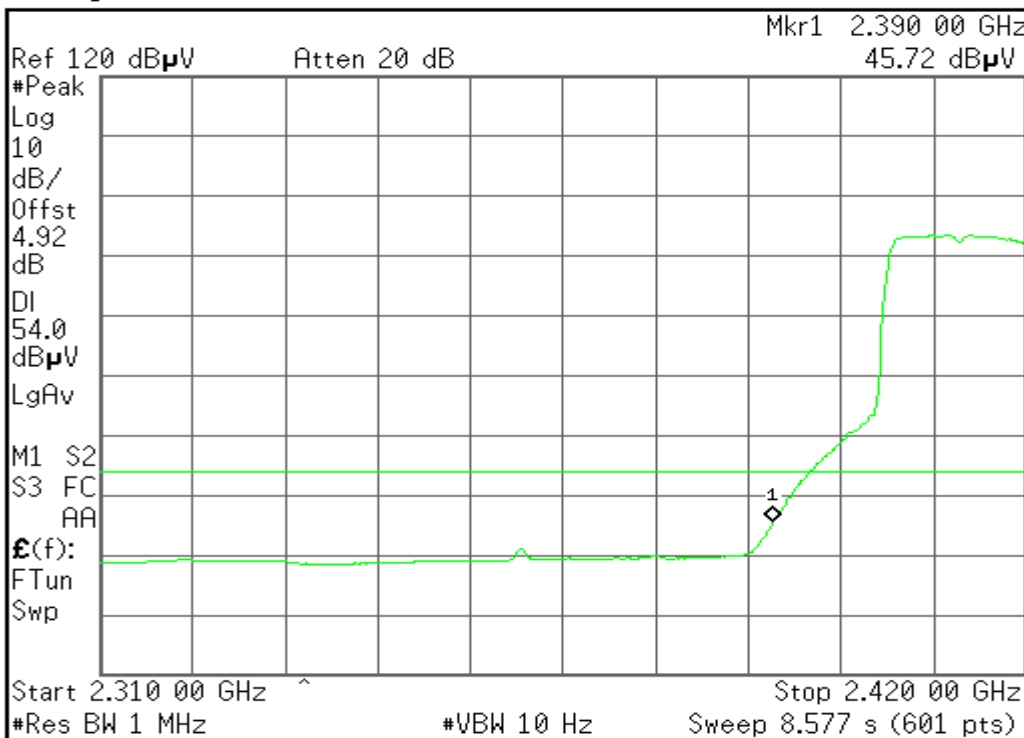
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref	▲			
Span Pair				
Span	Center			
Off				
More 1 of 2				

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Detector mode: Average

Polarity: Vertical

Agilent 15:26:42 Aug 20, 2008



Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref	▲			
Span Pair				
Span	Center			
Off				
More 1 of 2				

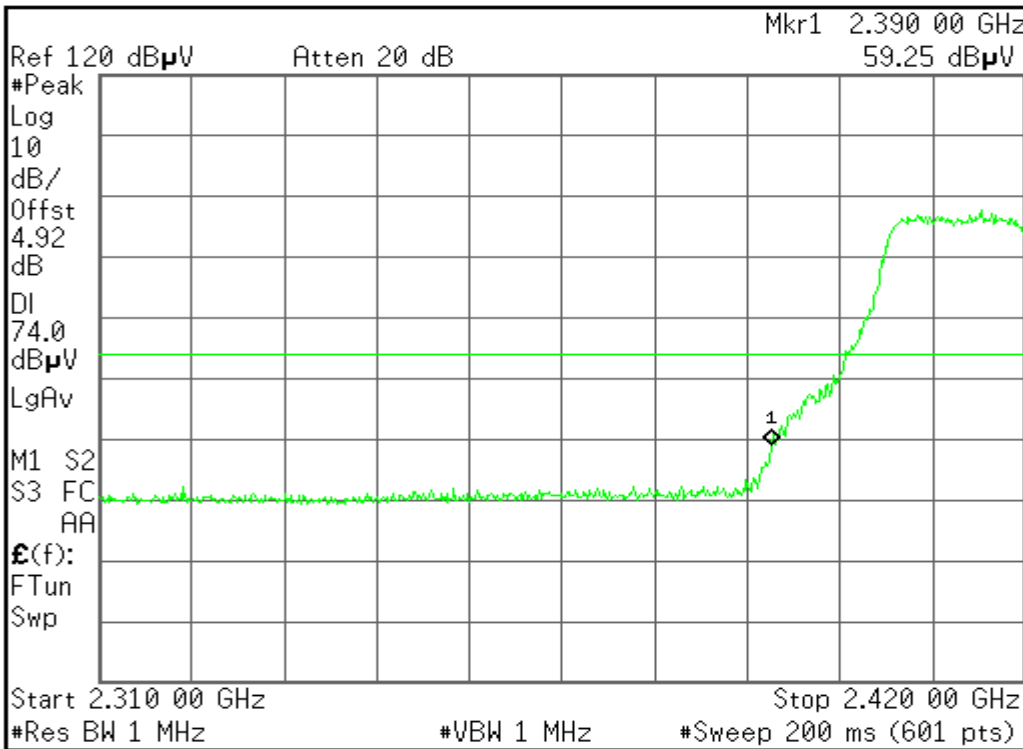
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Detector mode: Peak

