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ILAC MRA

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product name:	**ADSL ROUTER+WIRELESS**
Brand Name:	**TAICOM, Telewell**
Model Name:	**AWL-1000G, TW-EA410**
FCC ID:	**FELAWL1000G**
Report No:	**ER/2004/60007**
Issue Date:	**Sep. 23, 2004**
FCC Rule Part:	**§15.247**
Prepared for	**TAICOM DATA SYSTEMS CO., LTD.** **No. 45, Wu-Kung 5 Rd, Wu-Ku Industrial Park, Taipei-Hsien, Taiwan, R.O.C**
Prepared by	**SGS Taiwan Ltd.** **No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan.**

VERIFICATION OF COMPLIANCE

Applicant:	TAICOM DATA SYSTEMS CO., LTD. NO. 45, Wu-Kung 5 Rd, Wu-Ku Industrial Park, Taipei-Hsien, Taiwan, R.O.C
Product Description:	ADSL ROUTER+WIRELESS
Brand Name:	TAICOM, Telewell
FCC ID Number:	FELAWL1000G
Model No.:	AWL-1000G, TW-EA410
Model Difference:	The models are same except the model designed
Report Number:	ER/2004/60007
Date of test:	Aug. 22, 2004~ Sep. 15, 2004
Date of EUT Received:	Aug. 20, 2004

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 (2001) 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:	Willis Chen	***Date***	Sep. 23, 2004
	Willis Chen		
Approved By	Vincent Su	***Date***	Sep. 23, 2004
	Vincent Su		

Version

Version No.	Date
00	Sep. 23, 2004

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1 GENERAL INFORMATION

1.1 Product Description

TAICOM DATA SYSTEMS CO., LTD. Model: AWL-1000G, TW-EA410 (referred to as the EUT in this report) is a 802.11 b+g ADSL ROUTER. The EUT is compliance with IEEE802.11b Standard.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 2.412GHz – 2.462GHz; 11 channels;
B). Transmit Power: 12.24 dBm
C). Modulation type: Direct Sequence Spread Spectrum, (CCK; DQPSK; DBPSK, OFDM)
D). Transition Speed: 1/2/5.5/11/54Mbps
E). Antenna Designation: Dipole Antenna; Embedded Non-User changeable, detachable SMA revised connector.
F). Power Supply: Model: HRZ-10-0501500
Input: 100~240V~, 50/60Hz, 0.25A
Output: 5.0 V, 1500mA

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **FELAWL1000G** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with Subpart B is authorized under a DoC procedure.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2001). 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: 2001 and CISPR 22/EN 55022 requirements. Site No. 1(3 &10 meters) Registration Number: 94644, Anechoic chamber (3 meters) Registration Number: 573967

1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.

2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that 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 that is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4: 2001.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table that 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 that 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 13.1.4.1 of ANSI C63.4: 2001

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

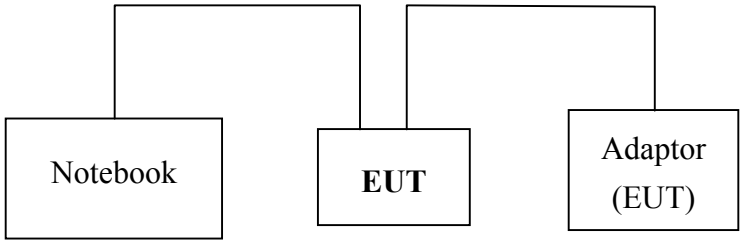


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	FCC ID	Series No.	Data Cable	Power Cord
1.	Notebook	COMPAQ	Presario 2100	CRVSA-2T1-75	CNF3450Q1R	N/A	Unshielded, 1.8m Have a core

3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	Conducted Emission	Compliant
§15.247(b)	Peak Output Power	Compliant
§15.247(c)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.209(a) §15.247(f)	Spurious Emission	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.247(d)	Power Density	Compliant
§15.203	Antenna Requirement	Compliant
§1.1310	RF Exposure	Compliant

4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.
Software used to control the EUT for staying in continuous transmitting mode is programmed.
Full tests were performed at channel 1 (2412MHz), 6 (2437MHz) and 11 (2462MHz) for both 802.11b and g mode with max transmission rate.

5 Measurement Equipment Used

5.1 Ac Power Line Conducted Emission Measurement Equipment

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMC Analyzer	HP	8594EM	3624A00203	12/31/2003	12/30/2004
EMI Test Receiver	R&S	ESCS30	828985/004	1/15/2004	1/14/2005
LISN	Rolf-Heine	NNB-2/16Z	99012	12/30/2003	12/29/2004
LISN	Rolf-Heine	NNB-2/16Z	99013	11/06/2003	11/05/2004

5.2 Spurious Emission Measurement Equipment

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2004	05/26/2005
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2004	08/26/2005
Bilog Antenna	SCHWAZBECK	VULB9163	152	06/03/2004	06/02/2005
Horn antenna	Schwarzbeck	BBHA 9120D	309/320	08/16/2004	08/15/2005
Horn antenna	Schwarzbeck	BBHA 9170	184/185	07/04/2004	07/03/2005
Pre-Amplifier	HP	8447D	2944A09469	07/19/2004	07/18/2005
Pre-Amplifier	HP	8494B	3008A00578	02/26/2004	02/25/2005
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	10/09/2003	10/08/2004
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	10/09/2003	10/08/2004
Site NSA	SGS	966 chamber	N/A	11/17/2003	11/16/2004

5.3 Conducted test Measurement Equipment

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMC Analyzer	HP	8594EM	3624A00203	12/31/2002	12/30/2003
EMI Test Receiver	R&S	ESCS30	828985/004	1/15/2004	1/14/2005
LISN	Rolf-Heine	NNB-2/16Z	99012	12/30/2002	12/29/2003
LISN	Rolf-Heine	NNB-2/16Z	99013	11/06/2003	11/05/2004

6 AC POWER LINE CONDUCTED EMISSION TEST

6.1 Standard Applicable

According to §15.207. frequency within 150KHz to 30MHz shall not exceed

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

6.2 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2001.
2. The EUT was plug-in the host PC via USB port. The host PC system was placed on the center of the back edge on the test table. The peripherals like modem, monitor printer, K/B, and mouse were placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the monitor, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when necessary.
6. The host PC system was connected with 110Vac/60Hz power source.

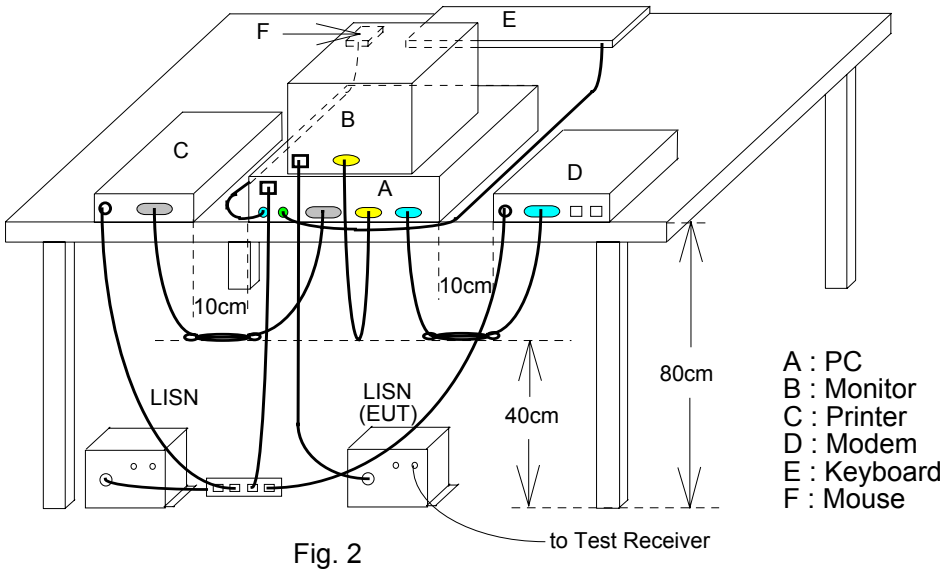


Fig. 2

6.3 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.

6.4 Measurement Result

The initial 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.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Normal Operating			Test Date:	Sep. 10, 2004
Temperature:	25 ℃	Humidity:	62 %	Test By:	Willis

FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.200	51.74	48.76	63.61	53.61	-11.87	-4.85	L1
0.310	46.33	---	59.97	49.97	-13.64	---	L1
0.410	42.59	---	57.65	47.65	-15.06	---	L1
0.460	46.93	43.62	56.69	46.69	-9.76	-3.07	L1
0.520	40.27	---	56.00	46.00	-15.73	---	L1
0.620	38.01	---	56.00	46.00	-17.99	---	L1
0.200	50.79	---	63.61	53.61	-12.82	---	L2
0.310	46.66	---	59.97	49.97	-13.31	---	L2
0.420	42.38	---	57.45	47.45	-15.07	---	L2
0.470	47.21	42.07	56.51	46.51	-9.30	-4.44	L2
0.510	39.80	---	56.00	46.00	-16.20	---	L2
0.620	37.76	---	56.00	46.00	-18.24	---	L2

Remark：

(1) Measuring frequencies from 0.15 MHz to 30MHz。

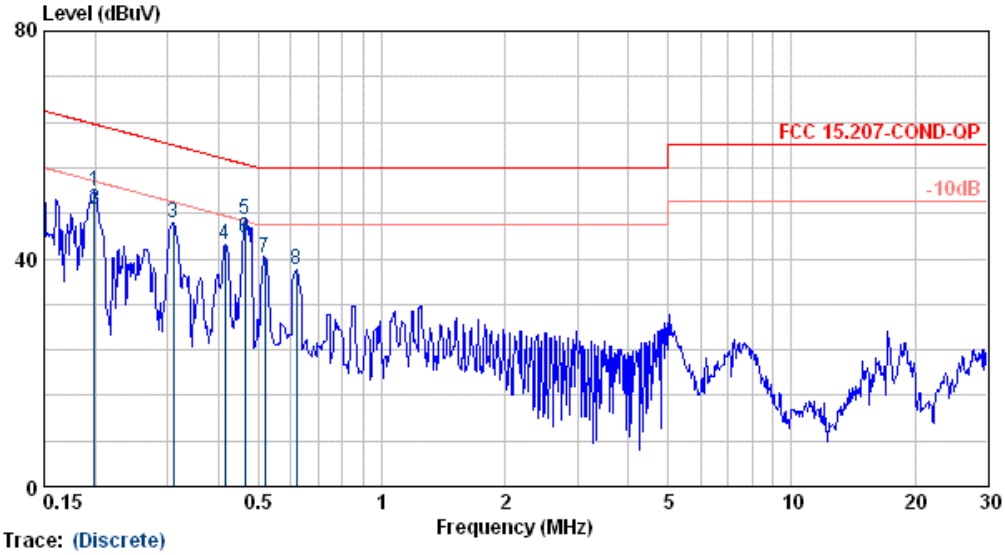
(2) The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Qusia-Peak detector and Average detector.

(3) **"---"** denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.

(4) The IF bandwidth of SPA between 0.15MHz to 30MHz was 10KHz;
The IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9KHz;

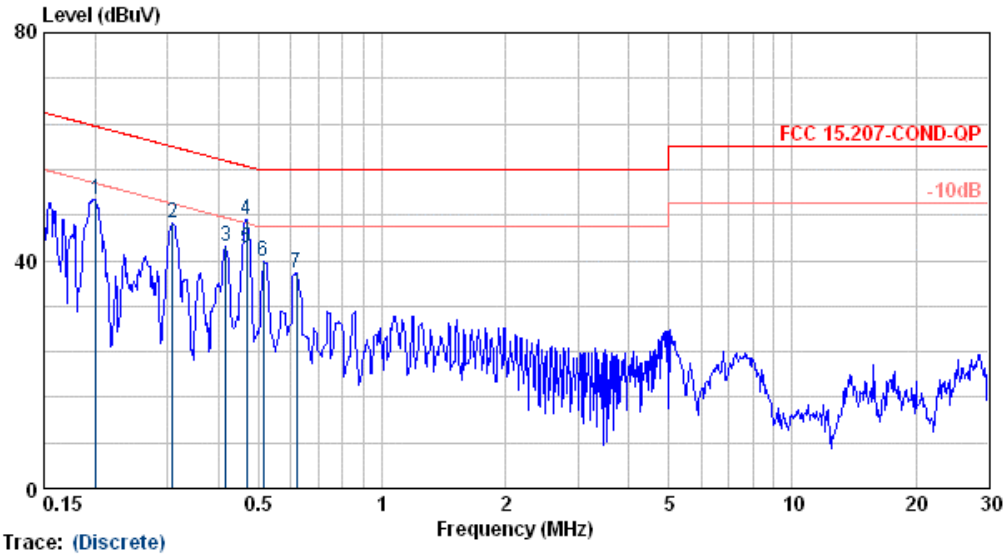
(5) L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

Conducted Test Data



Trace: (Discrete)

```
Condition       :FCC 15.207-COND-QP NNB-2/16Z(99012) LINE
Project No.     :ER/2004/60004,7
Applicant       :全球通
EUT Description:
EUT Model       :AWL-1000G
Test Mode       :
Temp./Humid.    :25/62
Operator        :WILLIS
```



Trace: (Discrete)

```
Condition       :FCC 15.207-COND-QP NNB-2/16Z(99012) NEUTRAL
Project No.     :ER/2004/60004,7
Applicant       :全球通
EUT Description:
EUT Model       :AWL-1000G
Test Mode       :
Temp./Humid.    :25/62
Operator        :WILLIS
```

7 PEAK OUTPUT POWER MEASUREMENT

7.1 Standard Applicable

According to §15.247(b)(2), for direct sequence systems, the maximum peak output power of the intentional radiator shall not exceed 1 Watt.

