

# FCC TEST REPORT

*of*

## Wireless ADSL/LAN Router

**FCC ID:** Q78-ZXV10W300V2  
**Model No.:** W300-ALR, W300-AR, W300-APE, W300-AP  
**Serial No.:** N/A  
**Report No.:** SZ\_34\_06022\_F-2  
**Date:** December 7, 2006

*Prepared for*

*ZTE CORPORATION*



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# 1 Test Report Certification

**Product:** Wireless ADSL/LAN Router

**Model No.:** W300-ALR, W300-AR, W300-APE, W300-AP

**FCC ID** Q78-ZXV10W300V2

**Applicant:** ZTE CORPORATION

**Applicant Address:** ZTE Plaza , Keji Road South , Hi-tech Industrial Park , Nanshan District , Shenzhen , P.R.China

**Manufacturer:** ZTE CORPORATION

**Manufacturer Address:** ZTE Plaza , Keji Road South , Hi-tech Industrial Park , Nanshan District , Shenzhen , P.R.China

**Test Standards:** 47 CFR Part 15 ,Subpart C

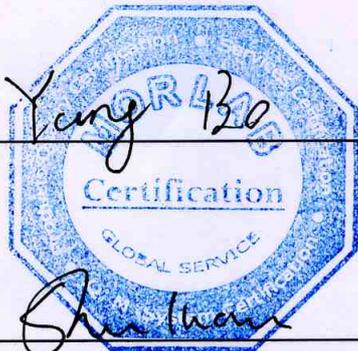
**Test Result:** PASS

We, MORLAB, hereby certify that the submitted samples of the above item, as detailed in chapter 2.1 of this report, has been tested in our facility. The test record, data evaluation and test configuration represented herein are true and accurate accounts of measurements of the sample's EMC characteristics under the conditions herein specified.

Tested by: Sheng Wu, Date: 2006.12.07

Checked by: Yang 130, Date: 2006.12.07

Approved by: Shen Han, Date: 2006.12.07



## 2 General Information

### 2.1 Description of EUT

EUT	
<b>Description:</b>	Wireless ADSL/LAN Router
<b>Model No.:</b>	W300-ALR, W300-AR, W300-APE, W300-AP
<b>IMEI No.:</b>	N/A
<b>Serial No.:</b>	N/A
<b>Hardware Version:</b>	72202W300A/4_060800-R6
<b>Software Version:</b>	V.T4
<b>Model Discrepancy</b>	Showed as below
<b>Power Supply</b>	Powered by Adapter
<b>Frequency Range</b>	IEEE 802.11b: 2412 ~ 2462 MHz IEEE 802.11g: 2412 ~ 2462 MHz
<b>Transmit Power</b>	802.11b mode: 22.55 dBm 802.11g mode: 20.33dBm
<b>Modulation Technique</b>	802.11 b :DSSS(BPSK,QPSK,CCK) 802.11g : OFDM(BPSK,QPSK,16-QAM,64-QAM)
<b>Number of Channels</b>	IEEE 802.11b: 11 CH IEEE 802.11g: 11 CH
<b>Antenna Gain</b>	2.0 dBi

#### NOTE:

1. The EUT is Class C Radio Frequency Devices, Unintentional Radiator according to FCC rules.
2. Please refer to Appendix I for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.
3. Country code selection is not available on the device/software, user can not use channel 12 and channel 13.

**Mode Difference description:**

Model A: former ZXV10 W300

Model B: new ZXV10 W300, Model ZXV10 W300-AR

Model C: Model ZXV10 W300-ALR

Model D: Model ZXV10 W300-APE

Model E: Model ZXV10 W300-AB

No.	Difference description		
	project	Model A	Model B
1	architecture	same	same
2	circuit	1、 SWITCH is RTL8305SB 2、 no 18VAC—5VDC circuit	1、 SWITCH is ADM6996M 2、 have 18VAC—5VDC circuit
3	PCB	Wireless card face left	Wireless card face down
4	Safe partition	same	same
5	EMC partition	same	same
6	other	Wireless card: XG-650E//WMG2K4V	Wireless card :WMT0581//WN4403B-LF-ZZ, To FCC, the max output power is 23dBm; To CE, the max output power is 20dBm。

Accept that , **Model A** and **Model B** are same.

Model C, D, E compare to B:

No.	difference				
	project	Model B	Model C	Model D	Model E
1	name	ZXV10 W300 — Wireless ADSL Router	ZXV10 W300 — Wireless ADSL/LAN Router	ZXV10 W300 — Wireless Access Point Enhanced	ZXV10 W300—4 port ADSL Bridge Modem
2	architecture	Same box, no antenna on the interface panel.	Same box, there is a antenna base on the interface panel.	Same box, there is a antenna base on the interface panel, the power jack have moved from left to right .And these are two interface panels, one is output antenna ,the other is input antenna. The downstream have two models ,one have 4 ports	Same box , the appearance is the same with model B.

				10M/100M LAN, the other is have no LAN.	
3	circuit	same	same	Added POE circuit and moved ADSL circuit.	Same
4	PCB	same	same	The power circuit have moved to right together with POE circuit. The WLAN card have moved to top left corner.	Same, we just deduct the WLAN card and 5V power circuit from material sheet.
5	Safe partition	same	same	Add a lightningproof cell in the interface of POE.	Same
6	EMC partition	same	same	same	same
7	other	LAN jack and Power jack have moved into the interface panel.	LAN jack and Power jack have moved behind the interface panel.	The power jack have moved form left to right.	Same with model B.
8	antenna	Antenna on the PCB board.	2dBi WLAN NETWORK CARD ANTENNA	2dBi WLAN NETWORK CARD ANTENNA	Same with model B.

## 2.2 Objective

Perform EMC test according to FCC rules Part 15 Subpart C.

## 2.3 Test Standards and Results

The EUT has been tested according to Part 15 Class C.

Test items and the results are as bellow:

<b>№</b>	<b>FCC Rules</b>	<b>Test Type</b>	<b>Result</b>
1	§15.207	Conducted Emission	PASS
2	§15.209, §15.247(c)	Radiated Emission	PASS
3	§15.247(a)	6 dB Bandwidth	PASS
4	§15.247(b)	Maximum Peak Output Power	PASS
5	§15.247(c)	Band Edge	PASS
6	§15.247(c)	Conducted Spurious Emission	PASS
7	§15.247(d)	Power Spectrum Density	PASS

## 2.4 List of Equipments Used

Description	Manufacturer	Model No.	Cal. Due Date	Serial No.
Test Receiver	Schwarzbeck	FCKL1528	2007.06.10	A0304230
Test Receiver	Rohde & Schwarz	ESIB26	2007.06.10	A0304218
LISN	Schwarzbeck	NSLK8127	2007.06.10	A0304233
Shield Room	Nanbo Tech	Site 3	2007.03.18	A9901141
Shield Room	Nanbo Tech	Site 1	2007.01.17	A0304188
Anechoic Chamber	Albatross	EMC12.8×6.8× 6.4(m)	2007.04.18	A0304210
Loop Antenna	Rohde & Schwarz	HFH2-Z2	2007.06.05	A0304218
Ultra Broadband Ant	Rohde & Schwarz	HL562	2007.06.05	A0304224
BiLog	Amplifier Research	AR AT1080	2007.06.05	A0304249
Horn	Amplifier Research	AT4002A	2007.06.5	A0304250
Power Meter	Rohde & Schwarz	NRVS	2007.6.10	100729

## 2.5 Test Facility

MORLAB (MORLAB) is a third party testing organization accredited by China National Accreditation Committee for Laboratories (CNACL) according to ISO/IEC 17025. The accreditation certificate number is **L1659**.

The EMC chamber site No.1 (EMC12.8×6.8×6.4(m)), and the radiated and conducted Emission test equipments of MORLAB are constructed and calibrated to meet the FCC requirements ANSI C63.4:2001 and CISPR 22/EN 55022. The FCC Registration Number is **741109**.

The EMC chamber site No.1 (EMC12.8×6.8×6.4(m)) also complies with Canada standard RSS 212, and acceptable to Industry Canada for the performance of radiated measurements. The Industry Canada Registration Number is **IC 5915**.

## 2.6 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 k Pa

### 3 Conducted Emission Measurement

#### 3.1 Limits of Conducted Emission

The radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB $\mu$ V), Class B digital device	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

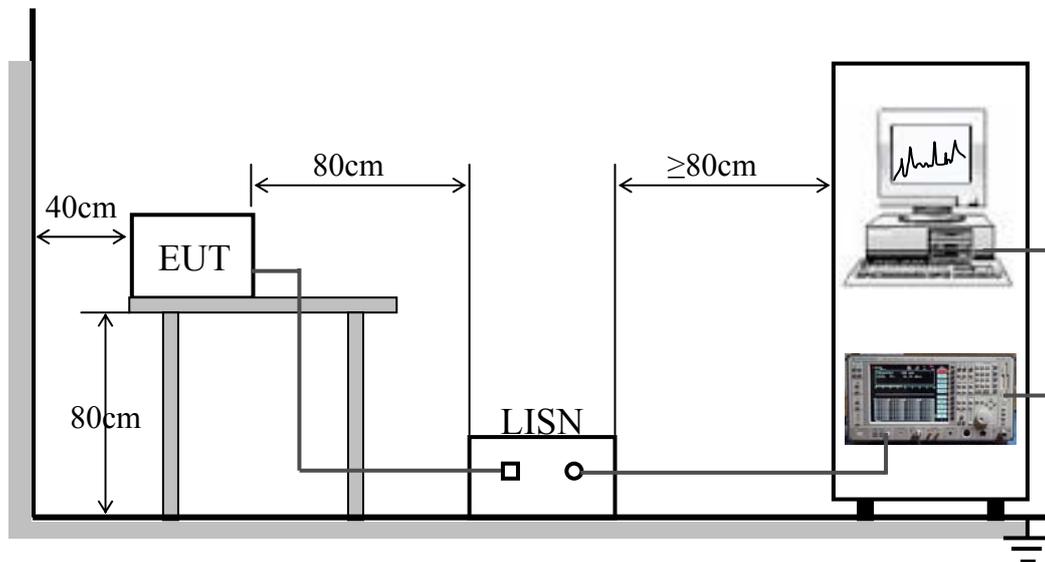
**NOTE:**

1. The lower limit shall apply at the band edges.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

#### 3.2 Test Procedure

- a. The EUT was placed on a 0.8m high insulating table and kept 0.4 meters from the conducting wall of shielded room.
- b. The EUT was connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50 $\Omega$ /50 $\mu$ H of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150 kHz to 30 MHz was searched using CISPR Quasi-Peak and Average detector.

### 3.3 Test Setup



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

### 3.4 EUT Setup and Operating Conditions

Set up EUT with the auxiliary equipments, link them normally, and make sure the EUT works normally during the test.