Polarity: Horizontal

Agilent 15:24:09 Aug 20, 2008



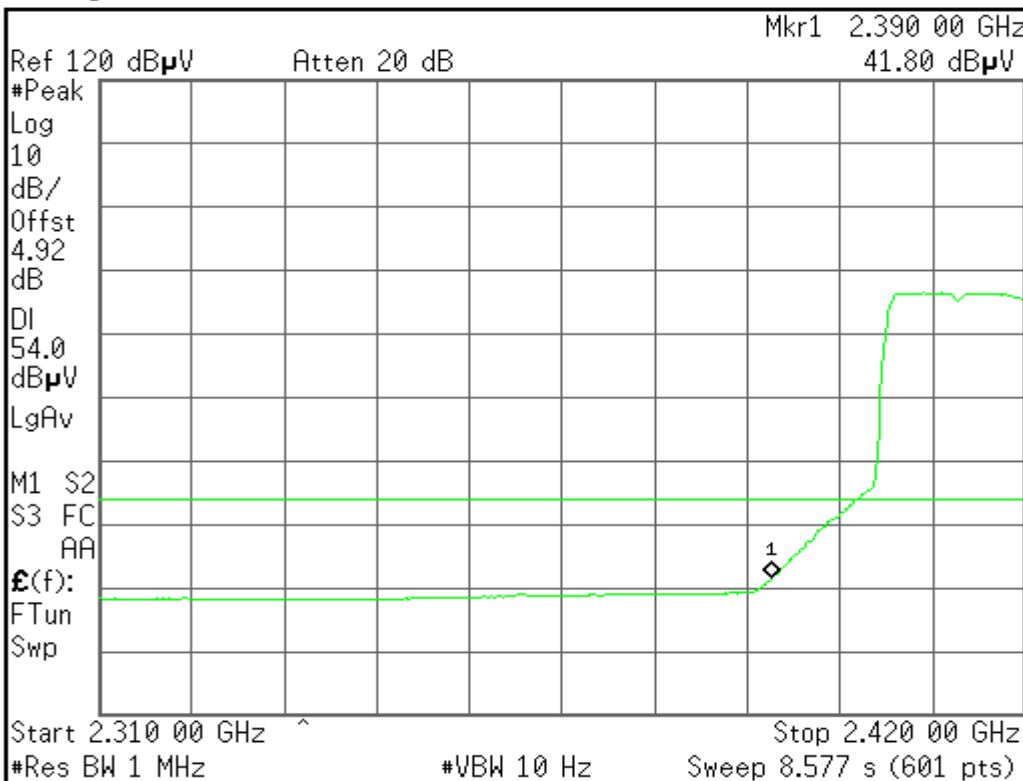
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref				▲
Span Pair				
Span	Center			
Off				
More 1 of 2				

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Detector mode: Average

Polarity: Horizontal

Agilent 15:24:35 Aug 20, 2008



Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref				▲
Span Pair				
Span	Center			
Off				
More 1 of 2				