7.2 Measurement Procedure

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

7.3 Test Results:

802.11b

CH	Reading Power	Cable Loss	Output Power	Output Power	Limit	Result
	dBm	dB	dBm	W	W	
LOWER	12.11	0.00	12.11	0.01626	1	PASS
MID	12.24	0.00	12.24	0.01675	1	PASS
HIGHER	12.21	0.00	12.21	0.01663	1	PASS

Note: There is an offset of 2.2dB for the cable loss

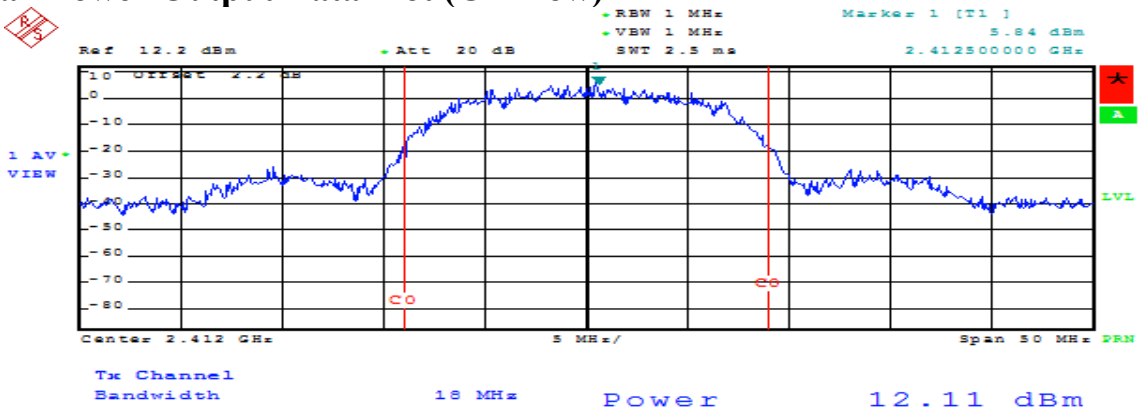
802.11g

CH	Reading Power	Cable Loss	Output Power	Output Power	Limit	Result
	dBm	dB	dBm	W	W	
LOWER	6.30	0.00	6.30	0.00427	1	PASS
MID	12.23	0.00	12.23	0.01671	1	PASS
HIGHER	7.54	0.00	7.54	0.00568	1	PASS

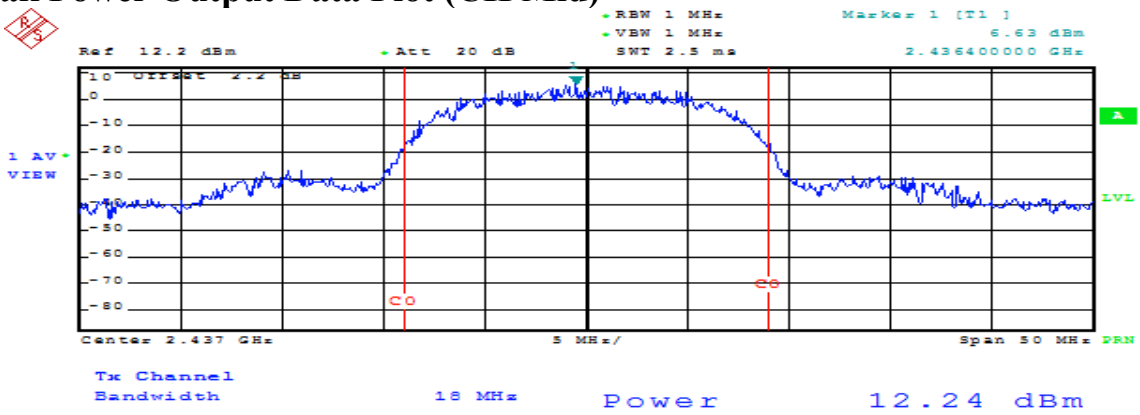
Note: There is an offset of 2.3dB for the cable loss

802.11b

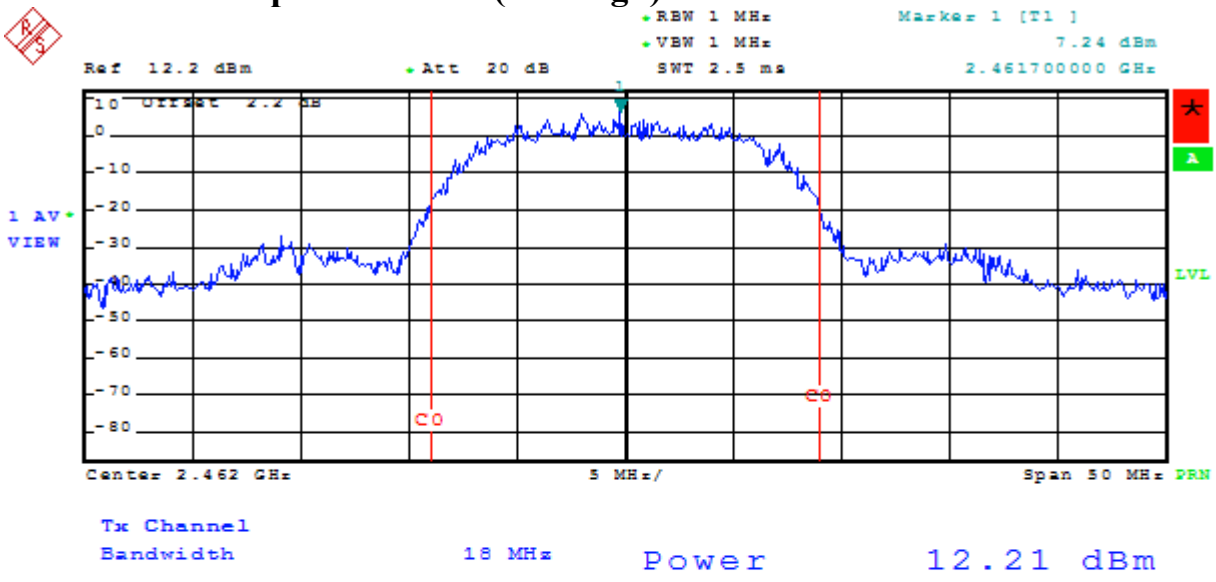
Peak Power Output Data Plot (CH Low)



Peak Power Output Data Plot (CH Mid)

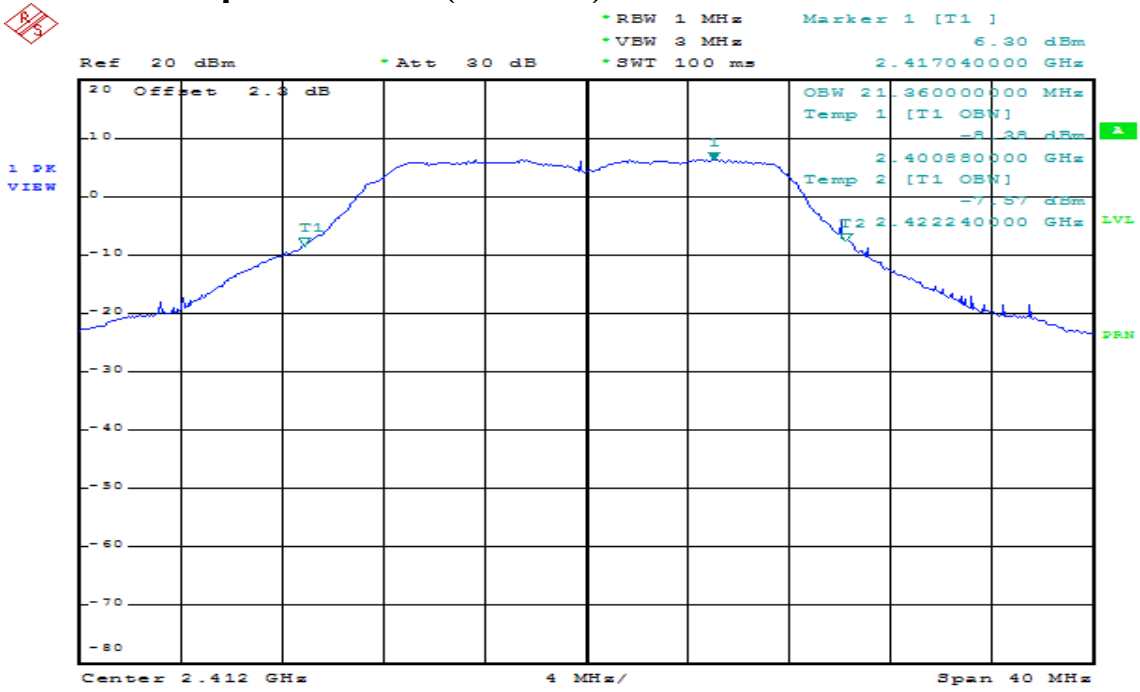


Peak Power Output Data Plot (CH High)

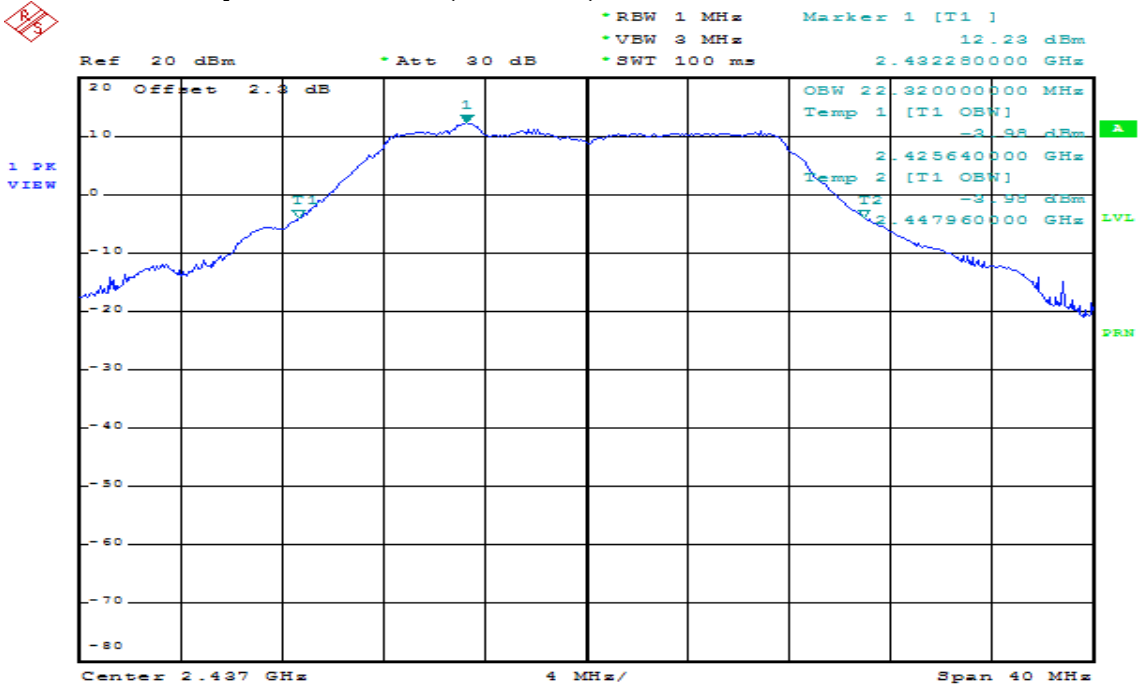


802.11g

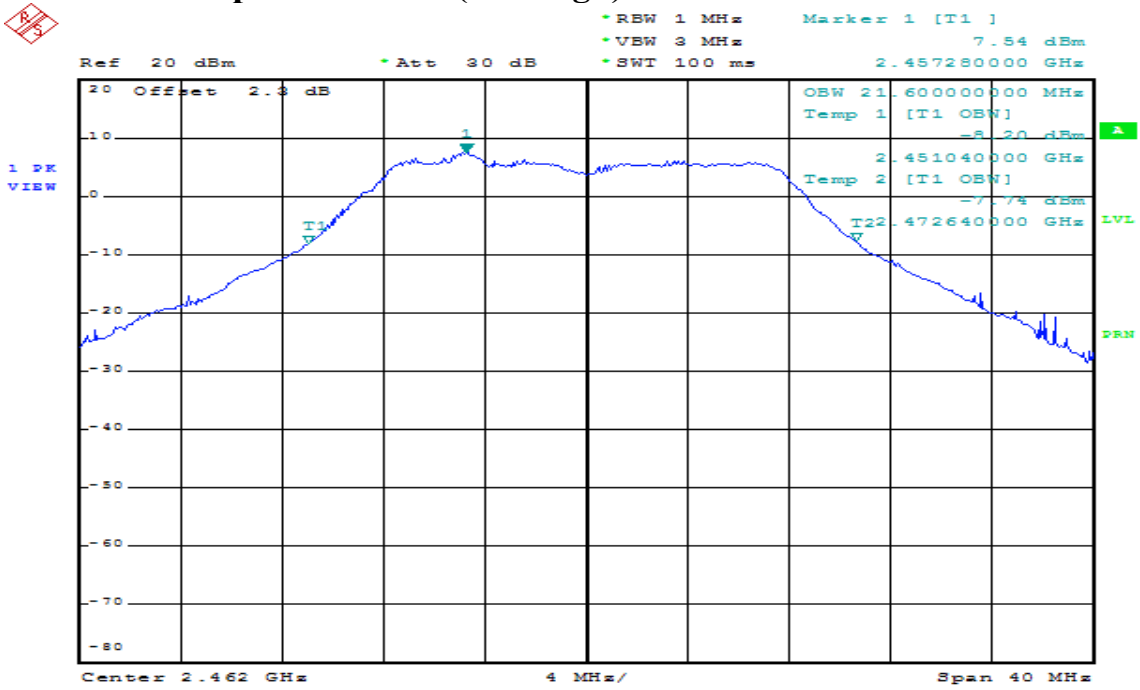
Peak Power Output Data Plot (CH Low)



Peak Power Output Data Plot (CH Mid)



Peak Power Output Data Plot (CH High)



8 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

8.1 Standard Applicable

According to §15.247(c), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in15.209(a).

8.2 Measurement Procedure

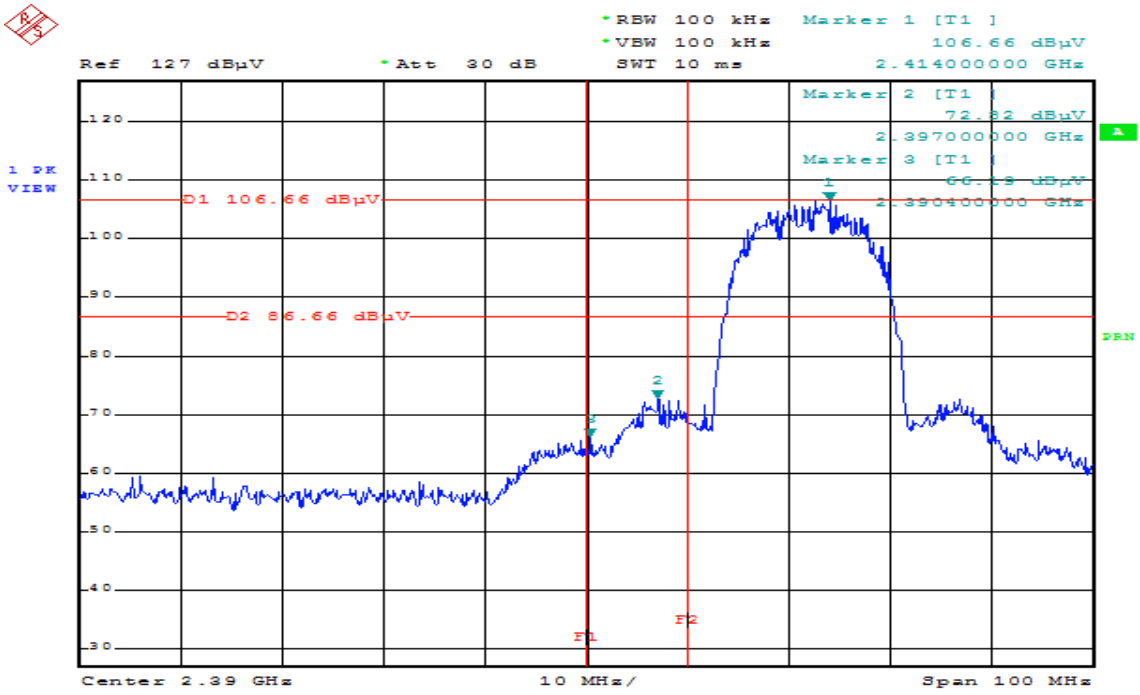
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW,VBW=100KHz, Start = 2.3857GHz, Stop = 2.406GHz or Start = 2.4751GHz, Stop = 2.495GHz,Sweep = auto.
5. Mark Peak ,2.4GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

8.3 Measurement Result

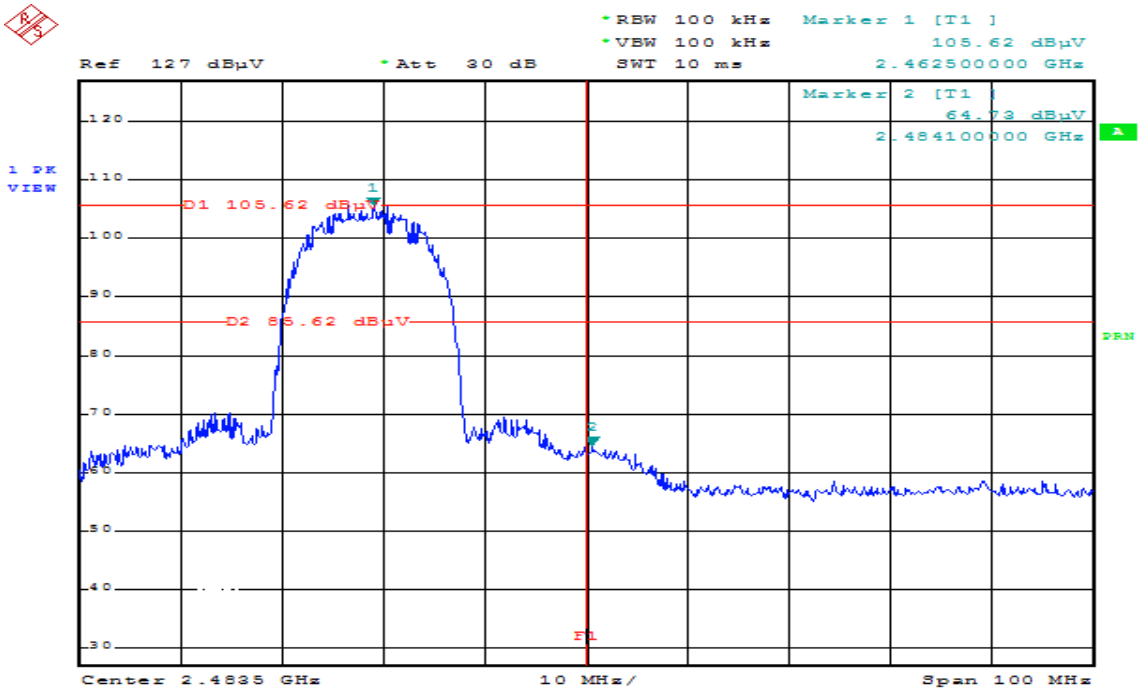
Refer to attach spectrum analyzer data chart.