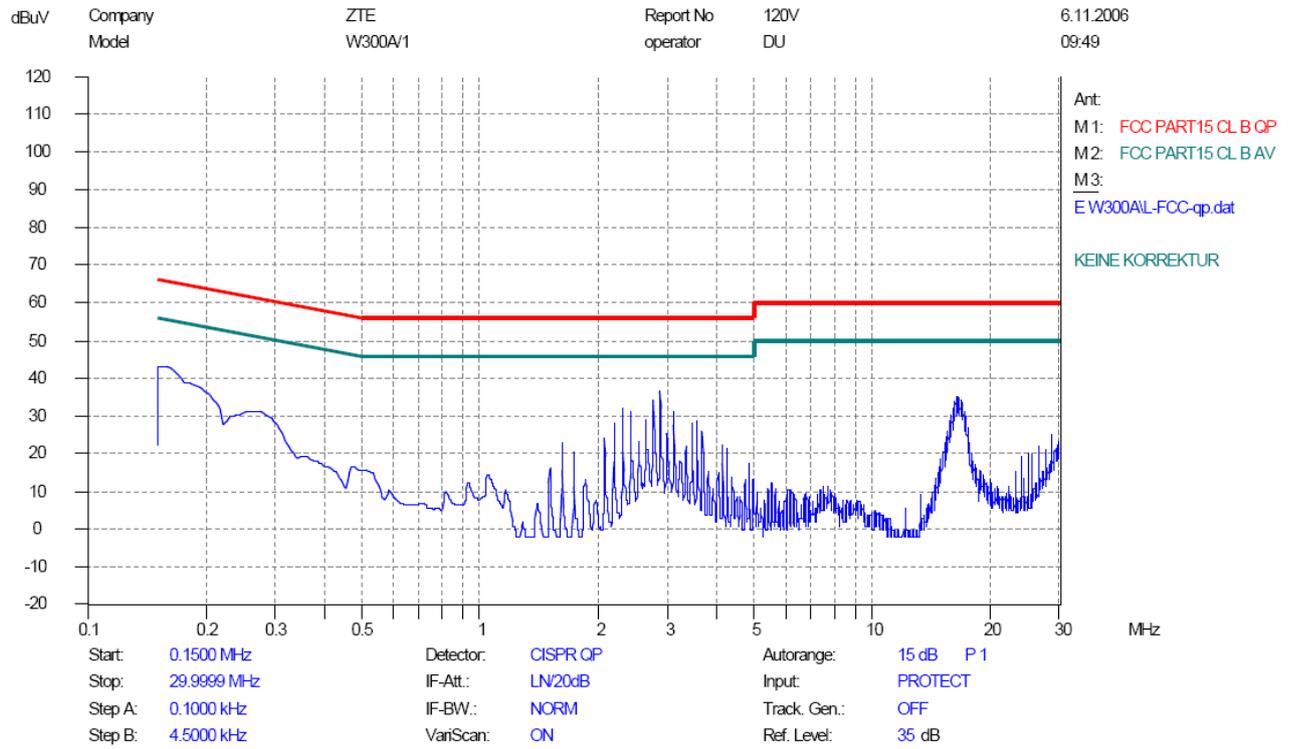
### 3.5 Test Results

No.	Freq. (MHz)	Limit Value (dBμV)		Emission Level (dBμV)	
		QP	AV	QP	AV
1	2.3055	56.0	46.0	32.21	--
2	2.8815	56.0	46.0	36.32	--
3	3.1065	56.0	46.0	31.51	--
4	3.4530	56.0	46.0	30.68	--
5	15.9720	60.0	50.0	30.71	--

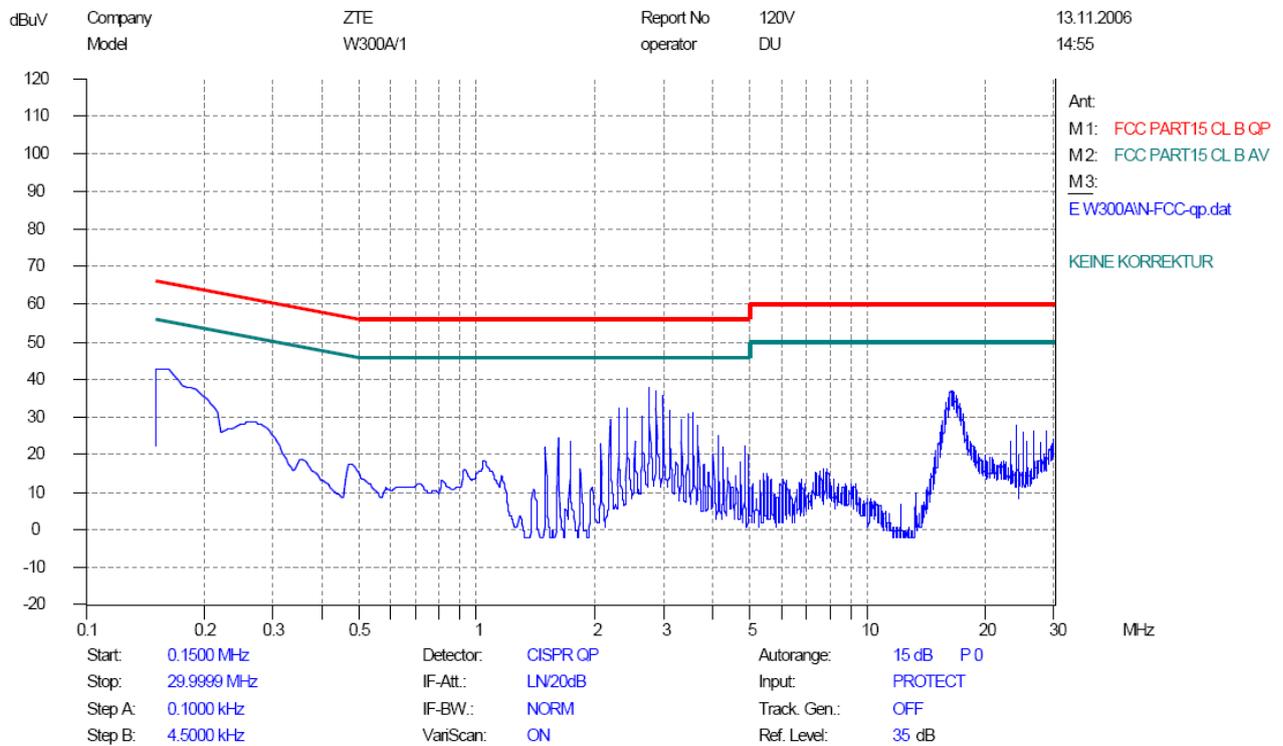
**NOTE:**

1. QP and AV are abbreviations of the quasi-peak and average individually.
2. If the emission levels measured with QP detector are lower than AV limits, there is unnecessary to measure with AV detector.
3. The emission levels recorded above is the larger ones of both L phase and N phase.

### 1. Mains terminal disturbance voltage, L phase



### 2. Mains terminal disturbance voltage, N phase



## 4 Radiated Emission Test

### 4.1 Limits of Radiated Emission

The field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength ( $\mu\text{V/m}$ )	Field Strength ( $\text{dB}\mu\text{V/m}$ )
0.009-0.490	2400/F(KHz)	--
0.490-1.705	24000/F(KHz)	--
1.705-30.0	30	29.5
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

**NOTE:**

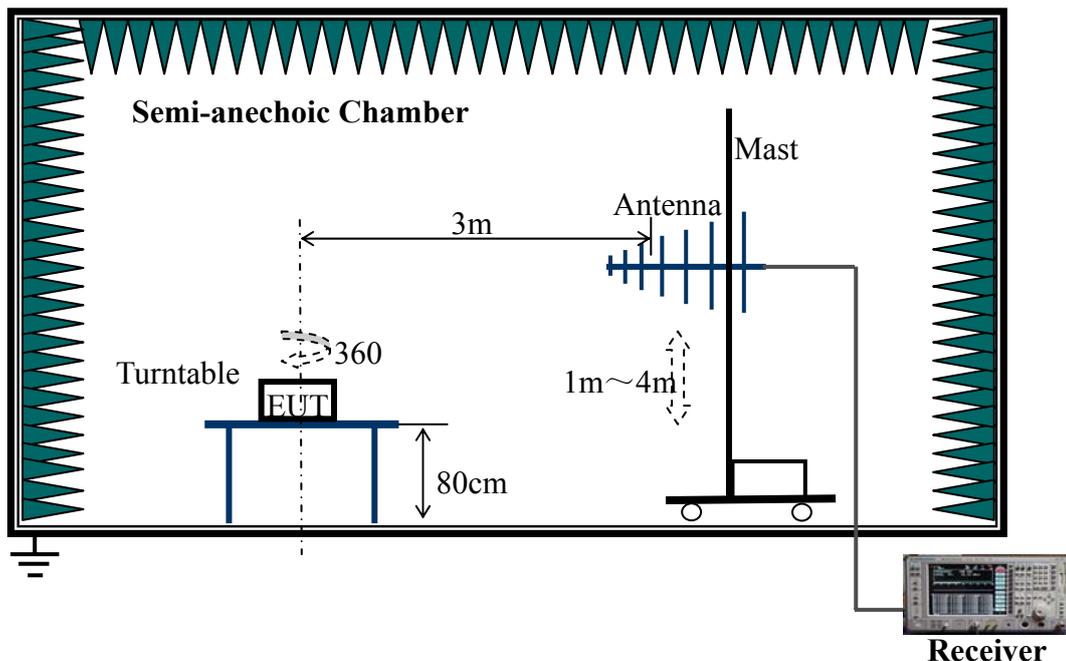
1. Field Strength ( $\text{dB}\mu\text{V/m}$ ) =  $20\log$  Field Strength ( $\mu\text{V/m}$ ).
2. In the emission tables above, the tighter limit applies at the band edges.

### 4.2 Test Procedure

- a. The EUT was placed on the top of a ratable 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. In the frequency range of 9 KHz to 30MHz, magnetic field was measured with loop antenna. The antenna was positioned with its plane vertical at 1m distance from the EUT. The center of the loop antenna was 1m above the ground. During the measurement the loop antenna rotated about its vertical axis for maximum response at each azimuth about the EUT.
- c. In the frequency range above 30 MHz, ultra-broadband bi-log antenna and horn antenna were used. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna is a broadband antenna, and its height is varied from one meter to four meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to the heights from 1 to 4 meters and the ratable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode.

- g. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10 dB margins would be retested one by one using the quasi-peak method.

### 4.3 Test Setup



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

### 4.4 EUT Setup and Operating Conditions

Controlled by an embedded test program provided by applicant, the EUT was set to continuous transmitting at maximum peak output power and different data rate(802.11b 11Mbps,802.11g 54Mbps),Lowest ,middle and highest channel were measured respectively.