Copyright 2000-2007 Agilent Technologies

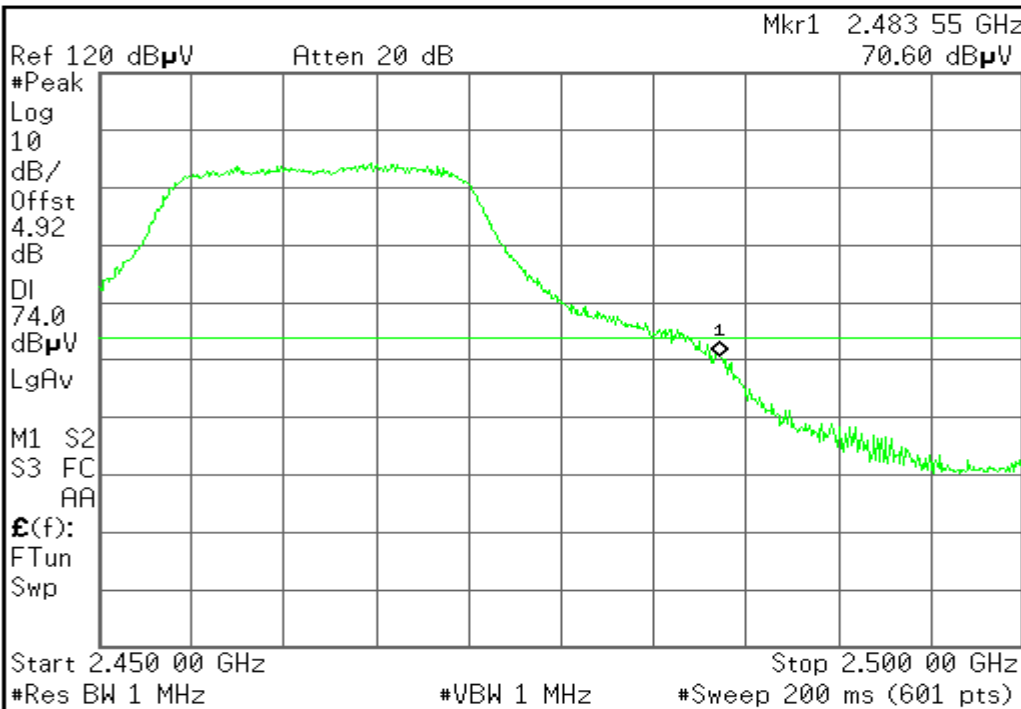


### Band Edges (CH High)

Detector mode: Peak

Polarity: Vertical

Agilent 15:14:25 Aug 20, 2008



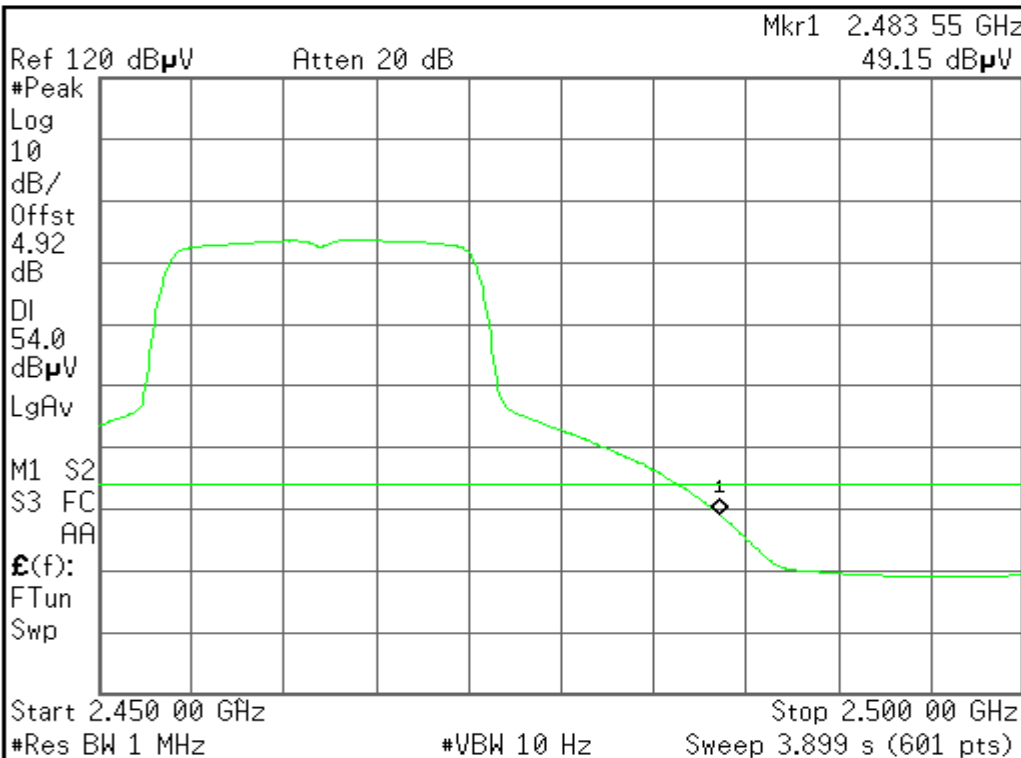
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref	▲			
Span Pair				
Span	Center			
Off				
More				
1 of 2				