802.11b

Out of Band Test Data CH-LOW



Out of Band Test Data CH-HIGH



Radiated Emission:

Operation Mode	TX CH Low (802.11b)	Test Date	Sep. 12, 2004
Fundamental Frequency	2412 MHz	Test By	Willis
Temperature	26 ℃	Pol	Ver.
Humidity	65 %		

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

Operation Mode	TX CH Low (802.11b)	Test Date	Sep. 12, 2004
Fundamental Frequency	2412 MHz	Test By	Willis
Temperature	26 ℃	Pol	Hor.
Humidity	65 %		

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

Remark：

(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。

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

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

Radiated Emission:

Operation Mode	TX CH High (802.11b)	Test Date	Sep. 12, 2004
Fundamental Frequency	2462 MHz	Test By	Willis
Temperature	26 ℃	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
2484.1	--					74.00	54.00		Peak

Operation Mode	TX CH High (802.11b)	Test Date	Sep. 12, 2004
Fundamental Frequency	2462 MHz	Test By	Willis
Temperature	26 ℃	Pol	Hor.
Humidity	65 %		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
2484.1	--					74.00	54.00		Peak

Remark：

(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.

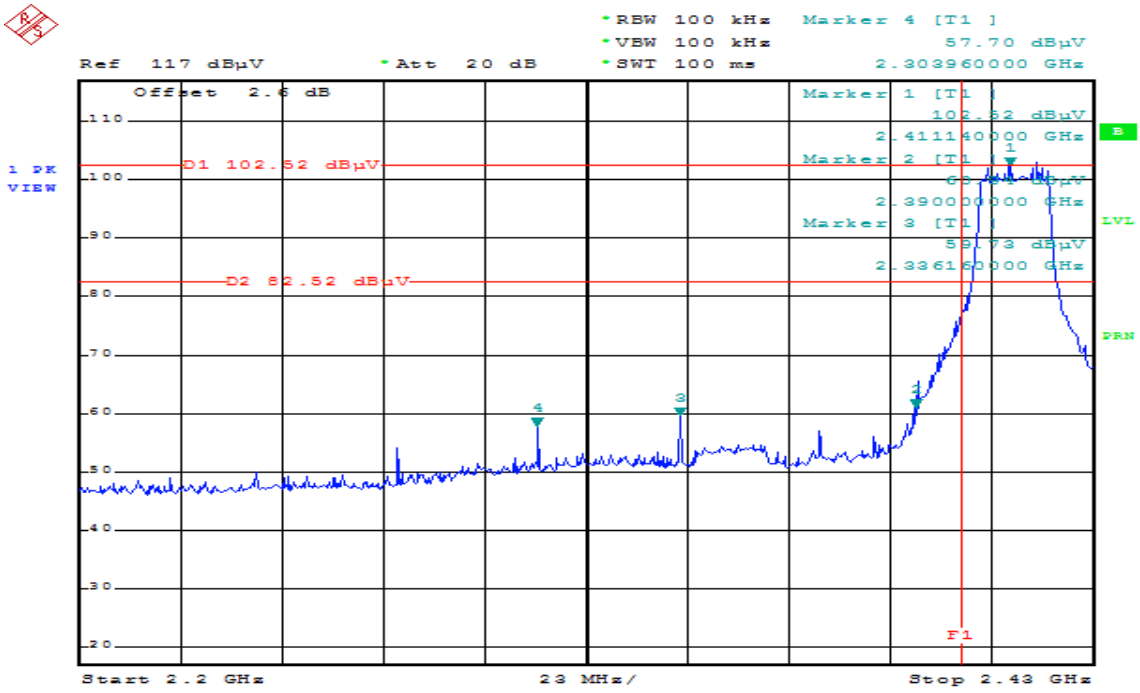
(2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column。

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

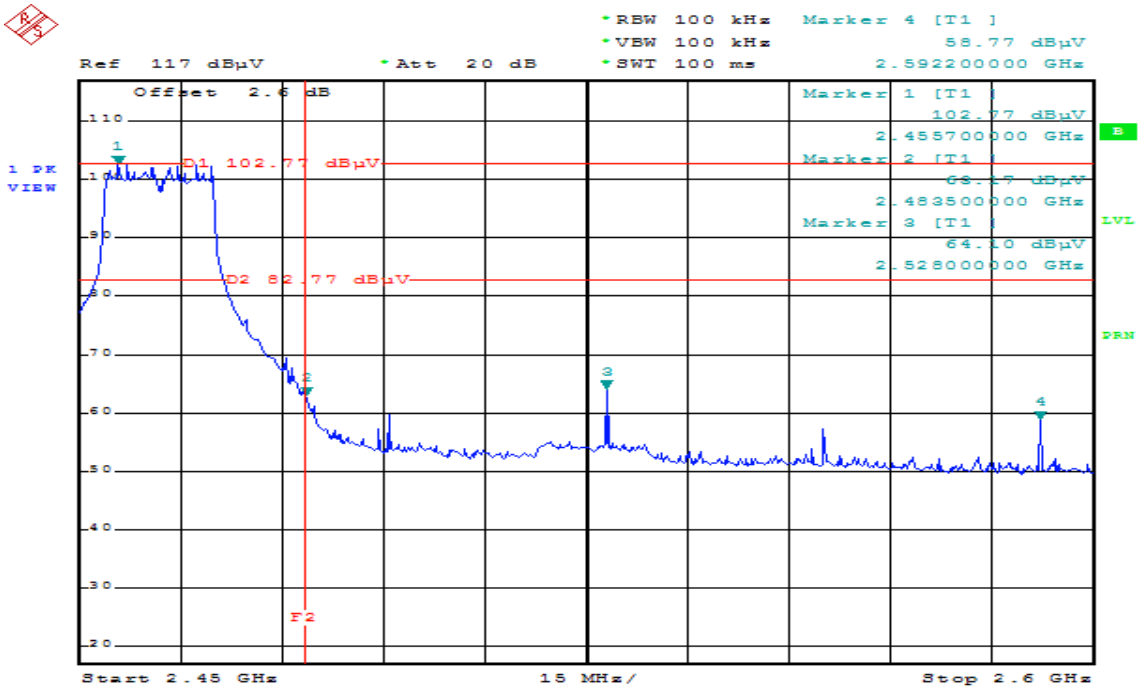
(4) Spectrum AV Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

802.11g

Out of Band Test Data CH-LOW



Out of Band Test Data CH-HIGH



Radiated Emission:

Operation Mode	TX CH Low (802.11g)	Test Date	Sep. 12, 2004
Fundamental Frequency	2412 MHz	Test By	Willis
Temperature	26 ℃	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
2336.16	--					74.00	54.00		Peak
2390.00	--					74.00	54.00		Peak

Operation Mode	TX CH Low (802.11g)	Test Date	Sep. 12, 2004
Fundamental Frequency	2412 MHz	Test By	Willis
Temperature	26 ℃	Pol	Hor.
Humidity	65 %		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
2336.16	--					74.00	54.00		Peak
2390.00	--					74.00	54.00		Peak

Remark：

(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。

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

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

Radiated Emission:

Operation Mode	TX CH High (802.11g)	Test Date	Sep. 12, 2004
Fundamental Frequency	2462 MHz	Test By	Willis
Temperature	26 ℃	Pol	Ver.
Humidity	65 %		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
2483.5	--					74.00	54.00		Peak

Operation Mode	TX CH High (802.11g)	Test Date	Sep. 12, 2004
Fundamental Frequency	2462 MHz	Test By	Willis
Temperature	26 ℃	Pol	Hor.
Humidity	65 %		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
2483.5	--					74.00	54.00		Peak

Remark：

(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。

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

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

9 SPURIOUS 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

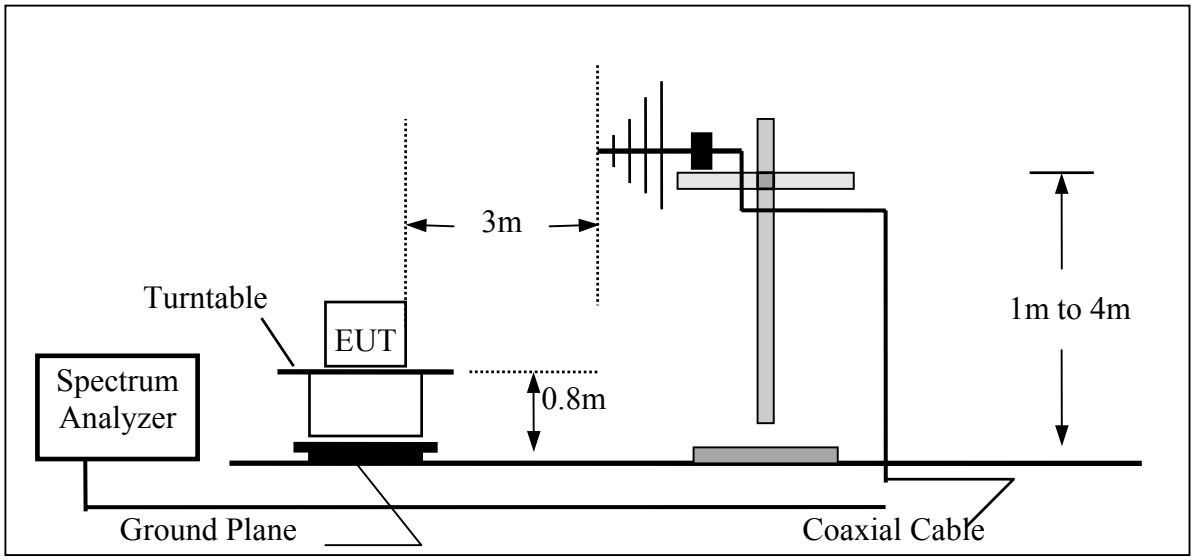
1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-2001.
2. The EUT was put in the front of the test table. The host PC system was placed on the center of the back edge on the test table. The peripherals like modem, monitor, printer, K/B, and mouse were placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the monitor, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when necessary.
6. The host PC system was connected with 110Vac/60Hz power source.

9.3 Measurement Procedure

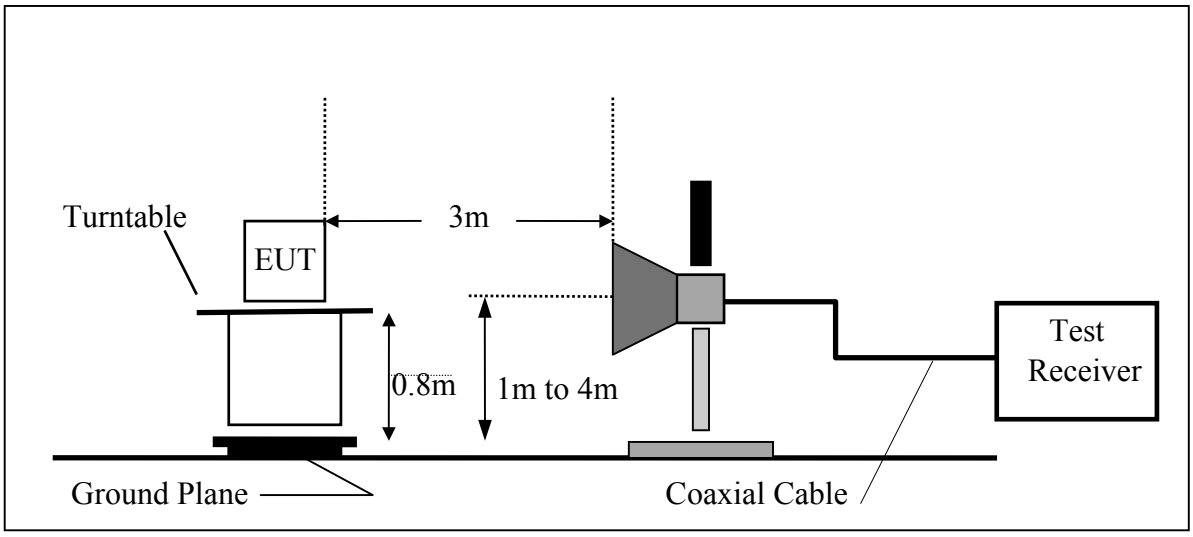
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna that varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was 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.