### 4.5 Test Results

The following test mode was scanned during the preliminary test:

Mode 1:802.11 b (Low, Mid, High Channel)

Mode 2: 802.11 g (Low, Mid, High Channel)

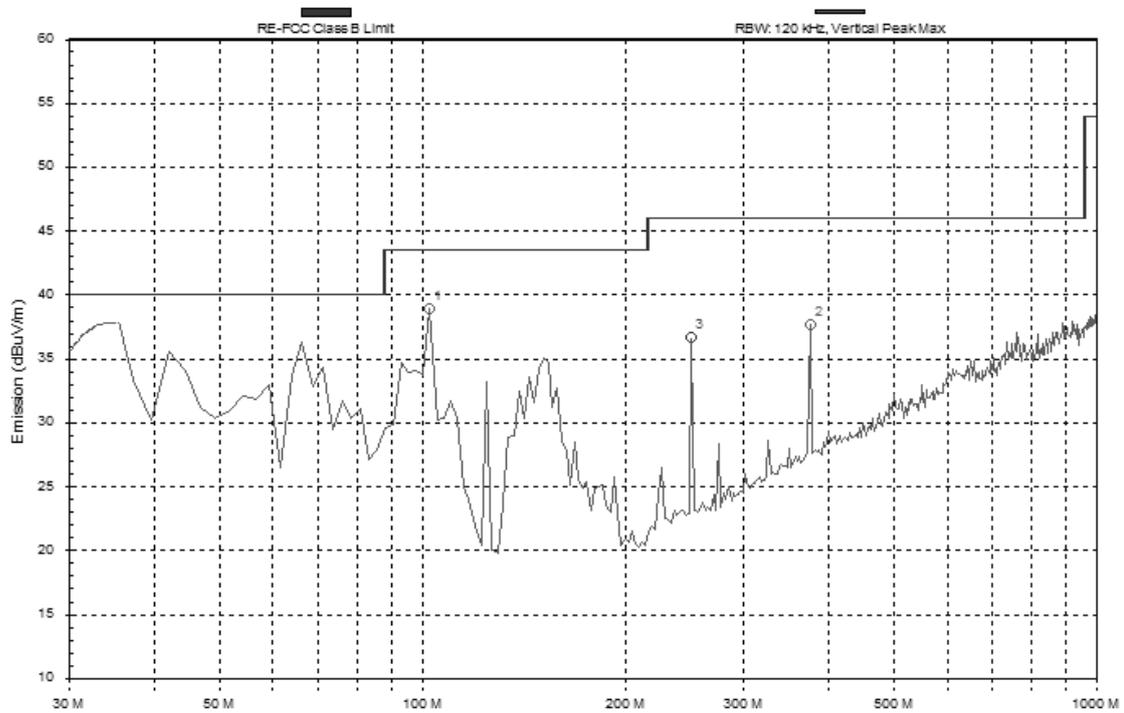
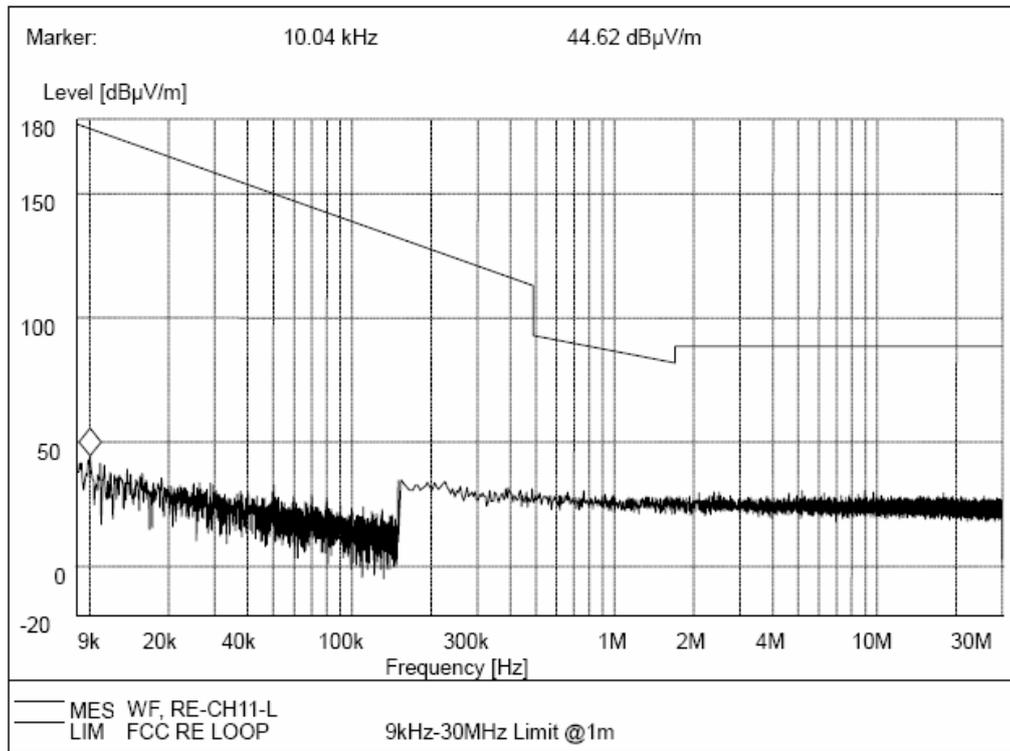
Data Link

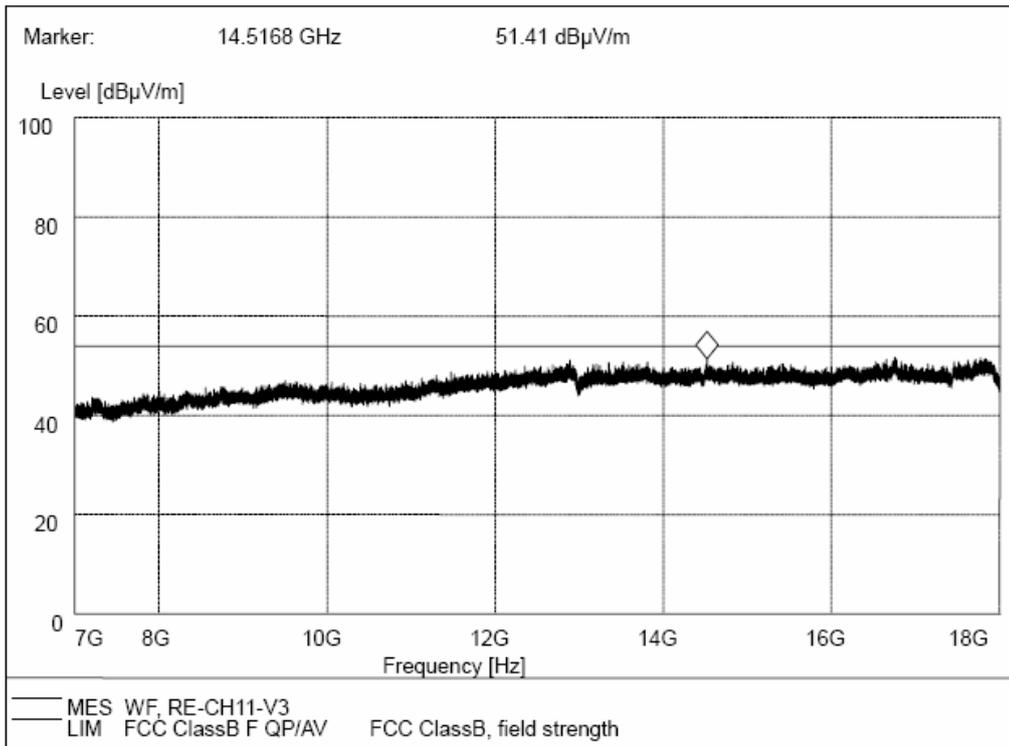
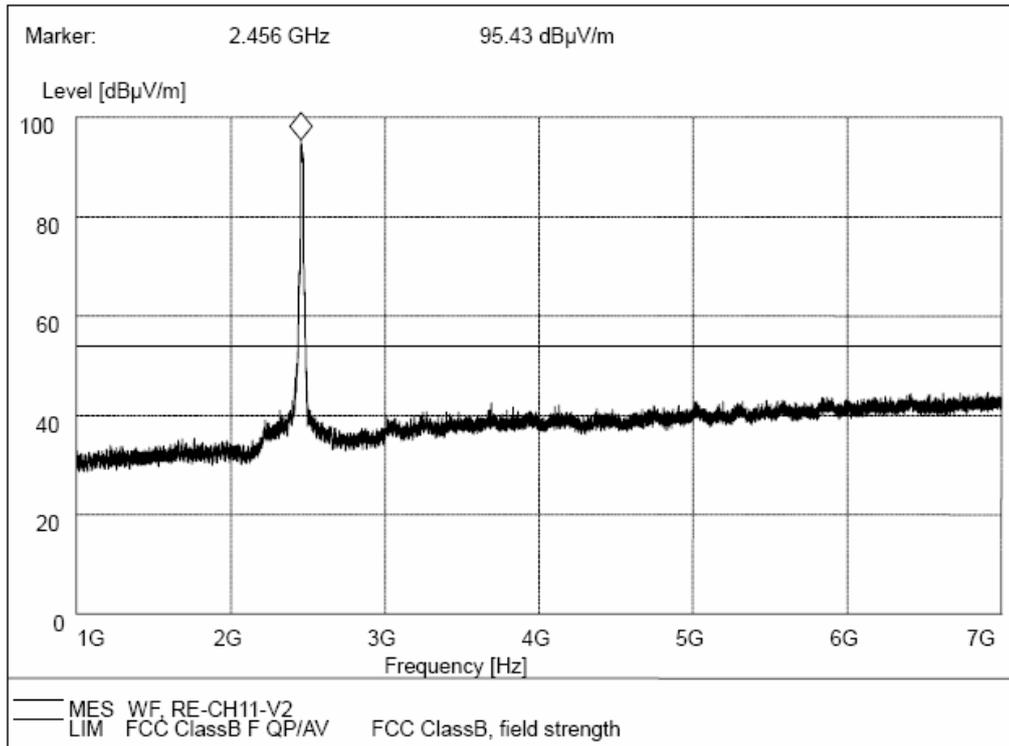
After the preliminary scan, the following test mode was found to produce the highest emission level:

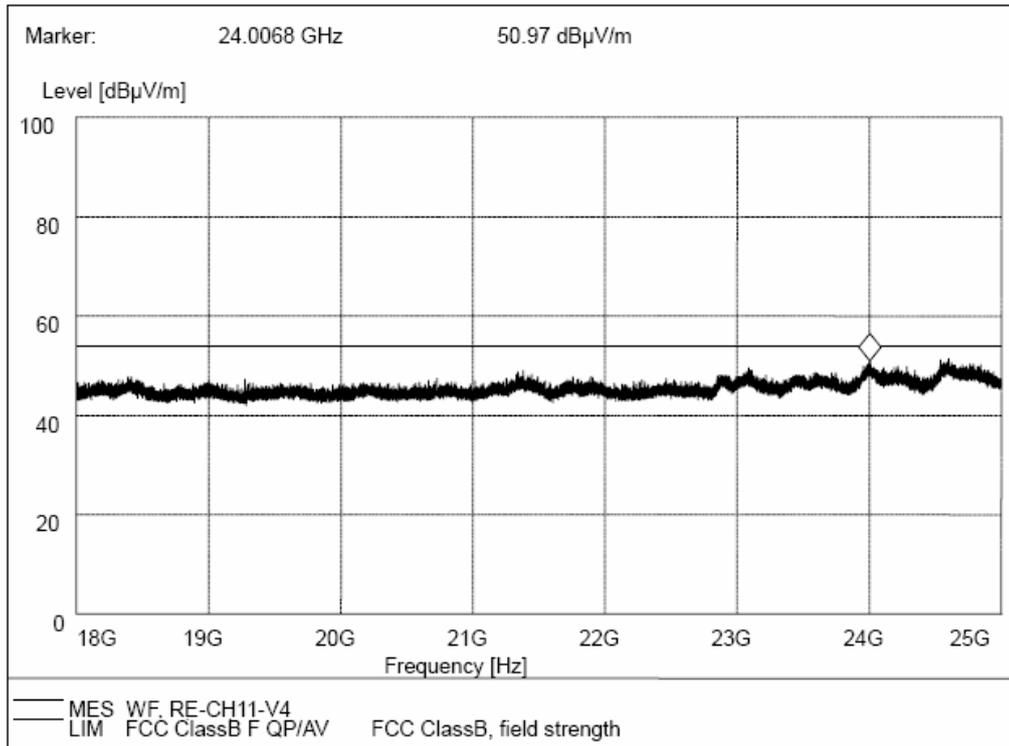
**Mode 1: High Channel**

Then, the EUT configuration and cable configuration of the above highest emission mode was recorded for all final test items.