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Detector mode: Average

Polarity: Vertical

Agilent 15:15:20 Aug 20, 2008



Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref	▲			
Span Pair				
Span	Center			
Off				
More				
1 of 2				

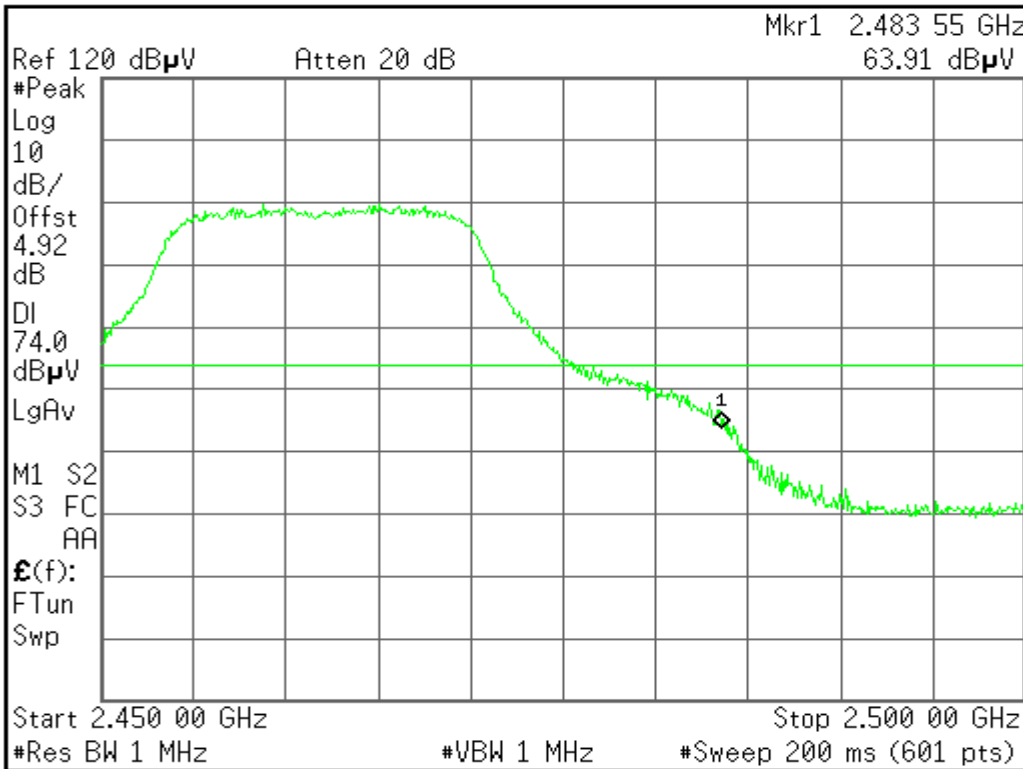
Copyright 2000-2007 Agilent Technologies