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



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	

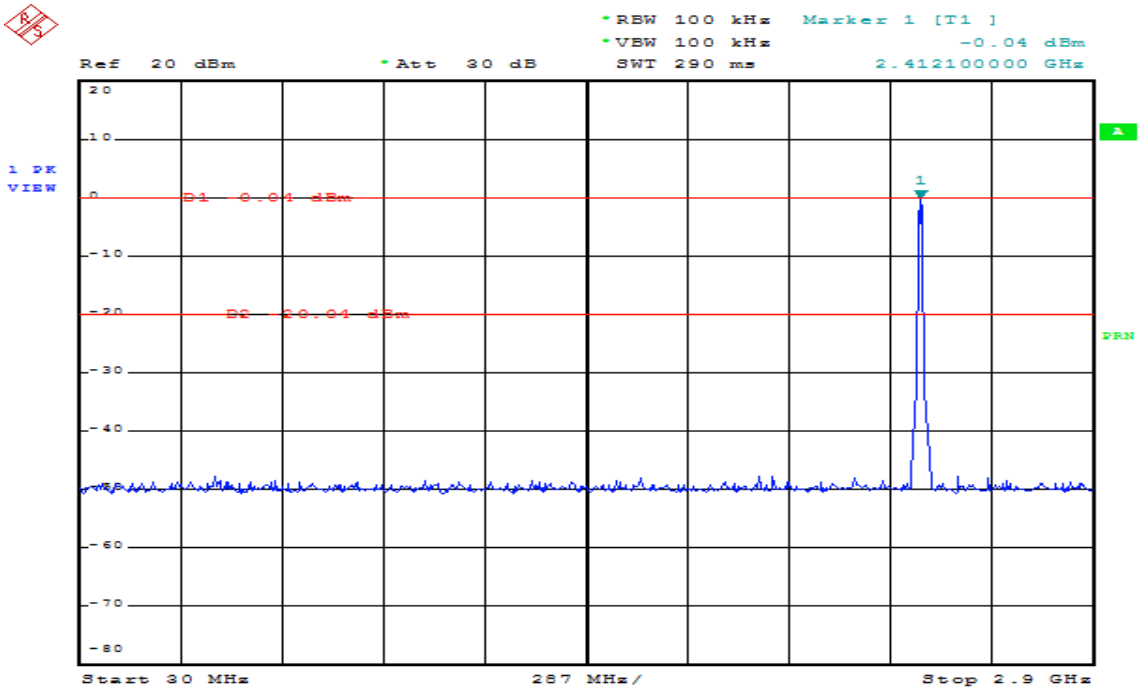
9.5 Measurement Result

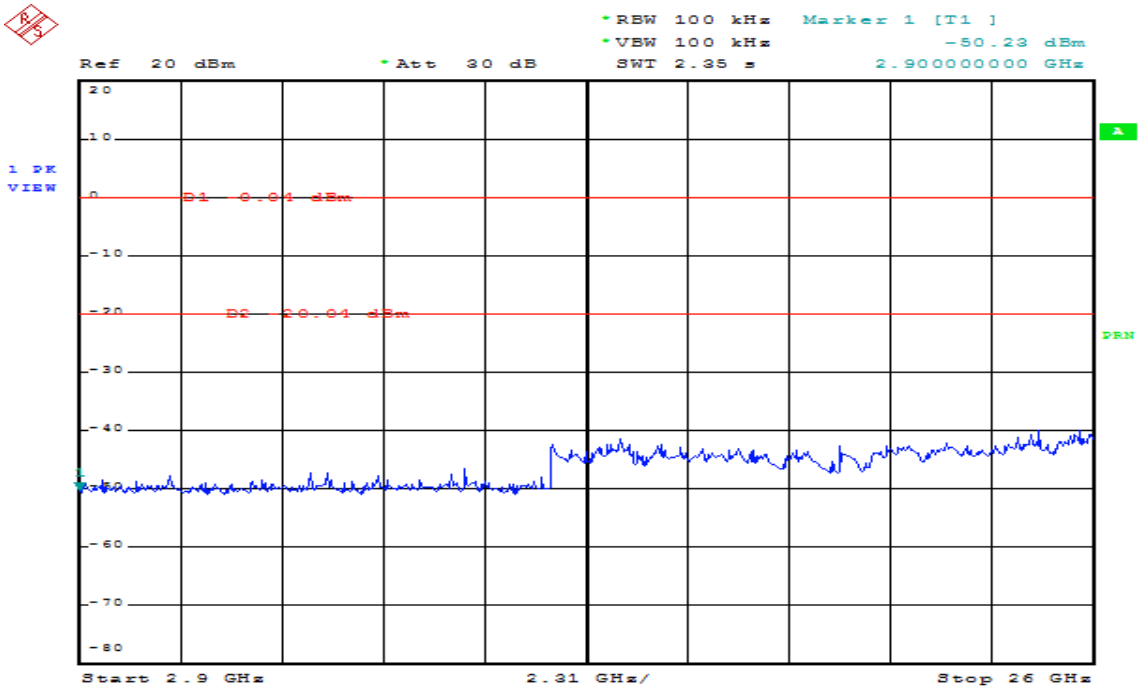
Refer to attach tabular data sheets.

802.11b

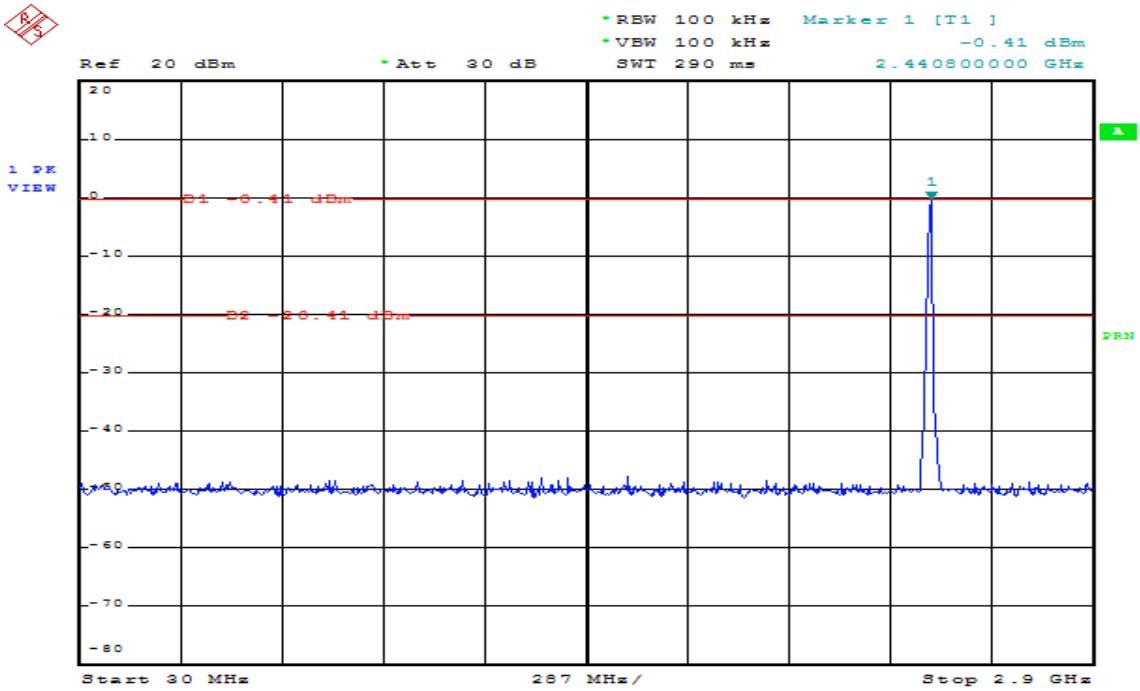
Conducted Spurious Emission Measurement Result