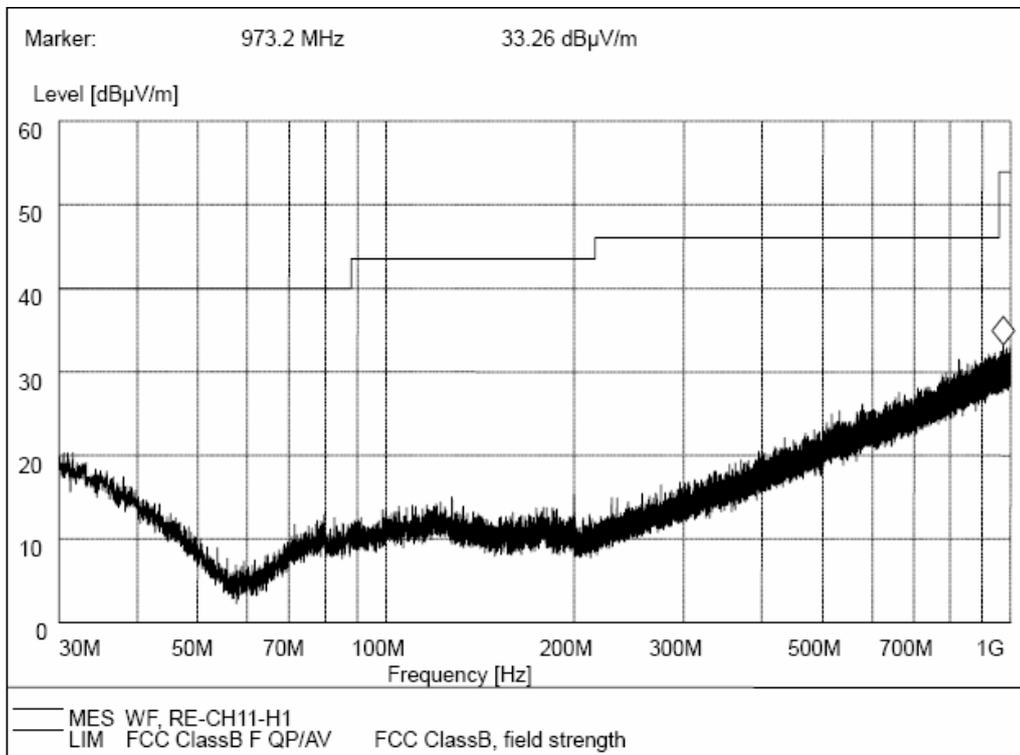
802.11 b  
Highest channel (2462MHz), Vertical

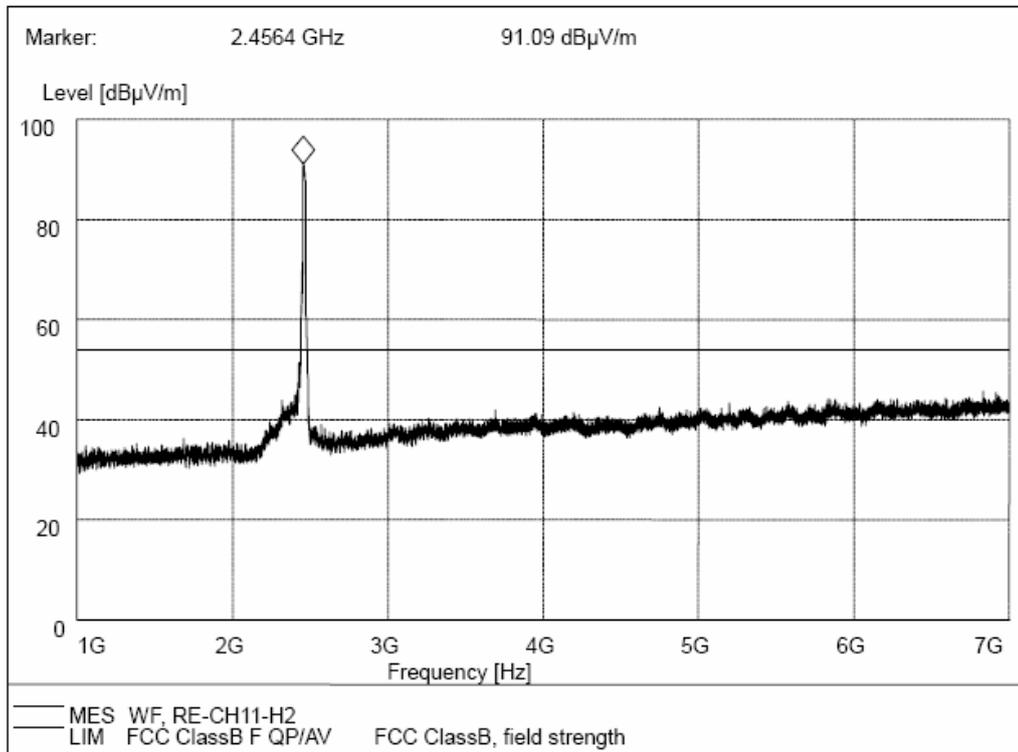
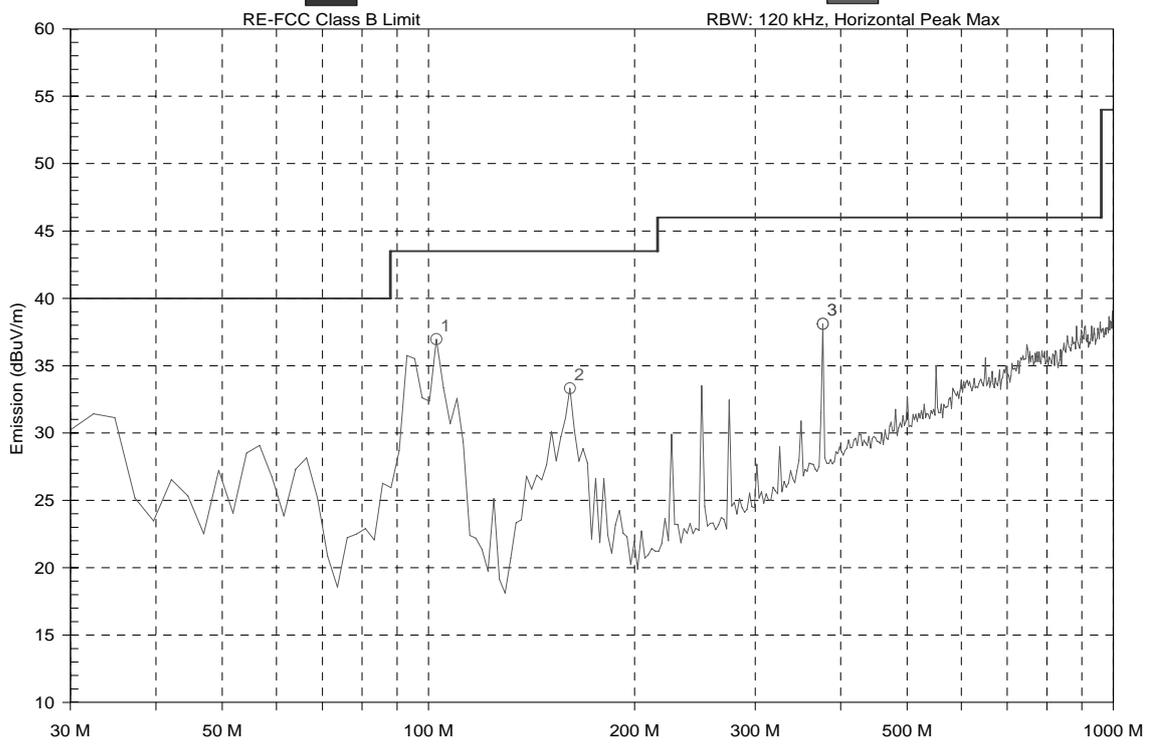


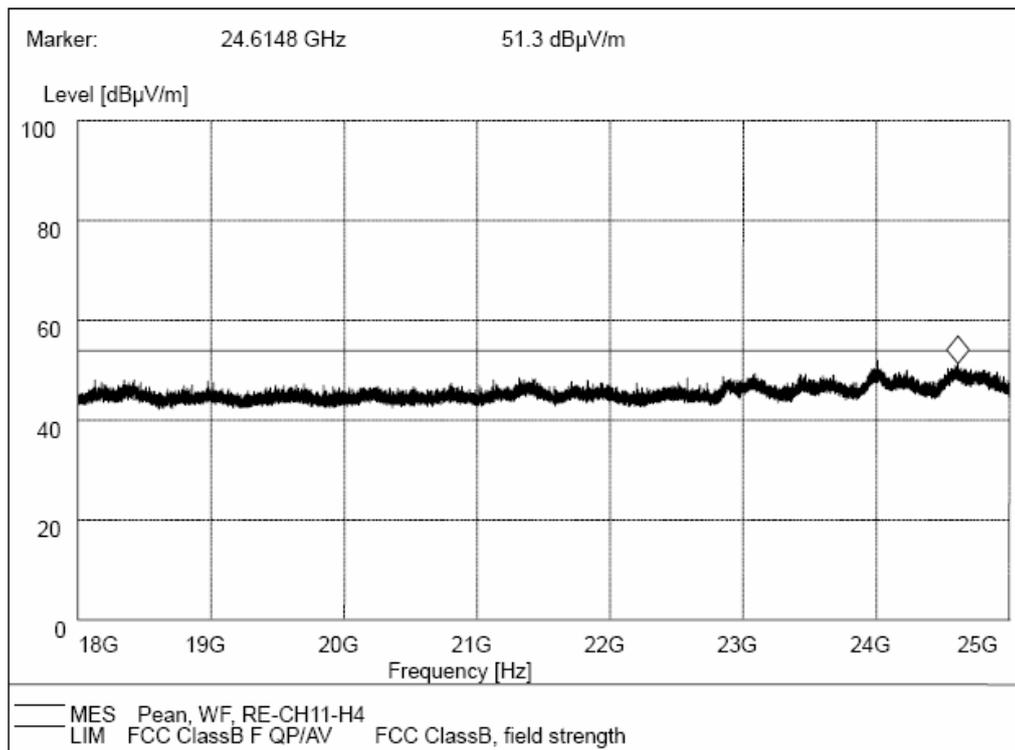
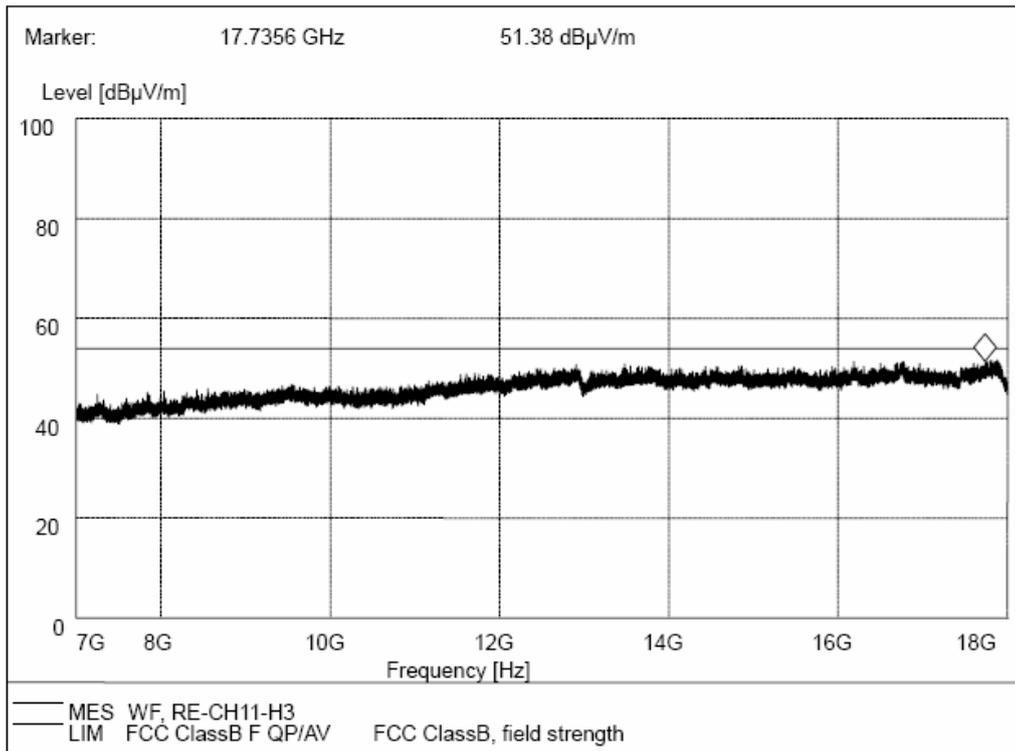




802.11 b  
Highest channel (2462MHz), Horizontal





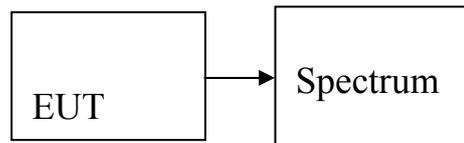


## 5 6dB Bandwidth Measurement

### 5.1 Definition

According to FCC §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.