Detector mode: Peak

Polarity: Horizontal

Agilent 15:18:22 Aug 20, 2008



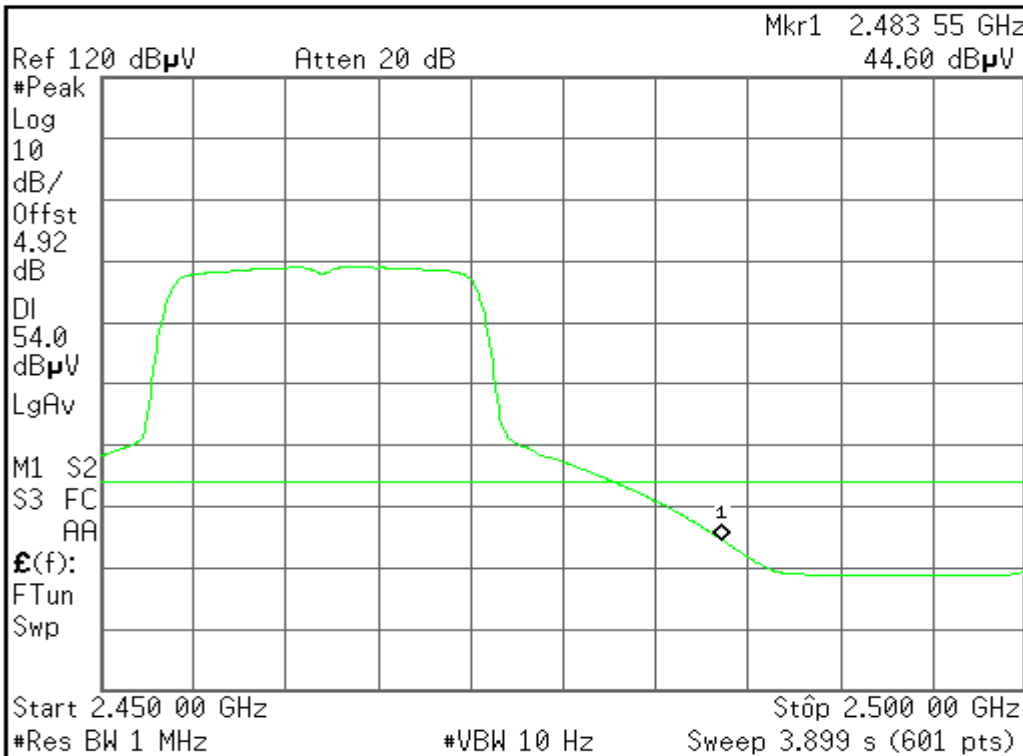
Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref				
Span Pair				
Span			Center	
Off				
More 1 of 2				

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Detector mode: Average

Polarity: Horizontal

Agilent 15:19:01 Aug 20, 2008



Marker				
Select Marker	1	2	3	4
Normal				
Delta				
Delta Pair (Tracking Ref)				
Ref				
Span Pair				
Span			Center	
Off				
More 1 of 2				

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## 7.6. PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 7.6.1. LIMITS

1. 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.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

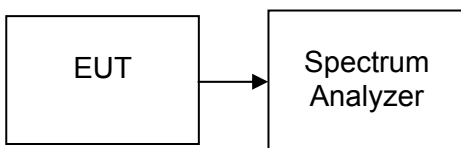
### 7.6.2. TEST INSTRUMENTS

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	11/16/2008

### 7.6.3. TEST PROCEDURES (please refer to measurement standard)

1. Place the EUT on the table and set it in transmitting mode.  
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

### 7.6.4. TEST SETUP



r



7.6.5. TEST RESULTS

No non-compliance noted

**Test Data**

Test mode: IEEE 802.11b

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-7.57	8.00	PASS
Mid	2437	-6.37		PASS
High	2462	-5.73		PASS

**Test Data**

Test mode: IEEE 802.11g

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Test Result
Low	2412	-11.68	8.00	PASS
Mid	2437	-11.02		PASS
High	2462	-11.06		PASS