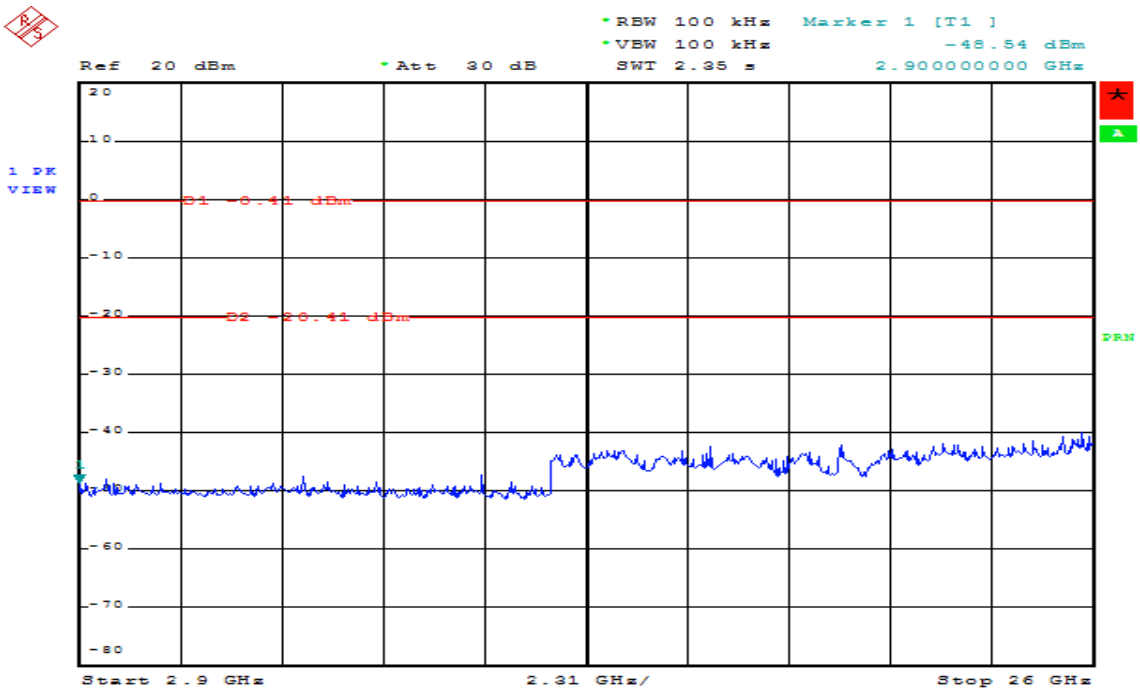
Ch Low



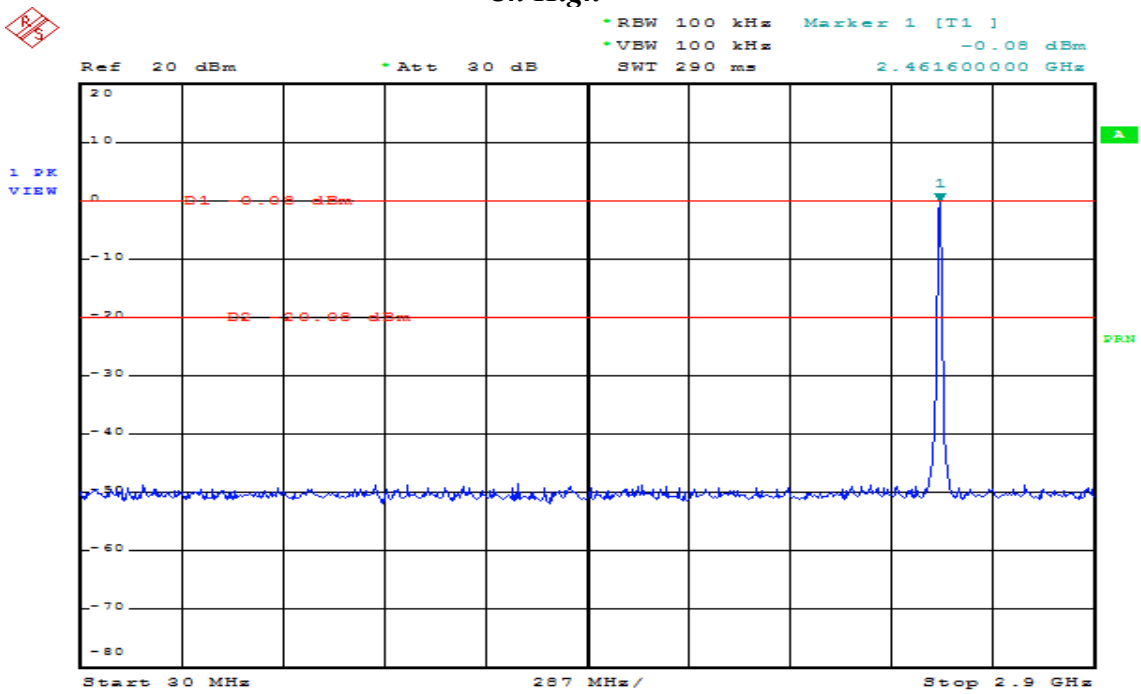


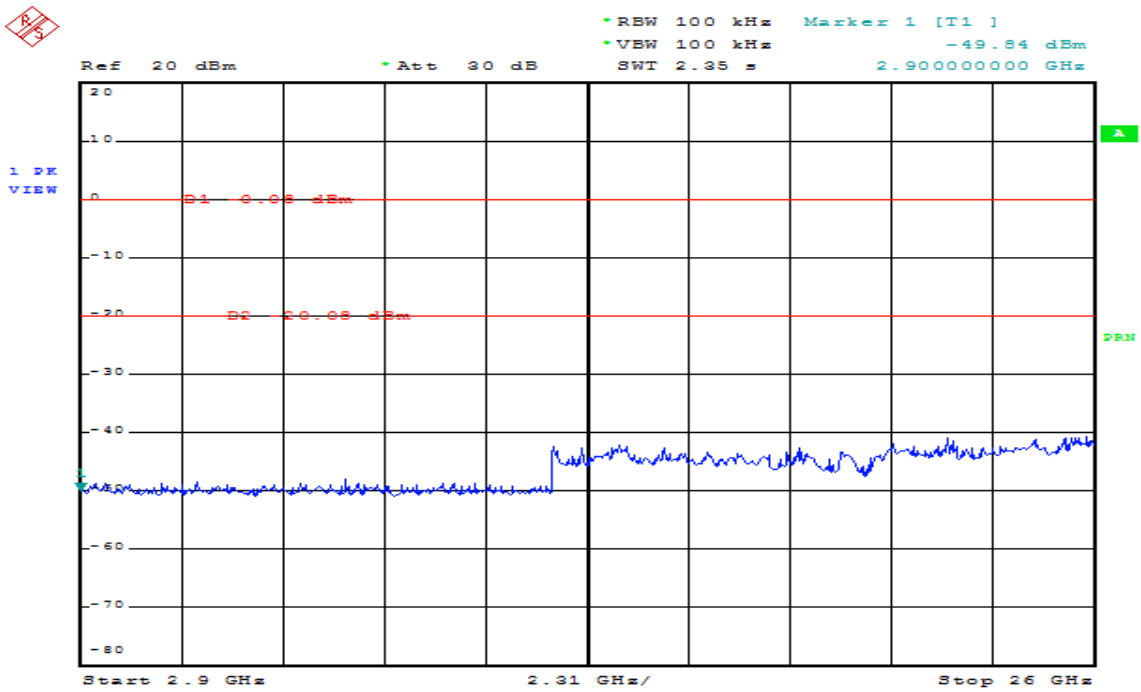
Ch Mid





Ch High

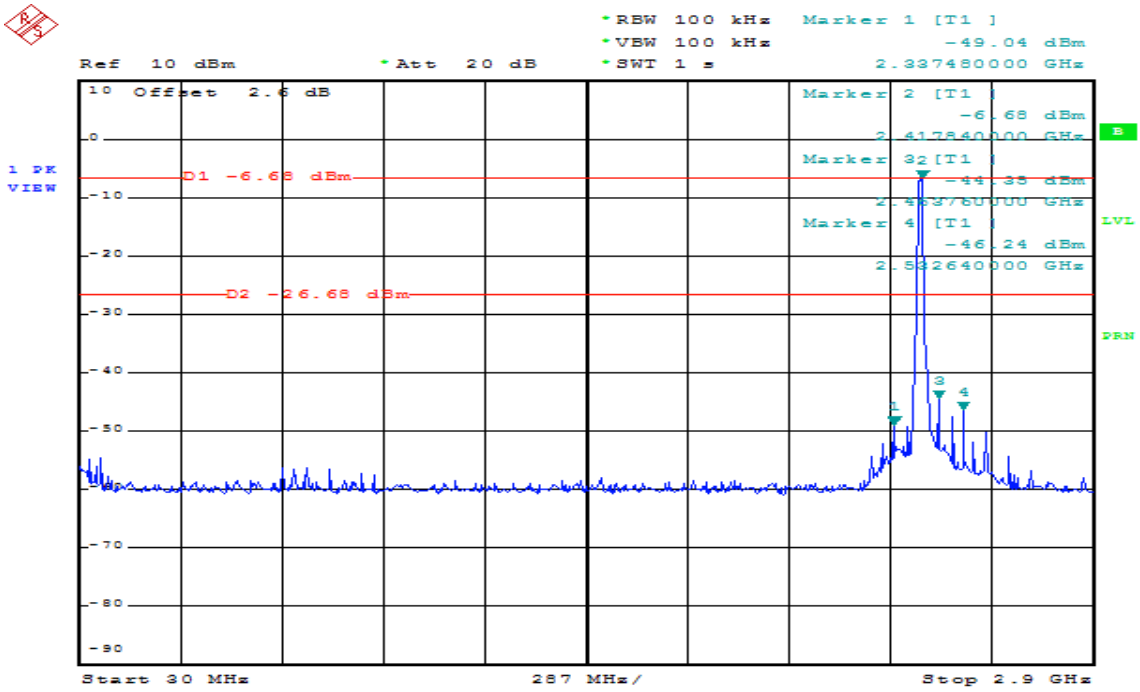


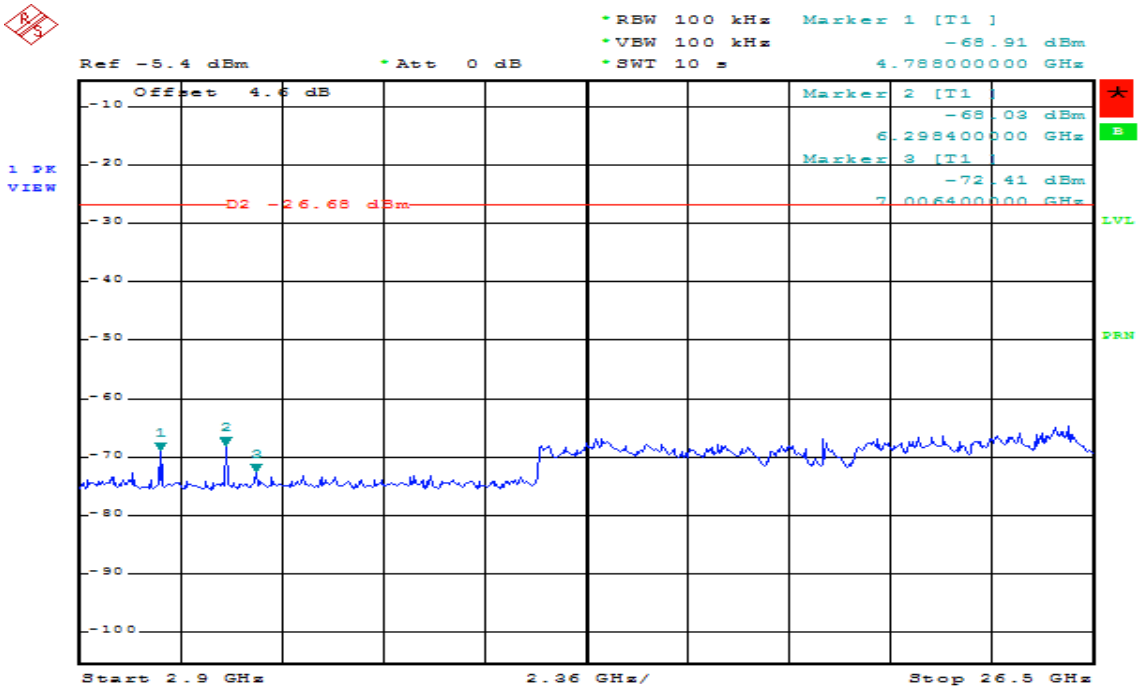


802.11g

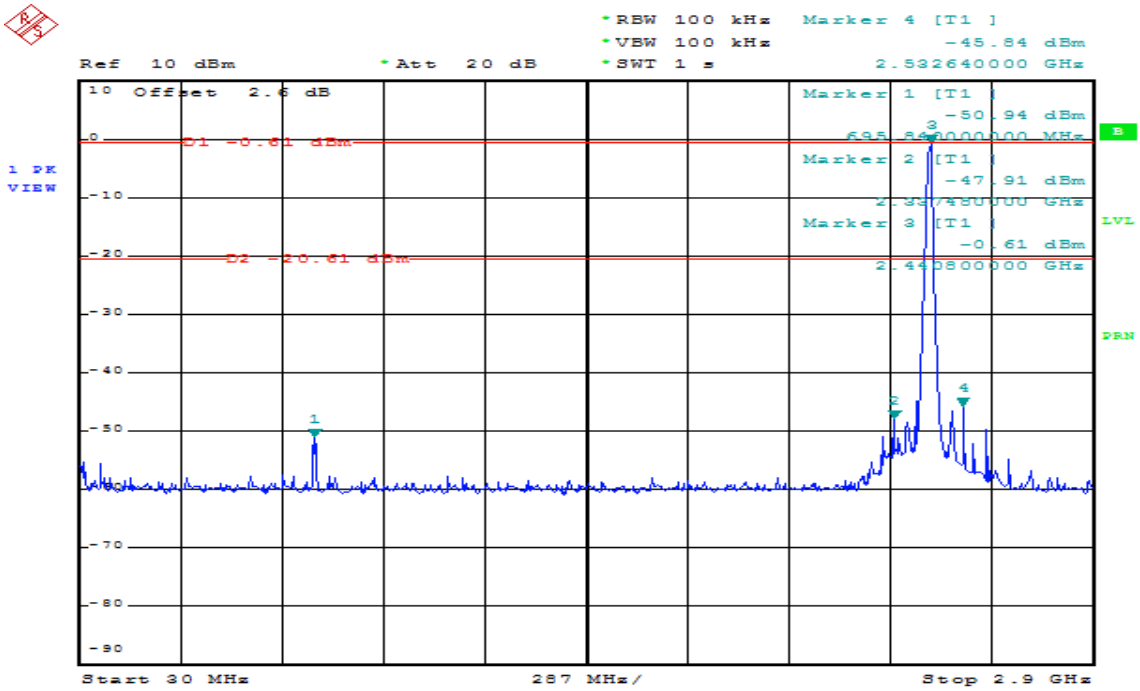
Conducted Spurious Emission Measurement Result

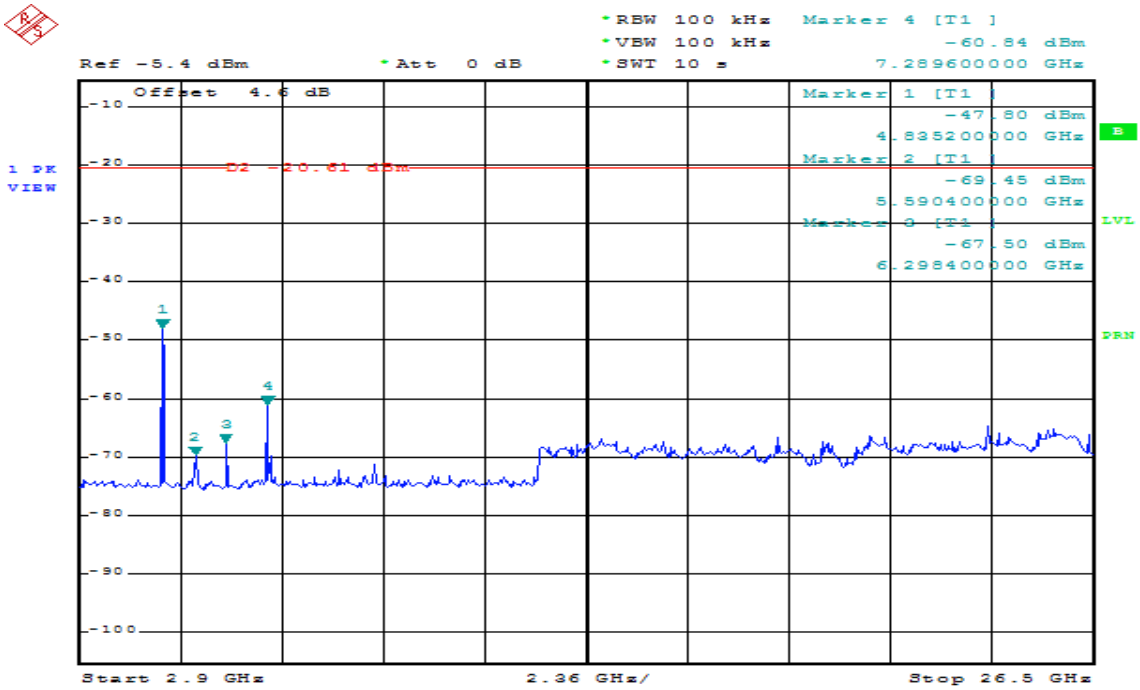
Ch Low



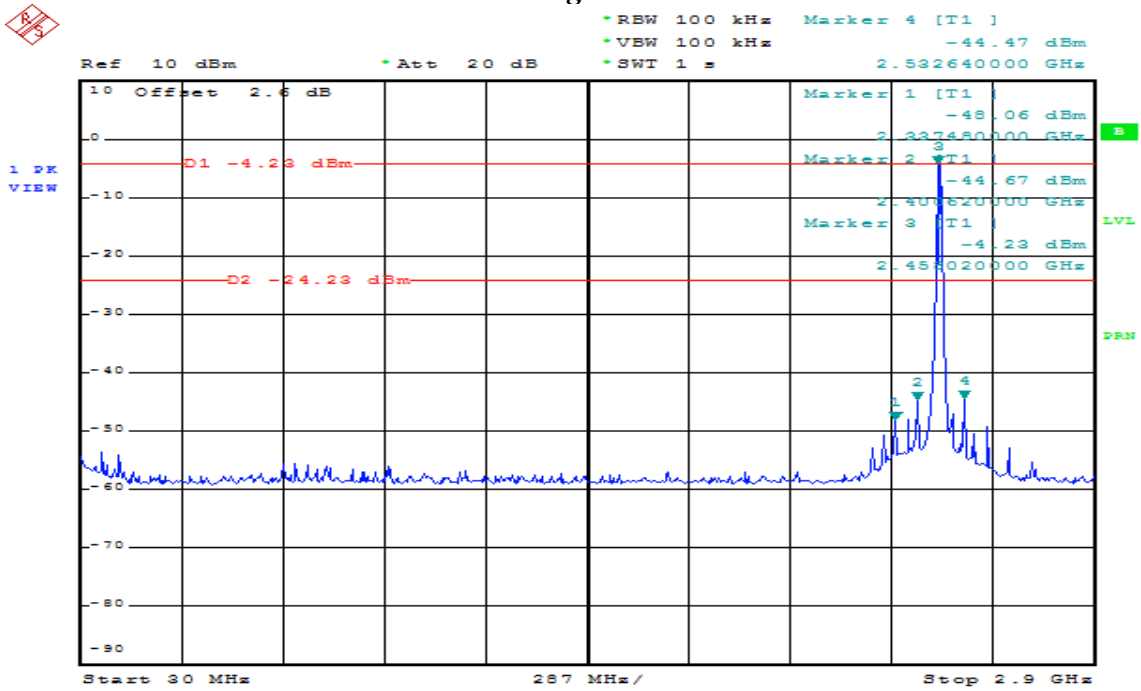


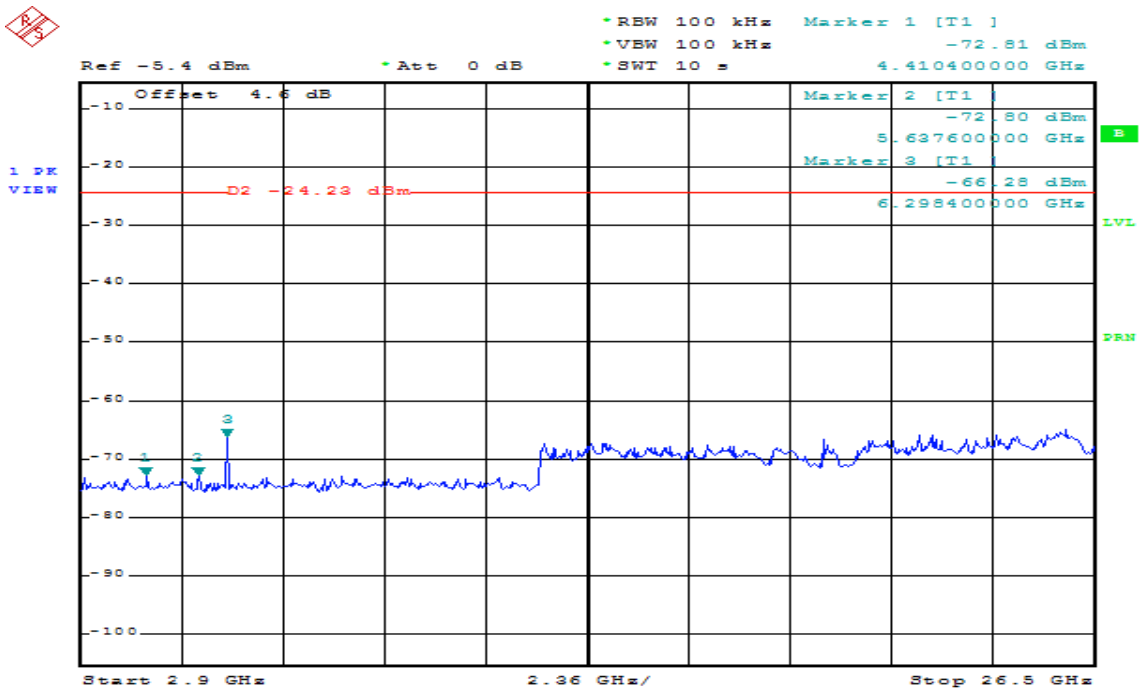
Ch Mid





Ch High





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

Operation Mode:	TX CH Low Mode	Test Date:	Sep. 15, 2004
Temperature:	20℃	Test By:	Willis
Humidity:	70 %	Pol:	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)
257.95	V	Peak	42.49	-15.03	27.46	46.00	-18.54
400.54	V	Peak	49.15	-10.58	38.57	46.00	-7.43
463.59	V	Peak	42.58	-9.65	32.93	46.00	-13.07
532.46	V	Peak	43.77	-8.77	35.00	46.00	-11.00
607.15	V	Peak	40.07	-7.47	32.60	46.00	-13.40
800.18	V	Peak	39.17	-3.50	35.67	46.00	-10.33
257.95	H	Peak	46.34	-15.03	31.31	46.00	-14.69
331.67	H	Peak	42.06	-12.46	29.60	46.00	-16.40
397.63	H	Peak	44.71	-10.66	34.05	46.00	-11.95
599.39	H	Peak	38.86	-7.64	31.22	46.00	-14.78
715.79	H	Peak	37.78	-5.08	32.70	46.00	-13.30
796.30	H	Peak	44.61	-3.57	41.04	46.00	-4.96

Remark:

1 Measuring frequencies from 30 MHz to the 1GHz.

2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak 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.

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

Operation Mode:	TX CH Mid Mode	Test Date:	Sep. 15, 2004
Temperature:	20℃	Test By:	Willis
Humidity:	70 %	Pol:	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)
132.82	V	Peak	43.78	-14.47	29.31	43.50	-14.19
400.54	V	Peak	48.02	-10.58	37.44	46.00	-8.56
455.83	V	Peak	41.84	-9.73	32.11	46.00	-13.89
529.55	V	Peak	43.68	-8.81	34.87	46.00	-11.13
599.39	V	Peak	40.22	-7.64	32.58	46.00	-13.42
796.30	V	Peak	37.93	-3.57	34.36	46.00	-11.64
257.95	H	Peak	47.05	-15.03	32.02	46.00	-13.98
331.67	H	Peak	41.91	-12.46	29.45	46.00	-16.55
400.54	H	Peak	47.08	-10.58	36.50	46.00	-9.50
607.15	H	Peak	39.72	-7.47	32.25	46.00	-13.75
731.31	H	Peak	36.78	-4.81	31.97	46.00	-14.03
800.18	H	Peak	41.91	-3.50	38.41	46.00	-7.59

Remark:

1 Measuring frequencies from 30 MHz to the 1GHz.

2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak 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.

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

Operation Mode:	TX CH High Mode	Test Date:	Sep. 15, 2004
Temperature:	20℃	Test By:	Willis
Humidity:	70 %	Pol:	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)
132.82	V	Peak	43.78	-14.47	29.31	43.50	-14.19
400.54	V	Peak	48.02	-10.58	37.44	46.00	-8.56
455.83	V	Peak	41.84	-9.73	32.11	46.00	-13.89
529.55	V	Peak	43.68	-8.81	34.87	46.00	-11.13
607.15	V	Peak	38.10	-7.47	30.63	46.00	-15.37
796.30	V	Peak	37.93	-3.57	34.36	46.00	-11.64
264.74	H	Peak	43.68	-14.77	28.91	46.00	-17.09
335.55	H	Peak	40.50	-12.34	28.16	46.00	-17.84
397.63	H	Peak	43.80	-10.66	33.14	46.00	-12.86
607.15	H	Peak	37.58	-7.47	30.11	46.00	-15.89
730.34	H	Peak	36.82	-4.82	32.00	46.00	-14.00
796.30	H	Peak	41.20	-3.57	37.63	46.00	-8.37

Remark:

1 Measuring frequencies from 30 MHz to the 1GHz.

2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak 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.