### 5.2 Test Configuration



### 5.3 Test Procedure

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  $-6$ dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

### 5.4 EUT Setup and Operating Conditions

Controlled by an embedded test program provided by applicant, the EUT was set to continuous transmitting at maximum peak output power and different data rate(802.11b 11Mbps,802.11g 54Mbps),Lowest ,middle and highest channel were measured respectively.

## 5.5 Test Result

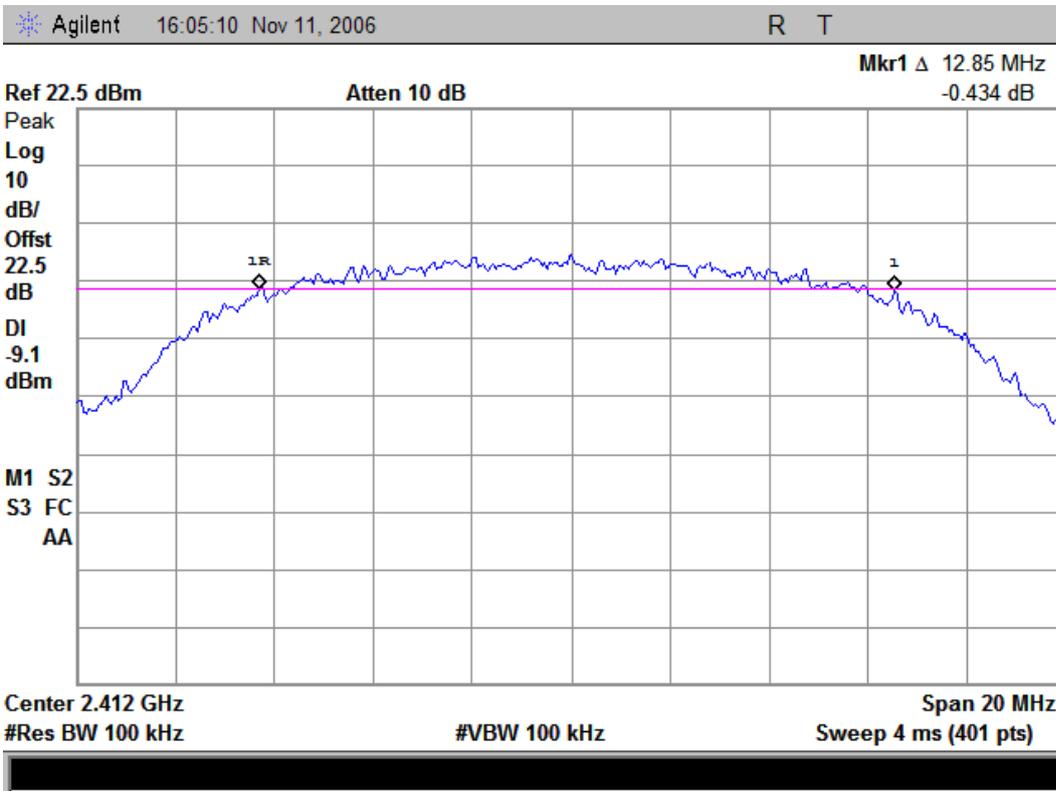
802.11b

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	12850	>500	PASS
Mid	2437	12900		PASS
High	2462	12950		PASS

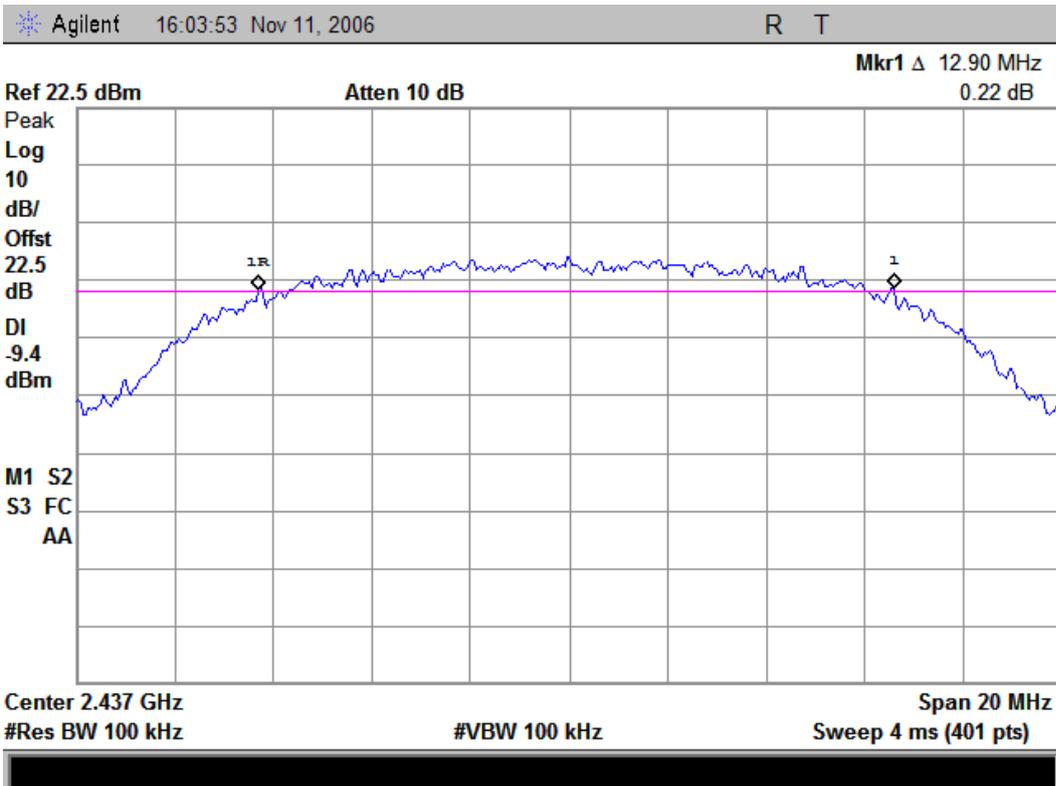
802.11g

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
Low	2412	16600	>500	PASS
Mid	2437	16600		PASS
High	2462	16600		PASS