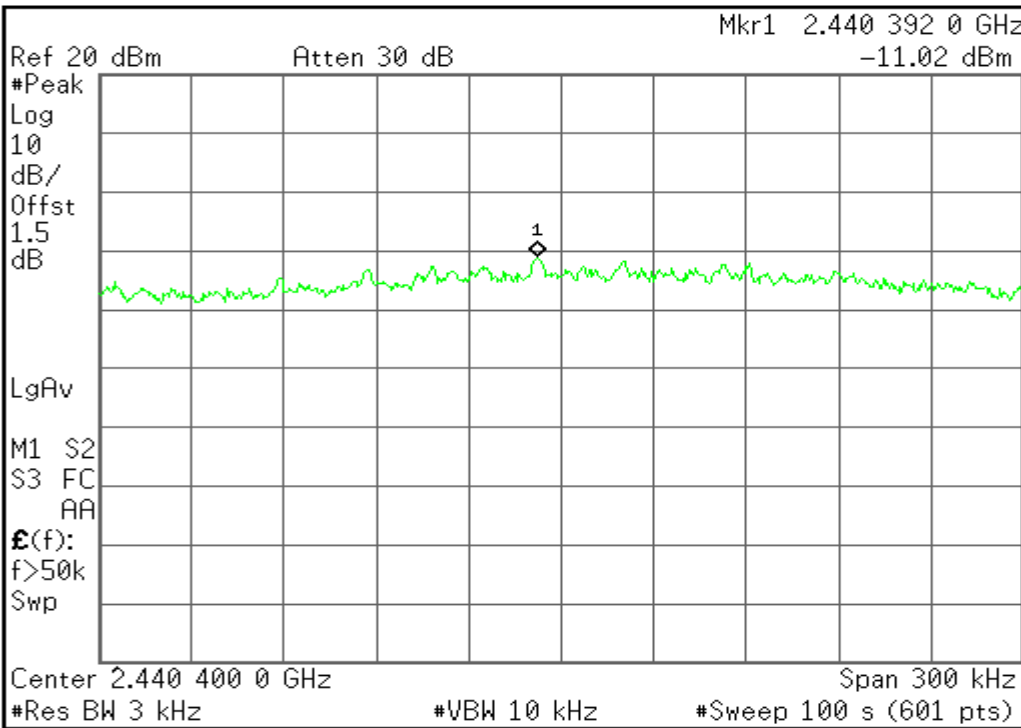






PPSD (CH Mid)

Agilent 14:56:46 Aug 20, 2008



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

Pk-Pk Search

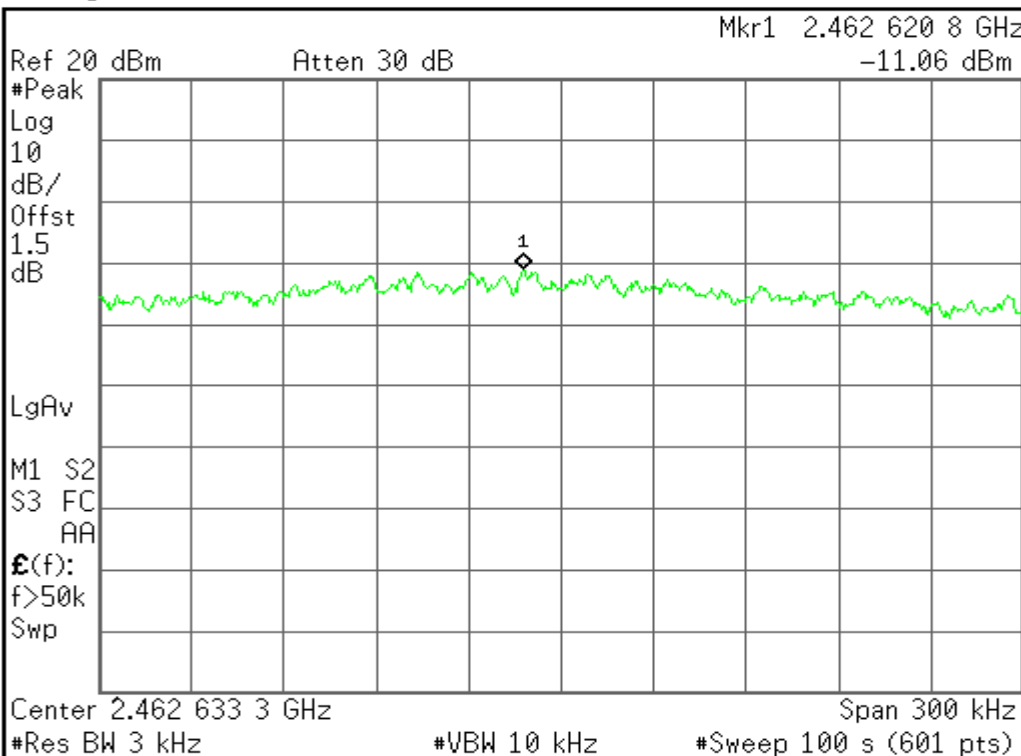
Mkr → CF

More  
1 of 2

Copyright 2000-2007 Agilent Technologies

PPSD (CH High)

Agilent 14:59:23 Aug 20, 2008



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Min Search

Pk-Pk Search

Mkr → CF

More  
1 of 2

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# APPENDIX I RADIO FREQUENCY EXPOSURE

## LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

## EUT Specification

EUT	UMPC
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> Bluetooth: <u>2.402GHz ~ 2.480 GHz</u>
Device category	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation)
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
Max. output power	IEEE 802.11b: 17.15 dBm (51.88mW) IEEE 802.11g: 13.30 dBm (21.38mW)
Antenna gain (Max)	0.57dBi (Numeric gain: 1.14)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

### Remark:

1. The maximum output power is 17.15dBm (51.88mW) at 2462MHz (with 1.14 numeric antenna gain.)
2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
3. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm<sup>2</sup> even if the calculation indicates that the power density would be larger.