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11b)

Operation Mode:	TX CH Low Mode	Test Date:	Sep. 15, 2004
Temperature:	20℃	Test By:	Willis
Humidity:	70 %	Pol:	Vertical

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1058.5	47.72	---	-9.25	38.47	---	74.00	54.00	-15.53	Peak
1188.5	49.12	---	-8.65	40.47	---	74.00	54.00	-13.53	Peak
1663.0	42.92	---	-6.52	36.40	---	74.00	54.00	-17.60	Peak
4824.0	--					74.00	54.00		
7236.0	--					74.00	54.00		
9648.0	--					74.00	54.00		
12060.0	--					74.00	54.00		
14472.0	--					74.00	54.00		
16884.0	--					74.00	54.00		
19296.0	--					74.00	54.00		
21708.0	--					74.00	54.00		
24120.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11b)

Operation Mode:	TX Low Mode	Test Date:	Sep. 15, 2004
Temperature:	20℃	Test By:	Willis
Humidity:	70 %	Pol:	Horizontal

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1078.0	46.69	---	-9.12	37.57	---	74.00	54.00	-16.43	Peak
1513.5	46.16	---	-7.14	39.02	---	74.00	54.00	-14.98	Peak
1578.5	46.93	---	-6.84	40.09	---	74.00	54.00	-13.91	Peak
4824.0	--					74.00	54.00		
7236.0	--					74.00	54.00		
9648.0	--					74.00	54.00		
12060.0	--					74.00	54.00		
14472.0	--					74.00	54.00		
16884.0	--					74.00	54.00		
19296.0	--					74.00	54.00		
21708.0	--					74.00	54.00		
24120.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11b)

Operation Mode:	TX Mid Mode	Test Date:	Sep. 15, 2004
Temperature:	20 ℃	Test By:	Willis
Humidity:	70 %	Pol:	Vertical

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1058.5	49.96	---	-9.25	40.71	---	74.00	54.00	-13.29	Peak
1188.5	47.45	---	-8.65	38.80	---	74.00	54.00	-15.20	Peak
1513.5	43.30	---	-7.14	36.16	---	74.00	54.00	-17.84	Peak
1663.0	42.98	---	-6.52	36.46	---	74.00	54.00	-17.54	Peak
4874.0	--					74.00	54.00		
7311.0	--					74.00	54.00		
9748.0	--					74.00	54.00		
12185.0	--					74.00	54.00		
14622.0	--					74.00	54.00		
17059.0	--					74.00	54.00		
19496.0	--					74.00	54.00		
21933.0	--					74.00	54.00		
24370.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11b)

Operation Mode:	TX Mid Mode	Test Date:	Sep. 15, 2004
Temperature:	20 ℃	Test By:	Willis
Humidity:	70 %	Pol:	Horizontal

	Peak	AV		Actual FS		Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
1078.0	46.85	---	-9.12	37.73	---	74.00	54.00	-16.27	Peak
1240.5	46.77	---	-8.42	38.35	---	74.00	54.00	-15.65	Peak
1513.5	45.94	---	-7.14	38.80	---	74.00	54.00	-15.20	Peak
1578.5	45.32	---	-6.84	38.48	---	74.00	54.00	-15.52	Peak
4874.0	--					74.00	54.00		
7311.0	--					74.00	54.00		
9748.0	--					74.00	54.00		
12185.0	--					74.00	54.00		
14622.0	--					74.00	54.00		
17059.0	--					74.00	54.00		
19496.0	--					74.00	54.00		
21933.0	--					74.00	54.00		
24370.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11b)

Operation Mode:	TX High Mode	Test Date:	Sep. 15, 2004
Temperature:	20 ℃	Test By:	Willis
Humidity:	70 %	Pol:	Vertital

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1058.5	48.59	---	-9.25	39.34	---	74.00	54.00	-14.66	Peak
1188.5	47.43	---	-8.65	38.78	---	74.00	54.00	-15.22	Peak
1305.5	45.11	---	-8.08	37.03	---	74.00	54.00	-16.97	Peak
4924.0	--					74.00	54.00		
7386.0	--					74.00	54.00		
9848.0	--					74.00	54.00		
12310.0	--					74.00	54.00		
14772.0	--					74.00	54.00		
17234.0	--					74.00	54.00		
19696.0	--					74.00	54.00		
22158.0	--					74.00	54.00		
24620.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11b)

Operation Mode:	TX High Mode	Test Date:	Sep. 15, 2004
Temperature:	20 ℃	Test By:	Willis
Humidity:	70 %	Pol:	Horizontal

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1058.5	47.18	---	-9.25	37.93	---	74.00	54.00	-16.07	Peak
1188.5	50.19	---	-8.65	41.54	---	74.00	54.00	-12.46	Peak
1305.5	43.92	---	-8.08	35.84	---	74.00	54.00	-18.16	Peak
4924.0	--					74.00	54.00		
7386.0	--					74.00	54.00		
9848.0	--					74.00	54.00		
12310.0	--					74.00	54.00		
14772.0	--					74.00	54.00		
17234.0	--					74.00	54.00		
19696.0	--					74.00	54.00		
22158.0	--					74.00	54.00		
24620.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

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

Operation Mode:	TX CH Low Mode	Test Date:	Sep. 15, 2004
Temperature:	20℃	Test By:	Willis
Humidity:	70 %	Pol:	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)
132.82	V	Peak	43.59	-14.47	29.12	43.50	-14.38
400.54	V	Peak	47.96	-10.58	37.38	46.00	-8.62
466.50	V	Peak	45.00	-9.62	35.38	46.00	-10.62
532.46	V	Peak	42.52	-8.77	33.75	46.00	-12.25
607.15	V	Peak	39.95	-7.47	32.48	46.00	-13.52
800.18	V	Peak	38.26	-3.50	34.76	46.00	-11.24
249.22	H	Peak	46.39	-15.37	31.02	46.00	-14.98
330.70	H	Peak	42.31	-12.49	29.82	46.00	-16.18
400.54	H	Peak	43.83	-10.58	33.25	46.00	-12.75
607.15	H	Peak	39.83	-7.47	32.36	46.00	-13.64
730.34	H	Peak	36.82	-4.82	32.00	46.00	-14.00
796.30	H	Peak	42.76	-3.57	39.19	46.00	-6.81

Remark:

1 Measuring frequencies from 30 MHz to the 1GHz.

2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak 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.

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

Operation Mode:	TX CH Mid Mode	Test Date:	Sep. 15, 2004
Temperature:	20℃	Test By:	Willis
Humidity:	70 %	Pol:	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)
257.95	V	Peak	40.66	-15.03	25.63	46.00	-20.37
400.54	V	Peak	47.96	-10.58	37.38	46.00	-8.62
466.50	V	Peak	45.00	-9.62	35.38	46.00	-10.62
532.46	V	Peak	42.52	-8.77	33.75	46.00	-12.25
607.15	V	Peak	39.95	-7.47	32.48	46.00	-13.52
800.18	V	Peak	37.60	-3.50	34.10	46.00	-11.90
260.86	H	Peak	46.33	-14.92	31.41	46.00	-14.59
330.70	H	Peak	41.66	-12.49	29.17	46.00	-16.83
400.54	H	Peak	45.73	-10.58	35.15	46.00	-10.85
607.15	H	Peak	39.30	-7.47	31.83	46.00	-14.17
708.03	H	Peak	38.28	-5.23	33.05	46.00	-12.95
801.15	H	Peak	43.25	-3.49	39.76	46.00	-6.24

Remark:

1 Measuring frequencies from 30 MHz to the 1GHz.

2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak 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.

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

Operation Mode:	TX CH High Mode	Test Date:	Sep. 15, 2004
Temperature:	20℃	Test By:	Willis
Humidity:	70 %	Pol:	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)
257.95	V	Peak	42.61	-15.03	27.58	46.00	-18.42
400.54	V	Peak	48.61	-10.58	38.03	46.00	-7.97
455.83	V	Peak	41.59	-9.73	31.86	46.00	-14.14
529.55	V	Peak	43.63	-8.81	34.82	46.00	-11.18
607.15	V	Peak	40.39	-7.47	32.92	46.00	-13.08
796.30	V	Peak	38.97	-3.57	35.40	46.00	-10.60
198.78	H	Peak	44.29	-16.60	27.69	43.50	-15.81
256.98	H	Peak	46.98	-15.07	31.91	46.00	-14.09
330.70	H	Peak	43.39	-12.49	30.90	46.00	-15.10
400.54	H	Peak	45.46	-10.58	34.88	46.00	-11.12
607.15	H	Peak	39.57	-7.47	32.10	46.00	-13.90
796.30	H	Peak	43.83	-3.57	40.26	46.00	-5.74

Remark:

1 Measuring frequencies from 30 MHz to the 1GHz.

2 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak 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.

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

Operation Mode:	TX CH Low Mode	Test Date:	Sep. 15, 2004
Temperature:	20℃	Test By:	Willis
Humidity:	70 %	Pol:	Vertical

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1058.5	50.99	---	-9.25	41.74	---	74.00	54.00	-12.26	Peak
1188.5	47.40	---	-8.65	38.75	---	74.00	54.00	-15.25	Peak
2040.0	45.17	---	-4.99	40.18	---	74.00	54.00	-13.82	Peak
4841.5	38.56	---	3.09	41.65	---	74.00	54.00	-12.35	Peak
7253.0	41.28	---	9.36	50.64	---	74.00	54.00	-3.36	Peak
4824.0	--					74.00	54.00		
7236.0	--					74.00	54.00		
9648.0	--					74.00	54.00		
12060.0	--					74.00	54.00		
14472.0	--					74.00	54.00		
16884.0	--					74.00	54.00		
19296.0	--					74.00	54.00		
21708.0	--					74.00	54.00		
24120.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11g)

Operation Mode:	TX Low Mode	Test Date:	Sep. 15, 2004
Temperature:	20℃	Test By:	Willis
Humidity:	70 %	Pol:	Horizontal

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1078.0	49.24	---	-9.12	40.12	---	74.00	54.00	-13.88	Peak
1513.5	47.90	---	-7.14	40.76	---	74.00	54.00	-13.24	Peak
2040.0	47.07	---	-4.99	42.08	---	74.00	54.00	-11.92	Peak
4824.0	--					74.00	54.00		
7236.0	--					74.00	54.00		
9648.0	--					74.00	54.00		
12060.0	--					74.00	54.00		
14472.0	--					74.00	54.00		
16884.0	--					74.00	54.00		
19296.0	--					74.00	54.00		
21708.0	--					74.00	54.00		
24120.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11g)

Operation Mode:	TX Mid Mode	Test Date:	Sep. 15, 2004
Temperature:	20 ℃	Test By:	Willis
Humidity:	70 %	Pol:	Vertical

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF (dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1058.5	49.85	---	-9.25	40.60	---	74.00	54.00	-13.40	Peak
1188.5	49.78	---	-8.65	41.13	---	74.00	54.00	-12.87	Peak
2053.0	46.20	---	-4.93	41.27	---	74.00	54.00	-12.73	Peak
4874.0	37.49	---	3.21	40.70	---	74.00	54.00	-13.30	Peak
7311.0	40.19	---	9.47	49.66	---	74.00	54.00	-4.34	Peak
9748.0	--					74.00	54.00		
12185.0	--					74.00	54.00		
14622.0	--					74.00	54.00		
17059.0	--					74.00	54.00		
19496.0	--					74.00	54.00		
21933.0	--					74.00	54.00		
24370.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11g)

Operation Mode:	TX Mid Mode	Test Date:	Sep. 15, 2004
Temperature:	20 ℃	Test By:	Willis
Humidity:	70 %	Pol:	Horizontal

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1078.0	49.71	---	-9.12	40.59	---	74.00	54.00	-13.41	Peak
1513.5	47.39	---	-7.14	40.25	---	74.00	54.00	-13.75	Peak
2053.0	48.23	---	-4.93	43.30	---	74.00	54.00	-10.70	Peak
4874.0	--					74.00	54.00		
7311.0	--					74.00	54.00		
9748.0	--					74.00	54.00		
12185.0	--					74.00	54.00		
14622.0	--					74.00	54.00		
17059.0	--					74.00	54.00		
19496.0	--					74.00	54.00		
21933.0	--					74.00	54.00		
24370.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11g)

Operation Mode:	TX High Mode	Test Date:	Sep. 15, 2004
Temperature:	20 ℃	Test By:	Willis
Humidity:	70 %	Pol:	Vertital

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1058.5	49.17	---	-9.25	39.92	---	74.00	54.00	-14.08	Peak
1188.5	48.07	---	-8.65	39.42	---	74.00	54.00	-14.58	Peak
1663.0	42.90	---	-6.52	36.38	---	74.00	54.00	-17.62	Peak
2085.5	45.69	---	-4.76	40.93	---	74.00	54.00	-13.07	Peak
4924.0	--					74.00	54.00		
7386.0	45.67	40.29	9.58	55.25	49.87	74.00	54.00	-4.13	AV
9848.0	--					74.00	54.00		
12310.0	--					74.00	54.00		
14772.0	--					74.00	54.00		
17234.0	--					74.00	54.00		
19696.0	--					74.00	54.00		
22158.0	--					74.00	54.00		
24620.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

Radiated Spurious Emission Measurement Result (Above 1GHz) (802.11g)

Operation Mode:	TX High Mode	Test Date:	Sep. 15, 2004
Temperature:	20 ℃	Test By:	Willis
Humidity:	70 %	Pol:	Horizontal

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1078.0	49.51	---	-9.12	40.39	---	74.00	54.00	-13.61	Peak
1513.5	47.23	---	-7.14	40.09	---	74.00	54.00	-13.91	Peak
2085.5	48.51	---	-4.76	43.75	---	74.00	54.00	-10.25	Peak
4924.0	--					74.00	54.00		
7386.0	39.45	---	9.58	49.03	---	74.00	54.00	-4.97	Peak
9848.0	--					74.00	54.00		
12310.0	--					74.00	54.00		
14772.0	--					74.00	54.00		
17234.0	--					74.00	54.00		
19696.0	--					74.00	54.00		
22158.0	--					74.00	54.00		
24620.0	--					74.00	54.00		

Remark:

1 Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

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

10 6 dB Bandwidth Measurement

10.1 Standard Applicable

According to § 15.247(a)(2), DSSS Systems operating in the 2400MHz-2483.5 MHz and 5725MHz – 5850MHz bands. The Minimum 6dB bandwidth shall be at least 500KHz.

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=100KHz, VBW = 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.