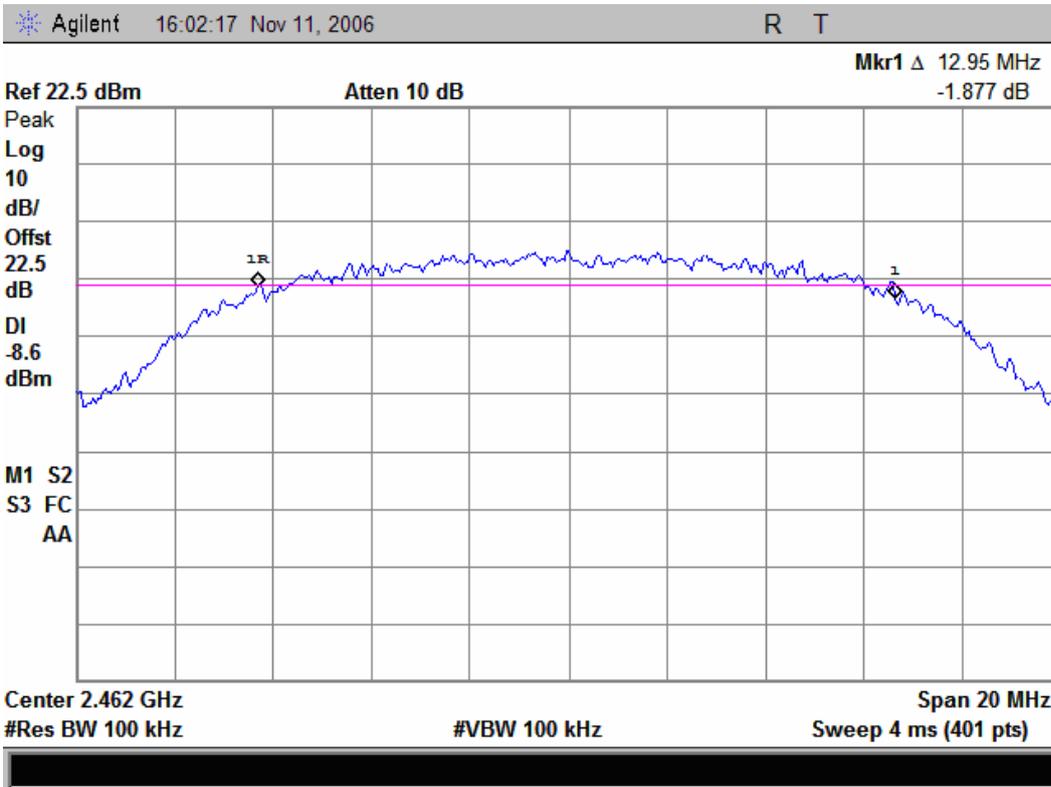
802.11b, Lowest channel, 2412MHz



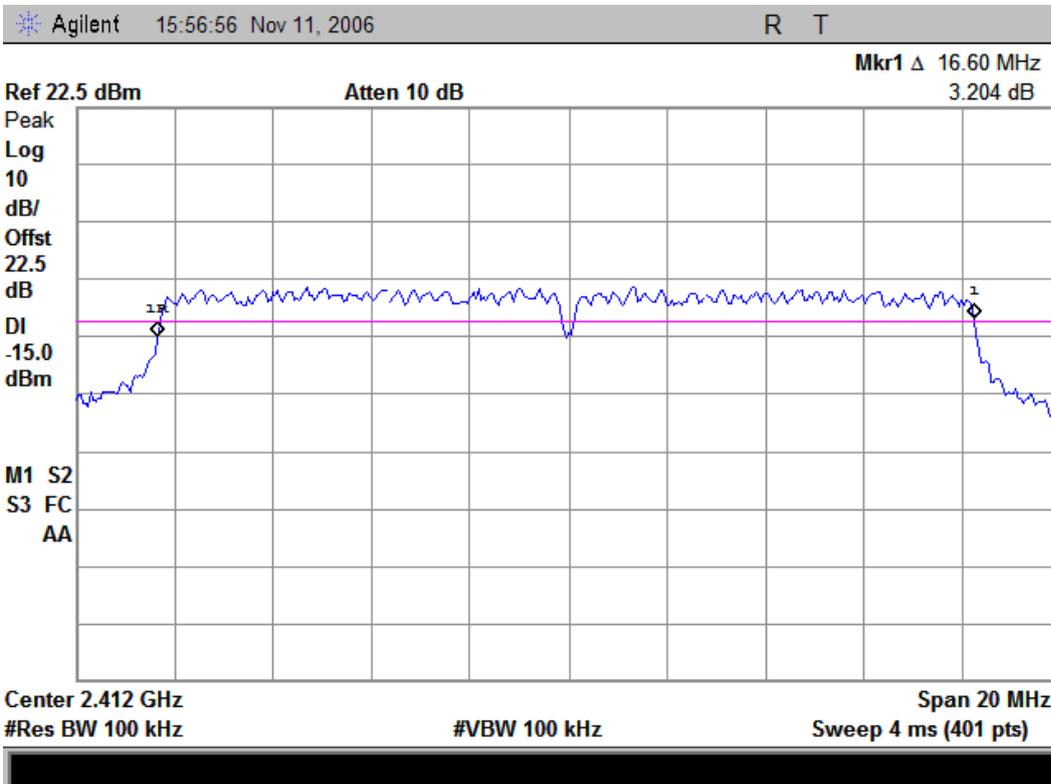
802.11b, Middle channel, 2437MHz



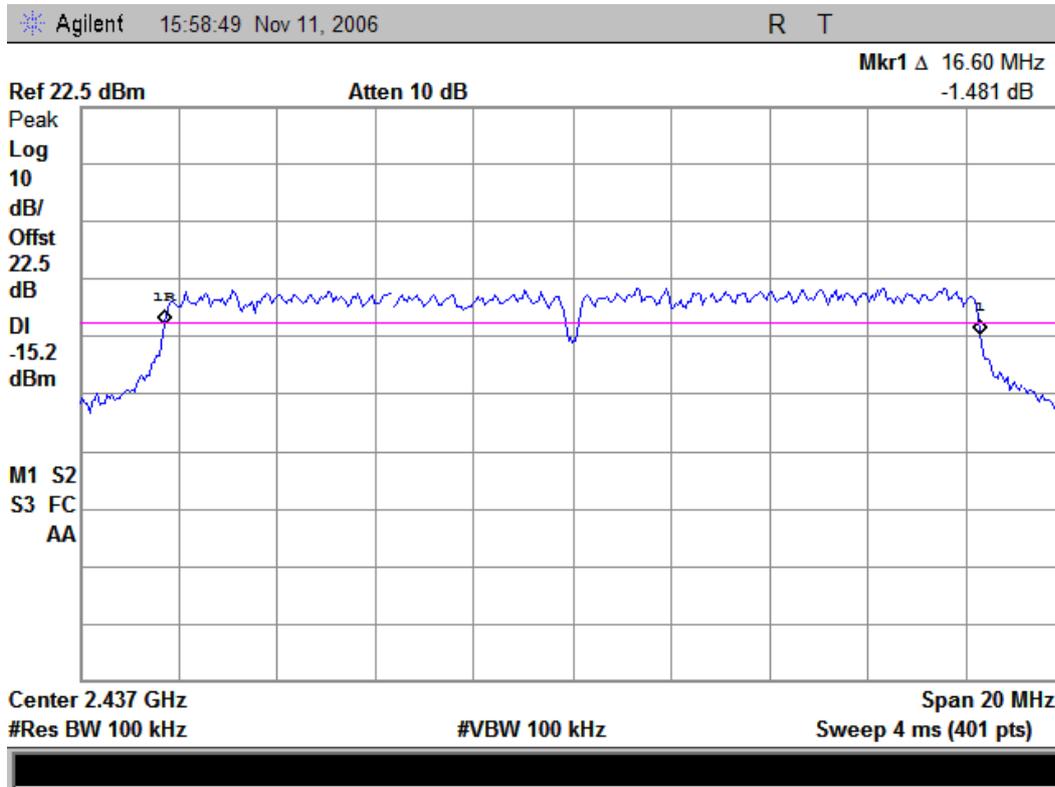
### 802.11b, Highest channel, 2462MHz



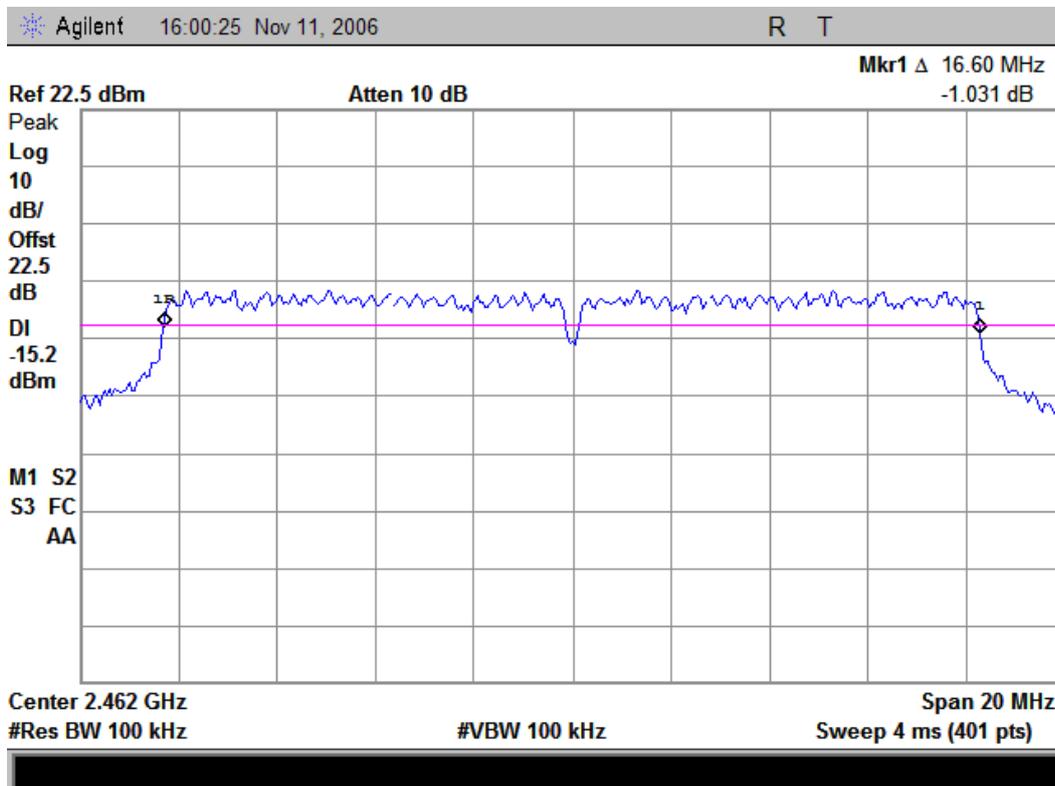
### 802.11g, Lowest channel, 2412MHz



802.11g, Middle channel, 2437MHz



802.11g, Highest channel, 2462MHz



## 6 Maximum Peak Output Power

### 6.1 Requirement of the standard

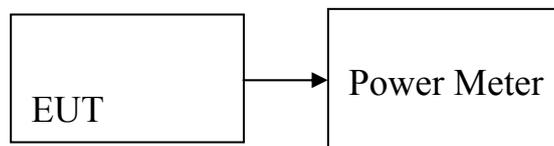
The maximum peak output power of the intentional radiator shall not exceed the following:

1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 6.2 Test Procedure

The EUT was connected to the Power Meter. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables and the test system is calibrated to correct the reading.

### 6.3 Test Setup



### 6.4 EUT Setup and Operating Conditions

Controlled by an embedded test program provided by applicant, the EUT was set to continuous transmitting at maximum peak output power and different data rate(802.11b 11Mbps,802.11g 54Mbps),Lowest ,middle and highest channel were measured respectively.

## 6.5 Test Result

802.11b

Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Limit (W)	Result
Low	2412	22.38	0.17298	1	PASS
Mid	2437	21.89	0.15453		PASS
High	2462	22.55	0.17989		PASS

802.11g

Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Limit (W)	Result
Low	2412	20.33	0.10789	1	PASS
Mid	2437	19.87	0.09705		PASS
High	2462	19.74	0.09419		PASS

## 7 Band Edge

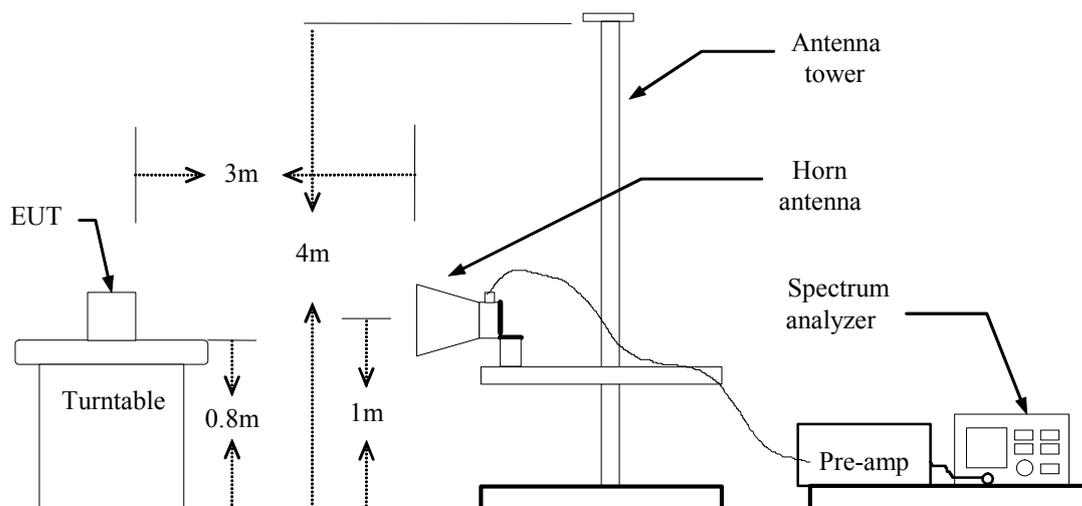
### 7.1 Requirement of the standard

According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

### 7.2 Test Procedure

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=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

### 7.3 Test Setup



## 7.4 EUT Setup and Operating Conditions

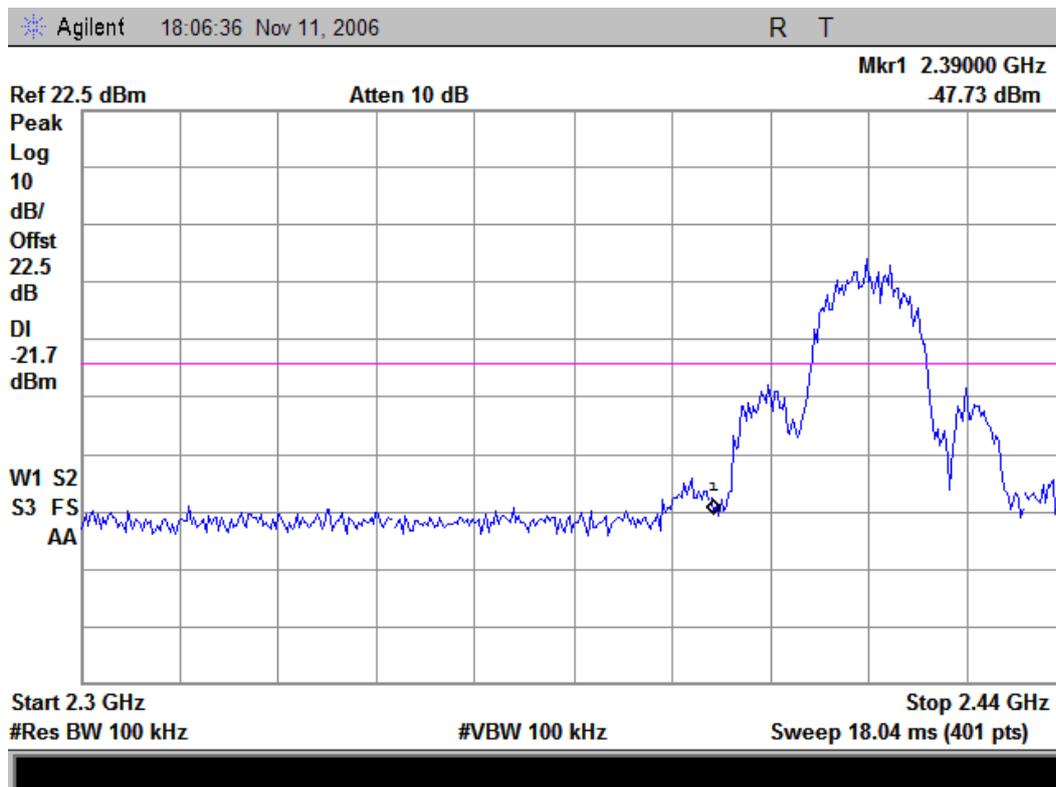
Controlled by an embedded test program provided by applicant, the EUT was set to continuous transmitting at maximum peak output power and different data rate(802.11b 11Mbps,802.11g 54Mbps),Lowest ,middle and highest channel were measured respectively.