**TEST RESULTS**

**Calculation**

Given  $E = \frac{\sqrt{30 \times P \times G}}{d}$  &  $S = \frac{E^2}{3770}$

Where  $E =$  Field strength in Volts / meter

$P =$  Power in Watts

$G =$  Numeric antenna gain

$d =$  Distance in meters

$S =$  Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = d(m) / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where  $d =$  Distance in cm

$P =$  Power in mW

$G =$  Numeric antenna gain

$S =$  Power density in mW / cm<sup>2</sup>

**Maximum Permissible Exposure**

EUT output power = 51.88mW

Numeric Antenna gain =1.14

Substituting the MPE safe distance using d = 20 cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where  $P =$  Power in mW

$G =$  Numeric antenna gain

$S =$  Power density in mW / cm<sup>2</sup>

→ Power density =0.012mW / cm<sup>2</sup>

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm<sup>2</sup> even if the calculation indicates that the power density would be larger.)

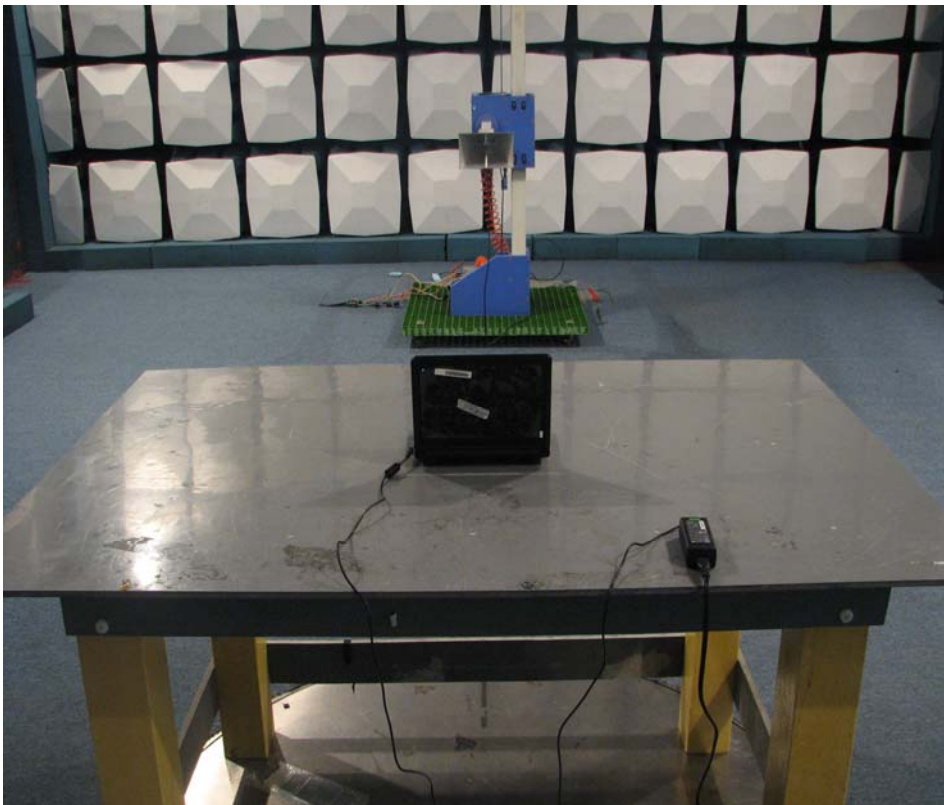
## APPENDIX II PHOTOGRAPHS OF THE TEST CONFIGURATION

### Radiated Emissions Setup Photos

*Front of view*



*Back of view*





**Power Line Conducted Emissions Setup Photos**  
*Front of view*



*Right of view*