10.3 Measurement Result

802.11b

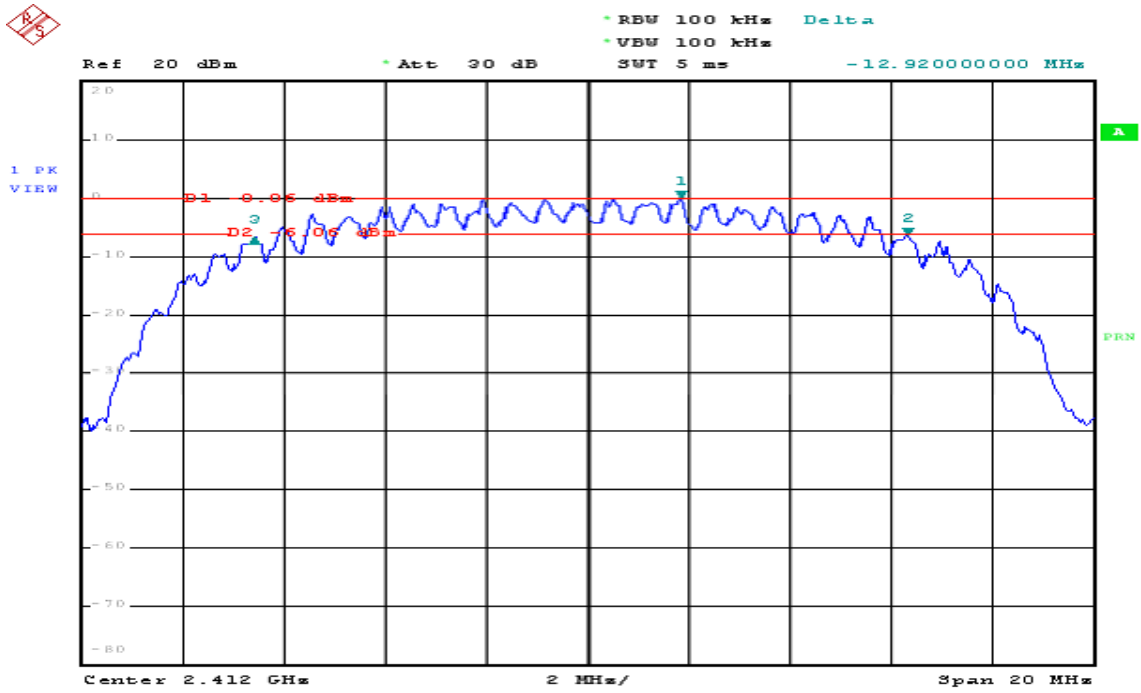
CH	Bandwidth (MHz)	Bandwidth (KHz)	Result
Lower	12.92	> 500	PASS
Mid	12.92	> 500	PASS
Higher	12.92	> 500	PASS

802.11g

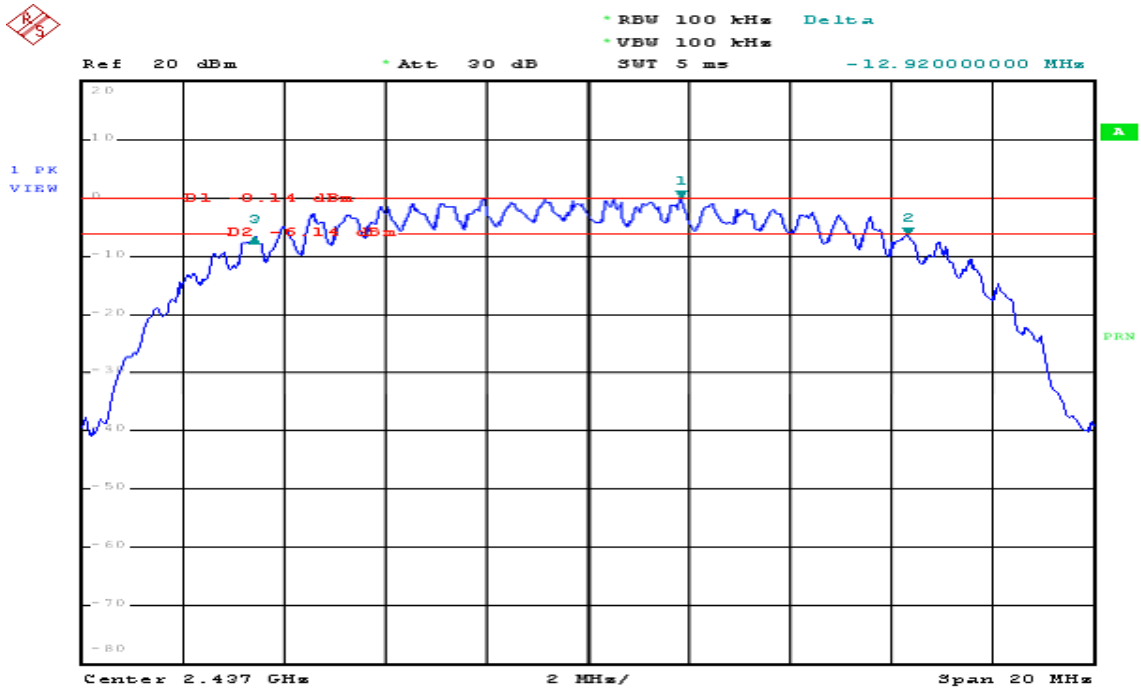
CH	Bandwidth (MHz)	Bandwidth (KHz)	Result
Lower	16.44	> 500	PASS
Mid	16.40	> 500	PASS
Higher	16.52	> 500	PASS

802.11b

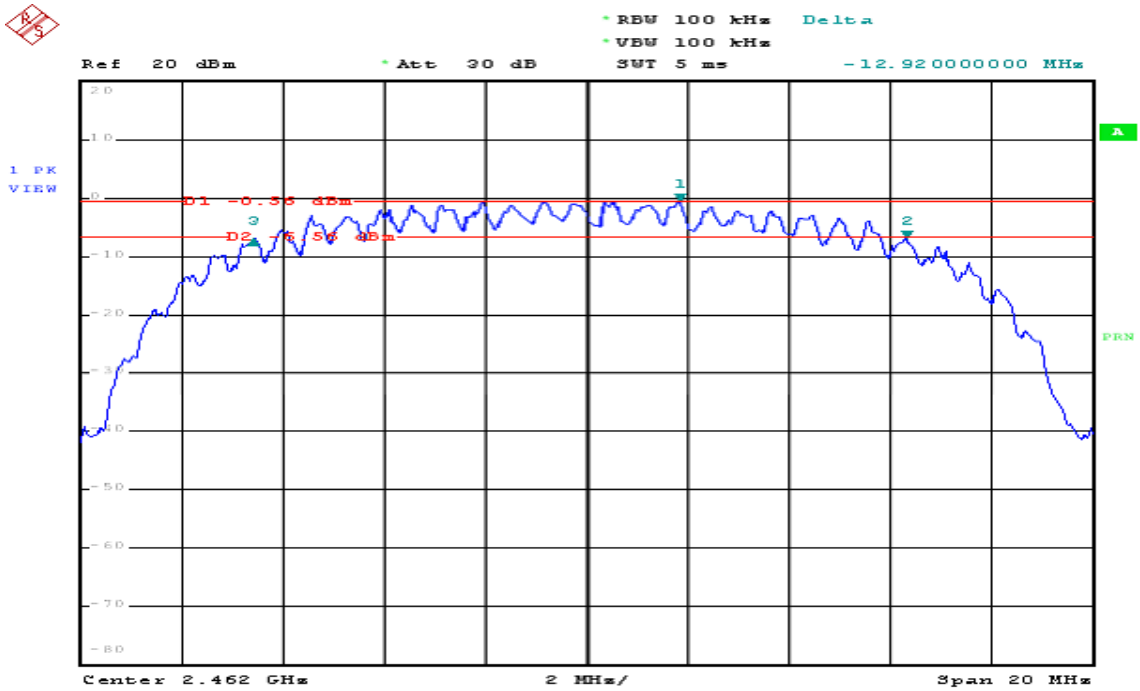
6dB Band Width Test Data CH-LOW



6dB Band Width Test Data CH-MID

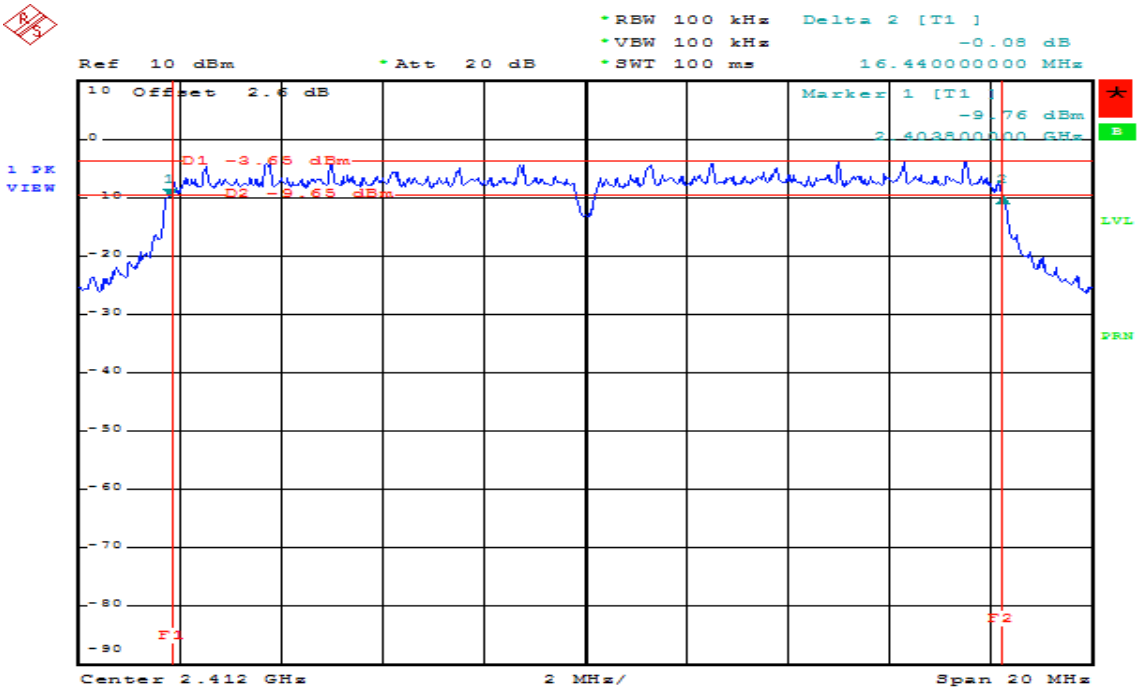


6dB Band Width Test Data CH-HIGH

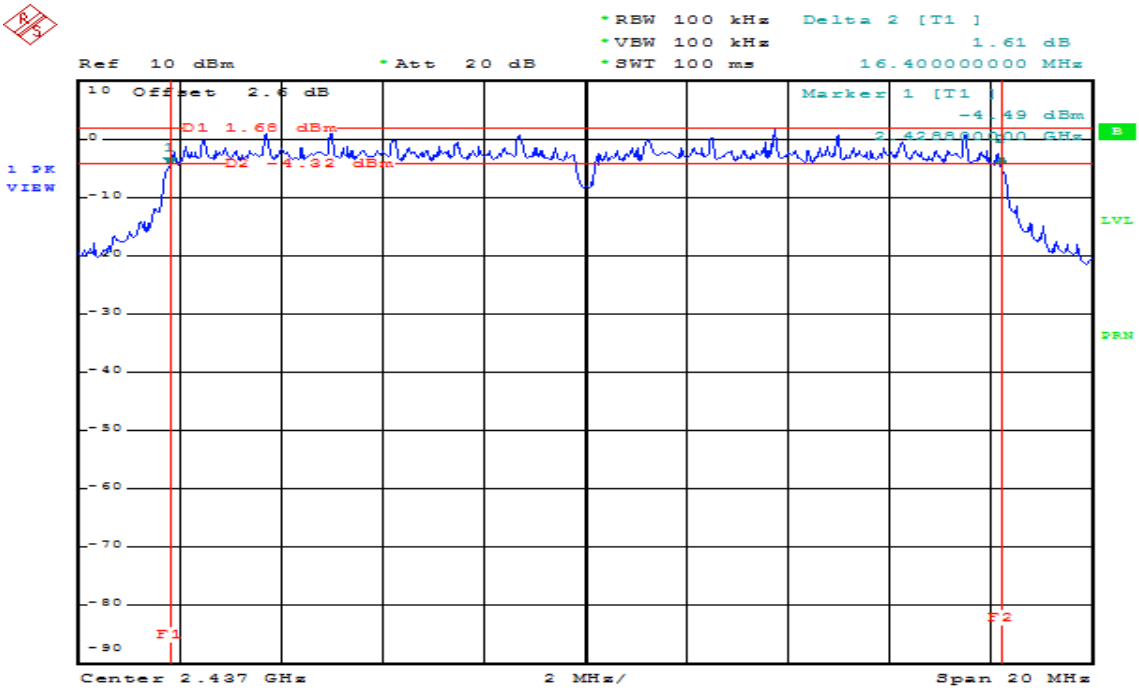


802.11g

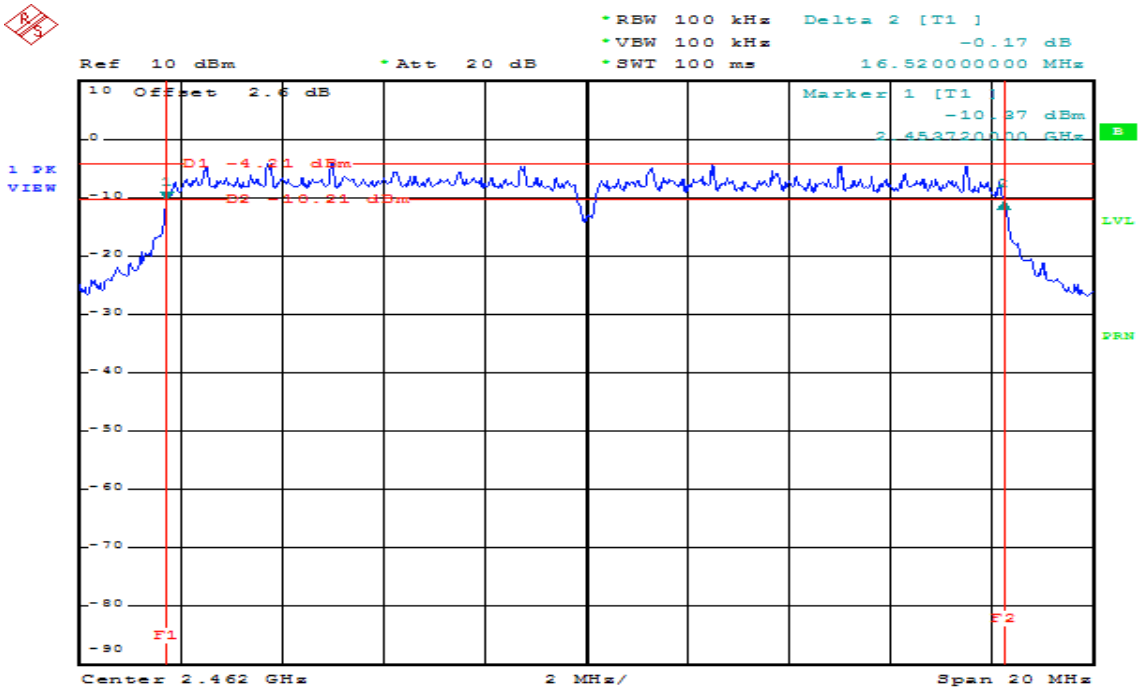
6dB Band Width Test Data CH-LOW



6dB Band Width Test Data CH-MID



6dB Band Width Test Data CH-HIGH



11 Peak Power Spectral Density

11.1 Standard Applicable

According to §15.247(d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3kHz band during any time interval of continuous transmission.