## 7.5 Test Result

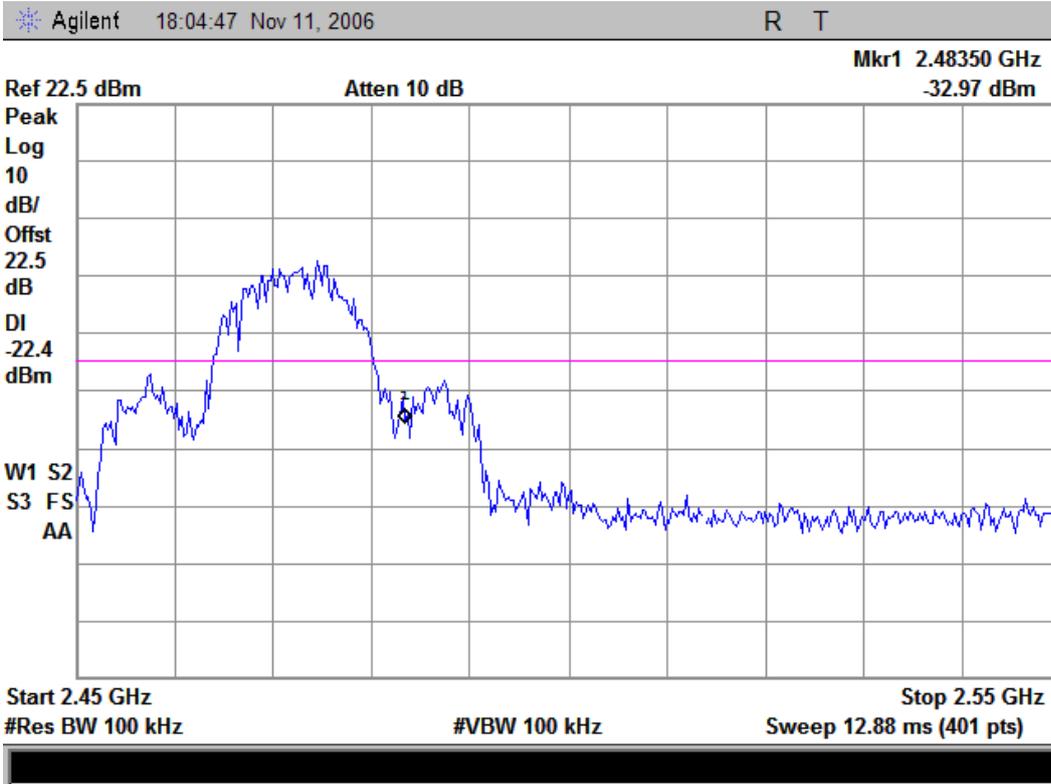
The radio frequency power beyond the band edge was 20dB below the peak output power, measured with 100 KHz resolution bandwidth.

Refer to attach spectrum analyzer data chart.

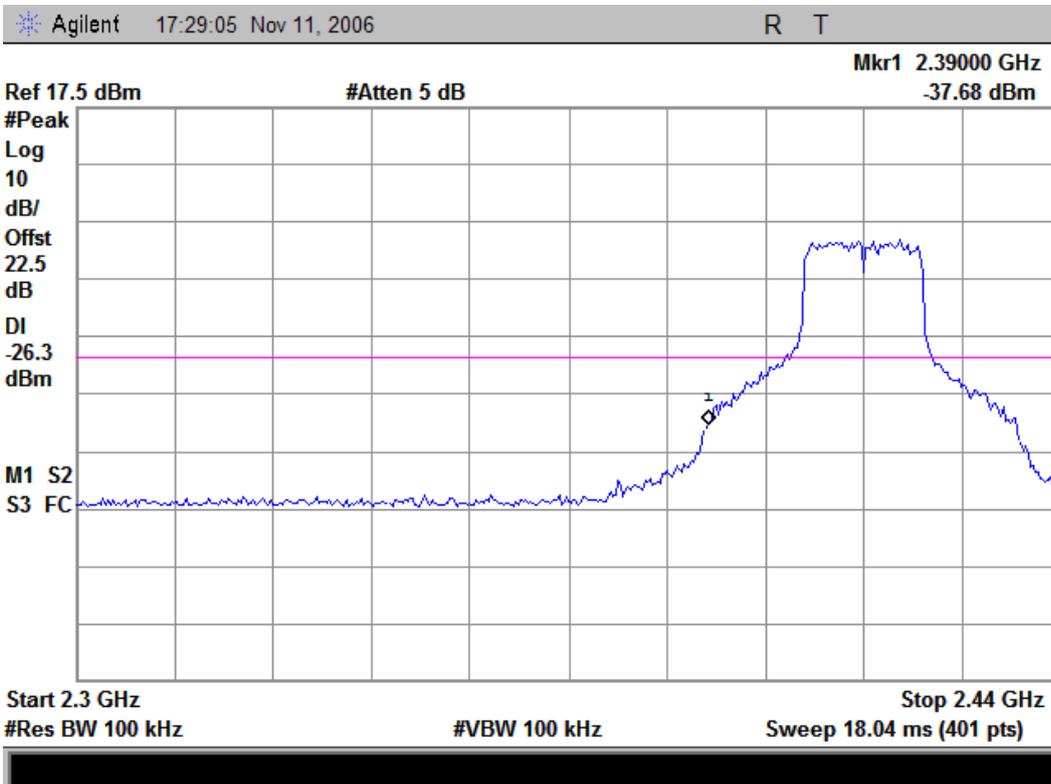
802.11b, lowest channel



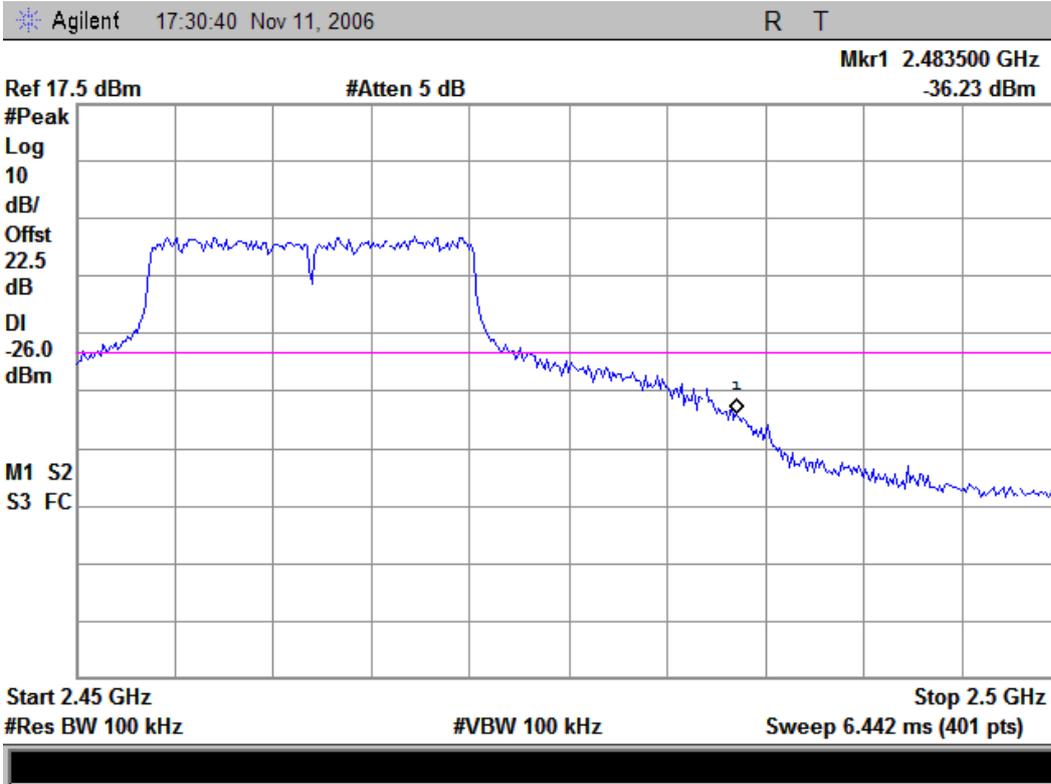
### 802.11b, highest channel



### 802.11g, lowest channel



802.11g, highest channel



## 8 Conducted Spurious Emission

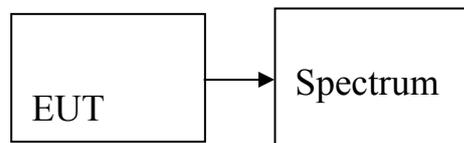
### 8.1 Requirement of the standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 8.2 Test Procedure

1. 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.
2. 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.
3. Measurements are made over the 30MHz to 26.5GHz range with the transmitter set to the lowest, middle, and highest channels.