11.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 3KHz, VBW = 10KHz, Span = 300KHz, Sweep=100s
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

11.3 Measurement Result

802.11b

	Reading dBm	Cable Loss dB	Density dBm	Limint dBm	Result
Low	-8.17	0.00	-8.17	8	PASS
Mid	-8.17	0.00	-8.17	8	PASS
High	-8.69	0.00	-8.69	8	PASS

802.11g

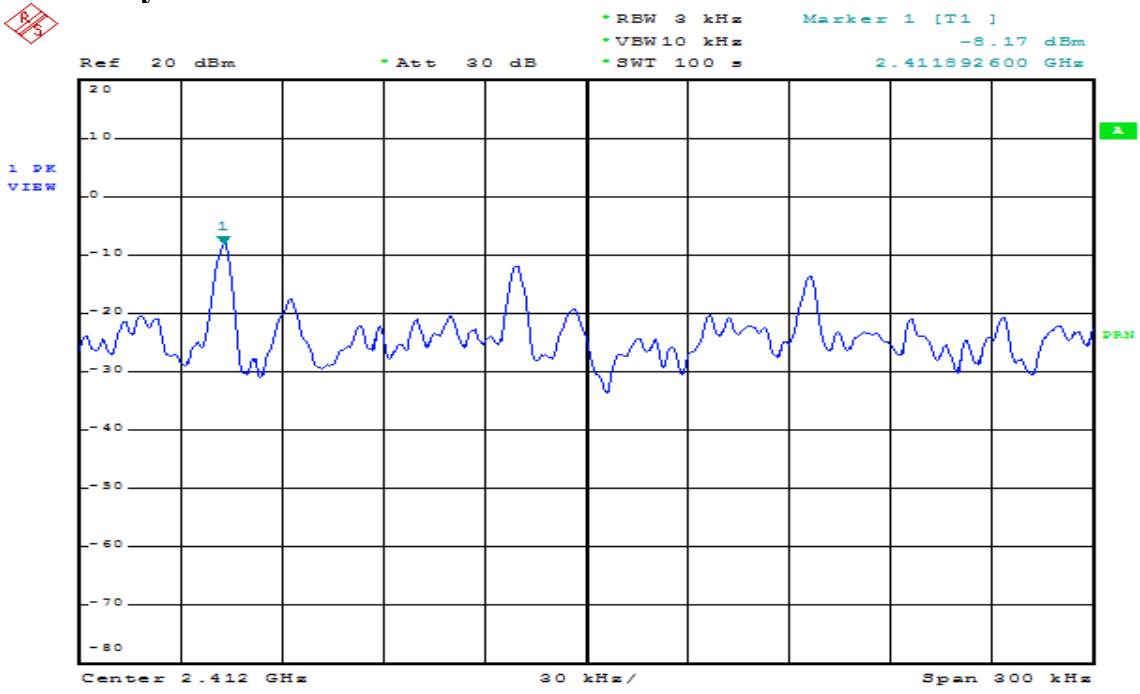
	Reading dBm	Cable Loss dB	Density dBm	Limint dBm	Result
Low	-16.98	0.00	-16.98	8	PASS
Mid	-12.30	0.00	-12.30	8	PASS
High	-17.50	0.00	-17.50	8	PASS

Note: There is a offset of 2.3dB for the cable loss

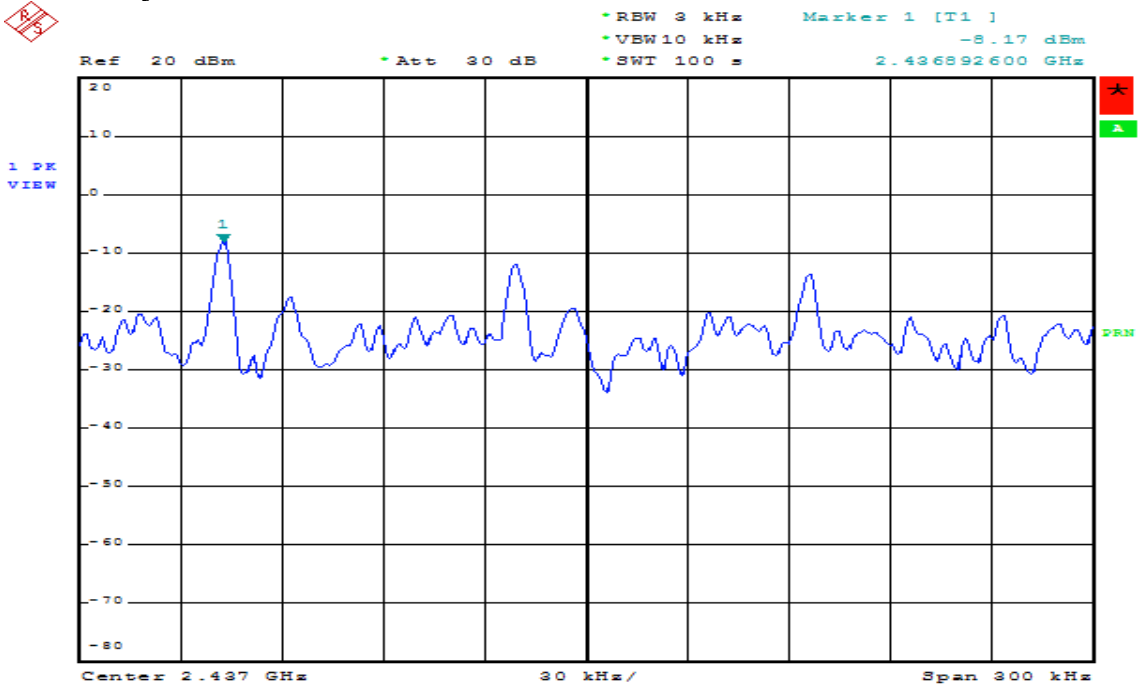
Refer to attached spectrum analyzer data chart.

802.11b

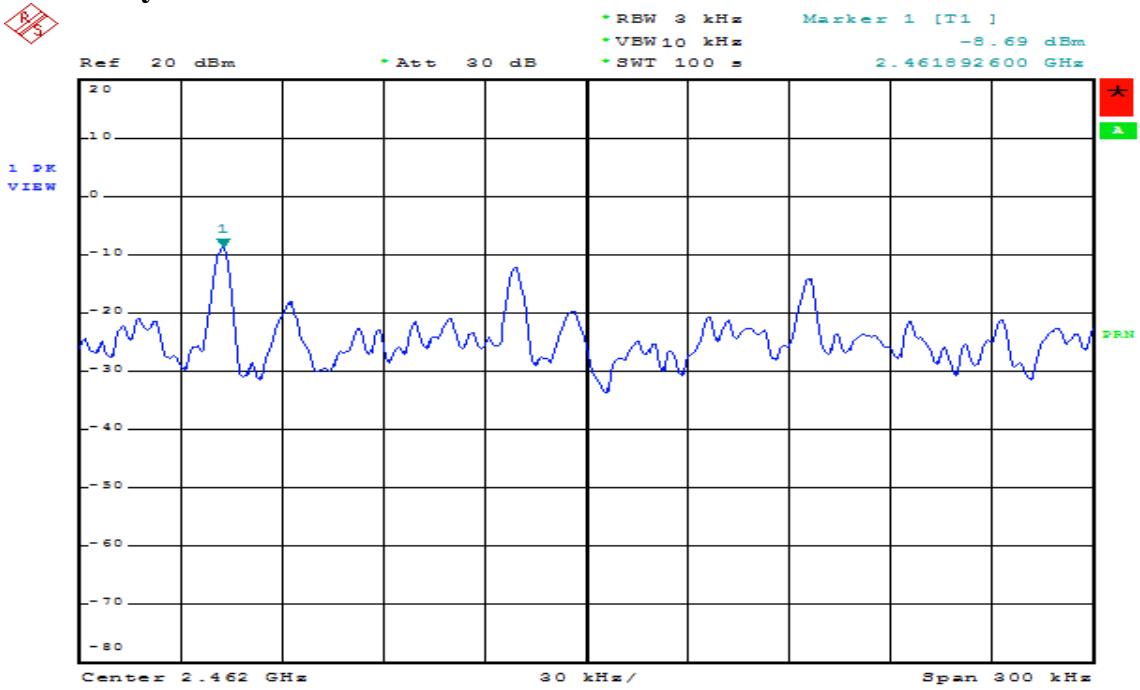
Power Density Test Data CH-LOW



Power Density Test Data CH-MID

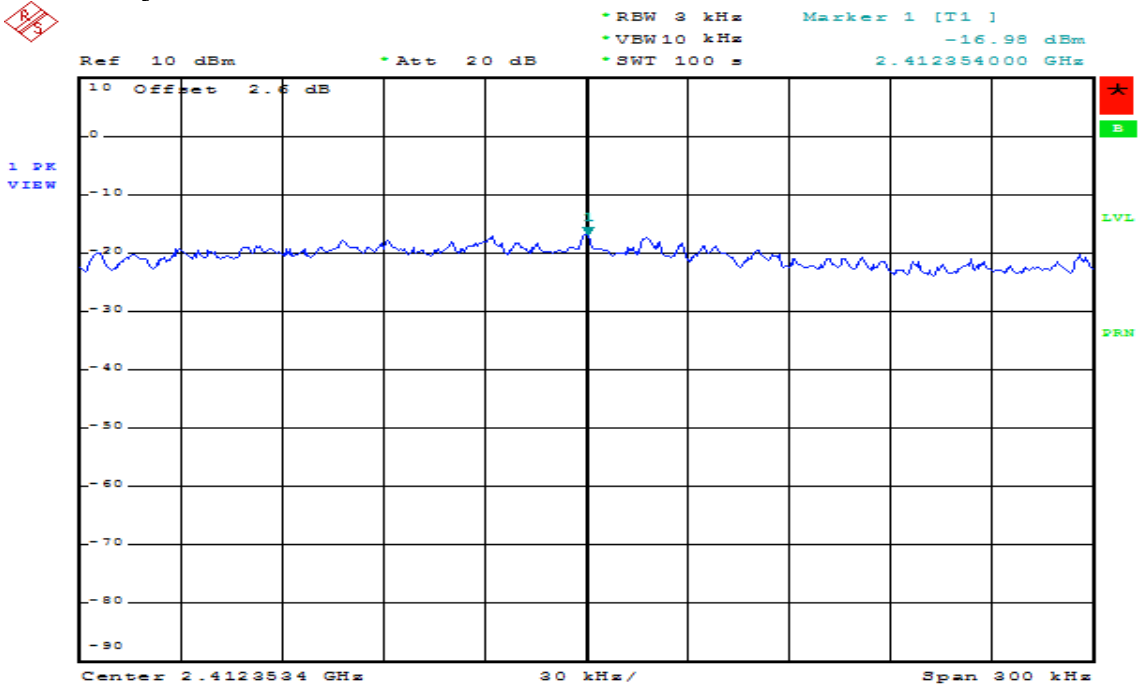


Power Density Test Data CH-HIGH

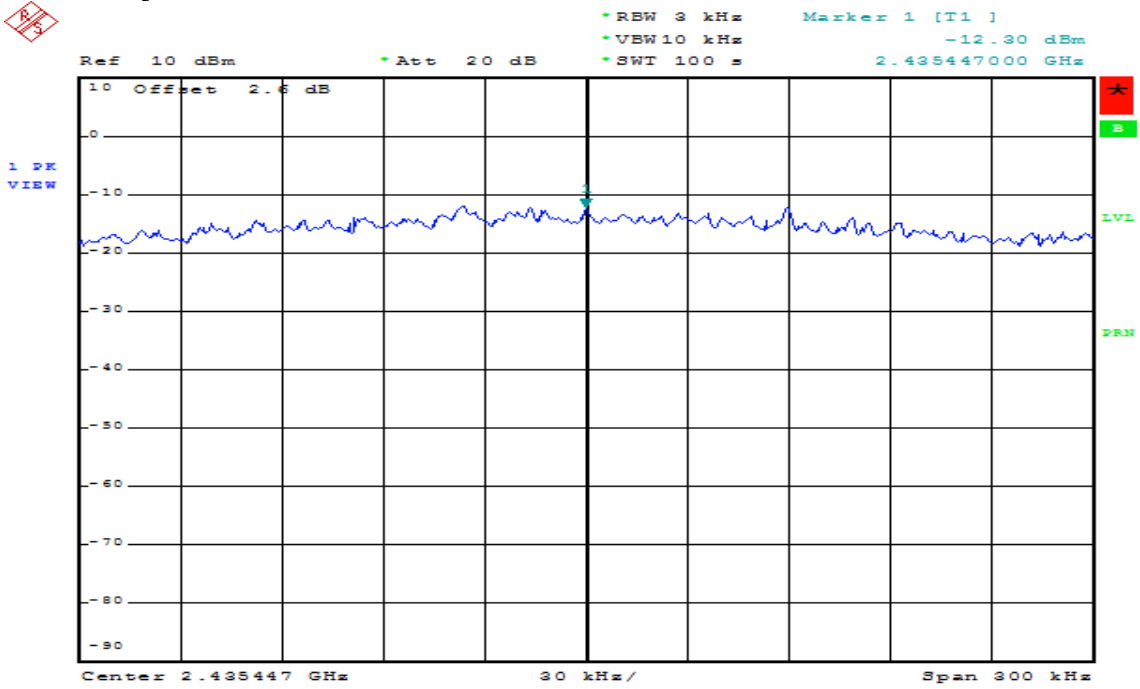


802.11g

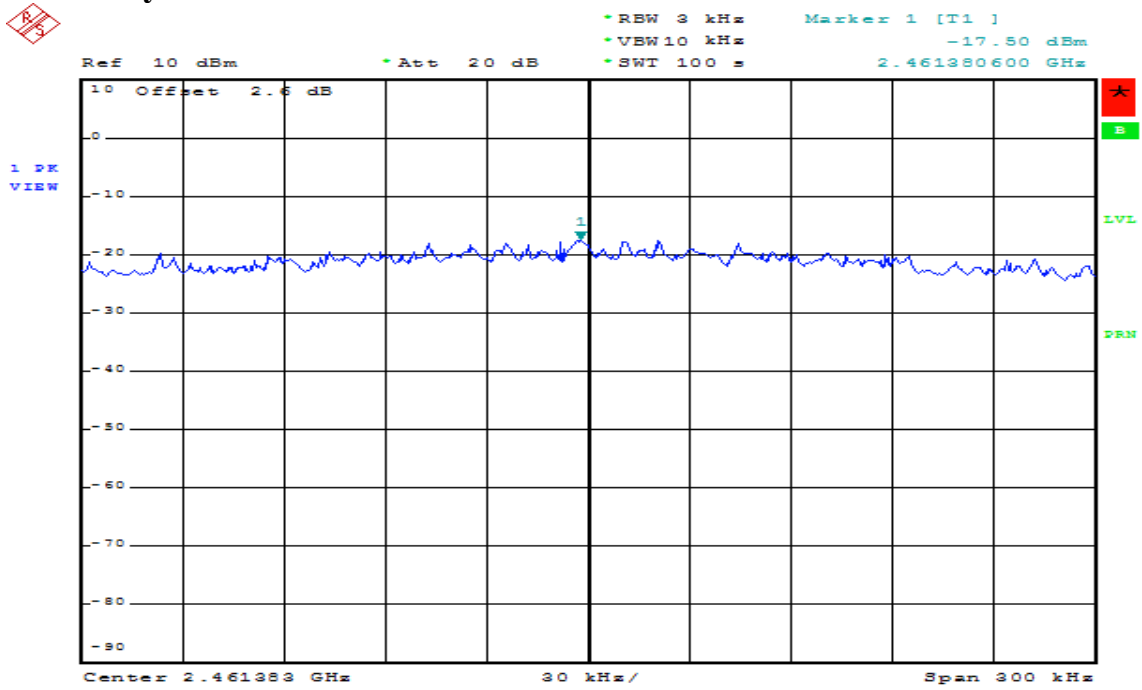
Power Density Test Data CH-LOW



Power Density Test Data CH-MID



Power Density Test Data CH-HIGH



12 ANTENNA REQUIREMENT

12.1 Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

And according to §15.247(4)(i), if transmitting antennas of directional gain greater than 6dBi are used the power shall be reduced by the amount in 1dB that the directional gain of the antenna exceeds 6 dBi.

12.2 Antenna Connected Construction

The directional gain of antenna used for transmitting is 2 dBi, and the user designs the antenna connector with unique connector and no consideration of replacement. Please see EUT photo for details.

13 RF Exposure

13.1 Standard Applicable

According to §15.247(b)(4) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

* = Plane-wave equipment power density

MPE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	12.24	(dBm)
Maximum peak output power at antenna input terminal:	16.74943	(mW)
Antenna gain (typical):	2	(dBi)
Maximum antenna gain:	1.584893	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)

MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.00528	(mW/cm^2)

Measurement Result:

The predicted power density level at 20 cm is	0.005284	(mW/cm^2)
This is below the uncontrolled exposure limit of 1 mW/cm	2437	MHz

Measurement Result

The predicted power density level at 20 cm is 0.005284 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2 at 2437MHz.