### 8.3 Test Setup

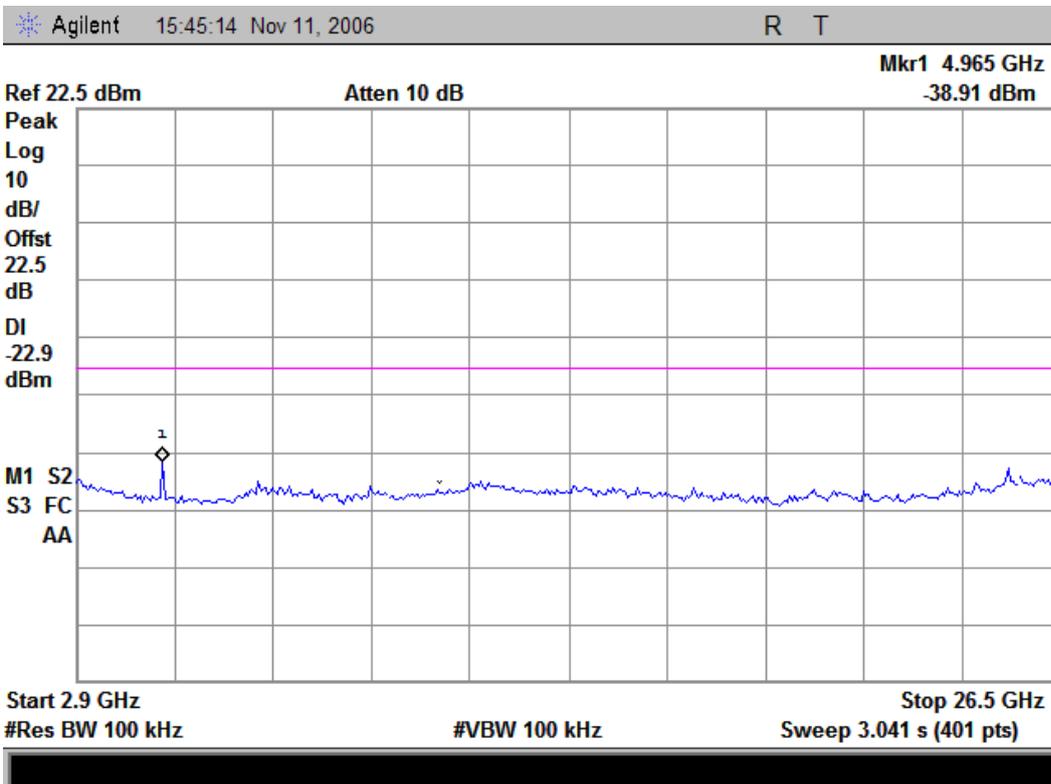
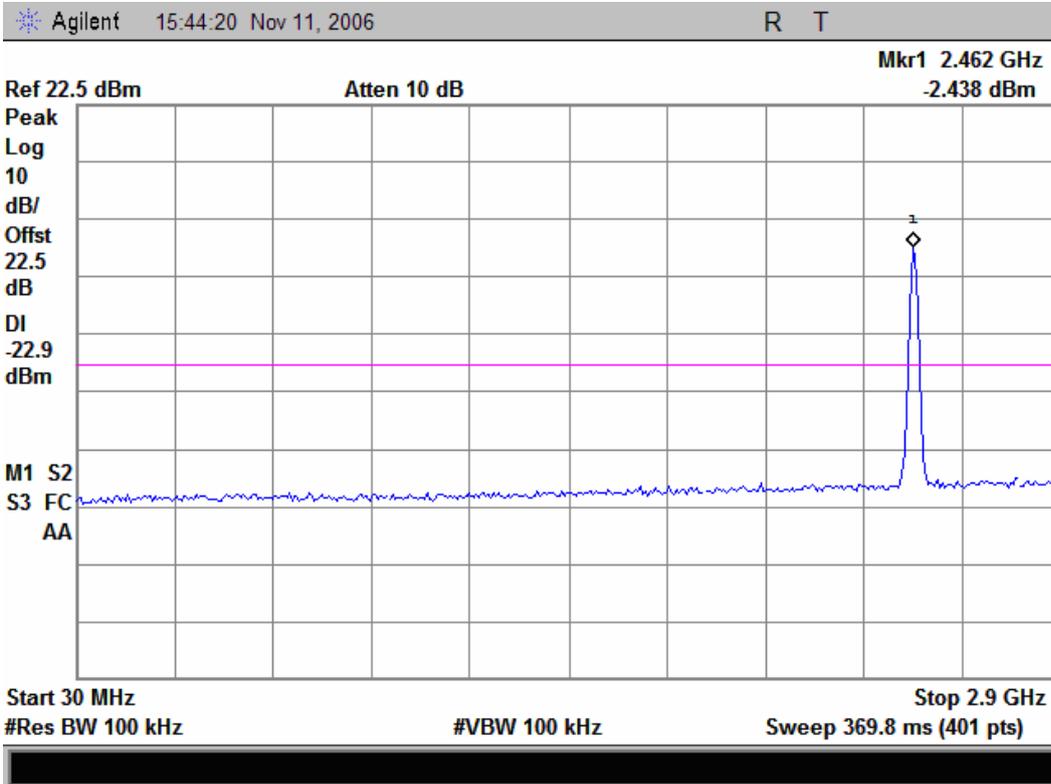


### 8.4 EUT Setup and Operating Conditions

Controlled by an embedded test program provided by applicant, the EUT was set to continuous transmitting at maximum peak output power and different data rate(802.11b 11Mbps,802.11g 54Mbps),Lowest ,middle and highest channel were measured respectively.

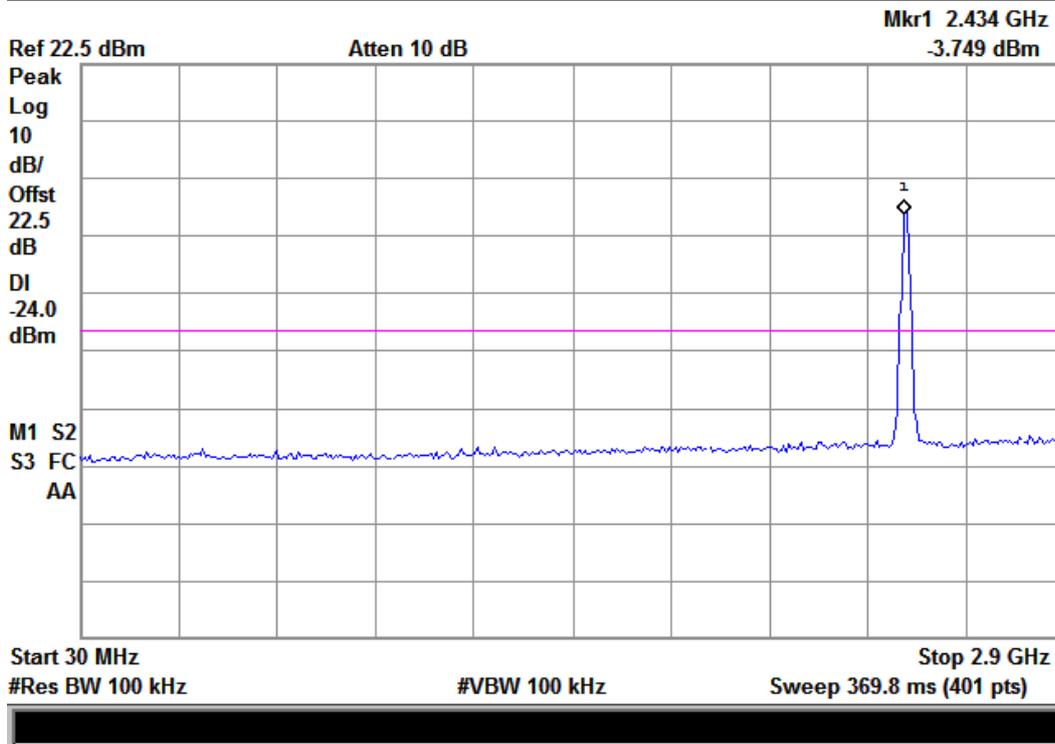
# 8.5 Test Result

802.11b, highest channel

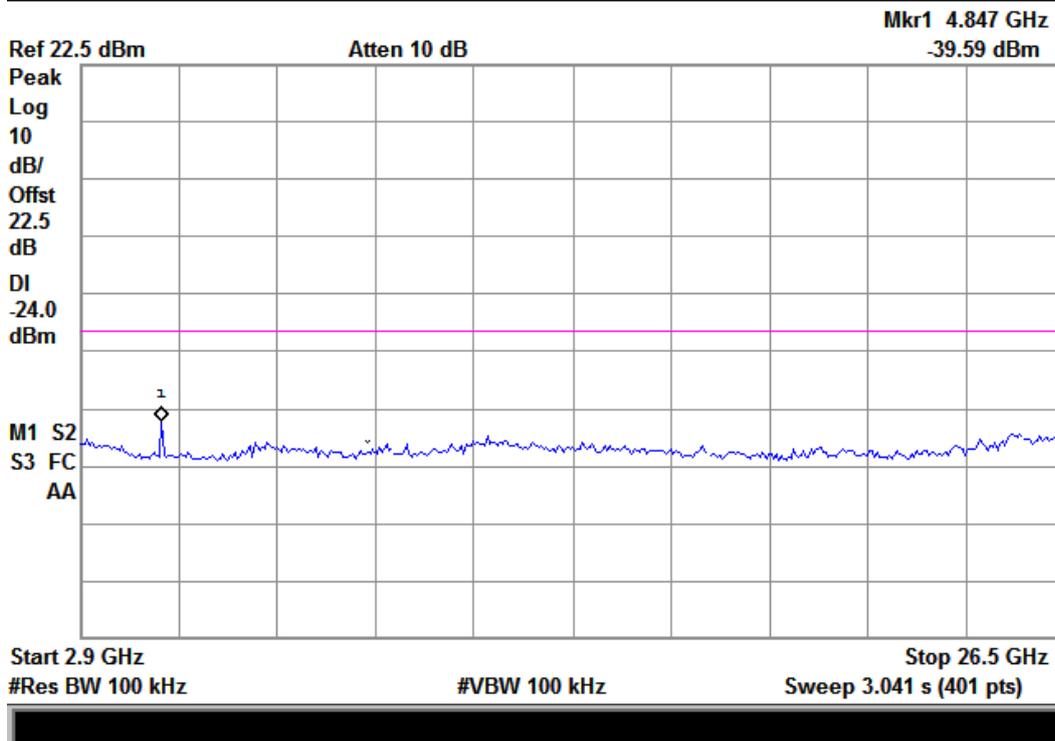


### 802.11b, middle channel

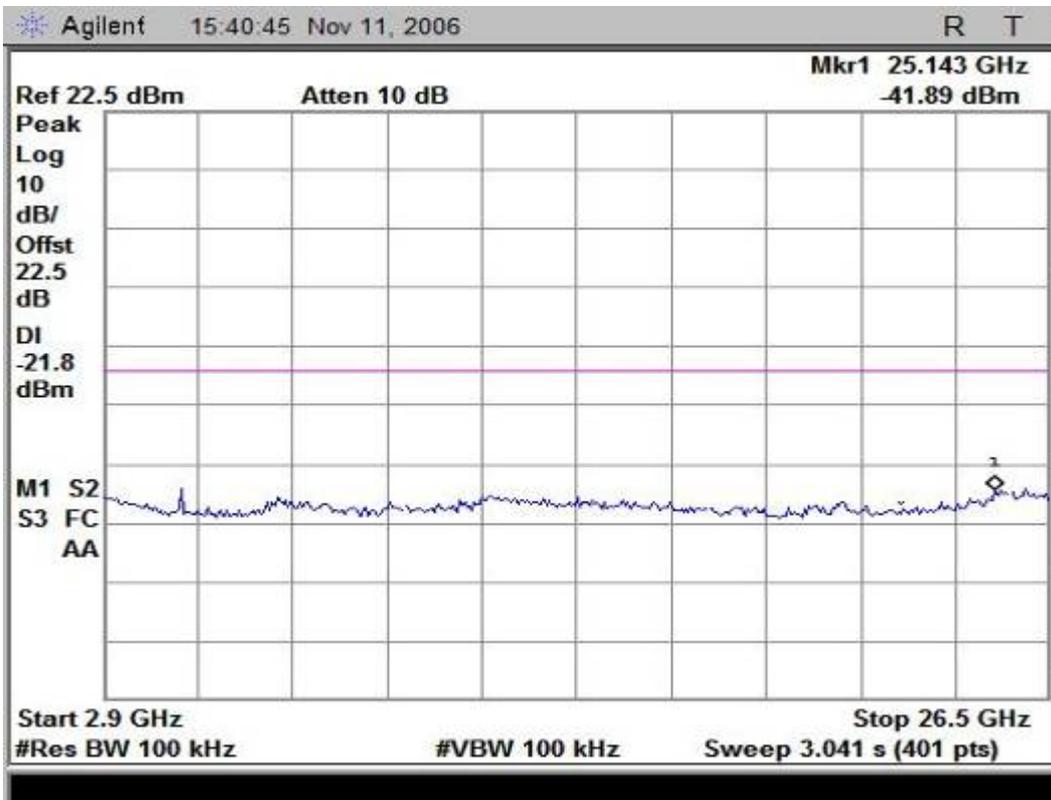
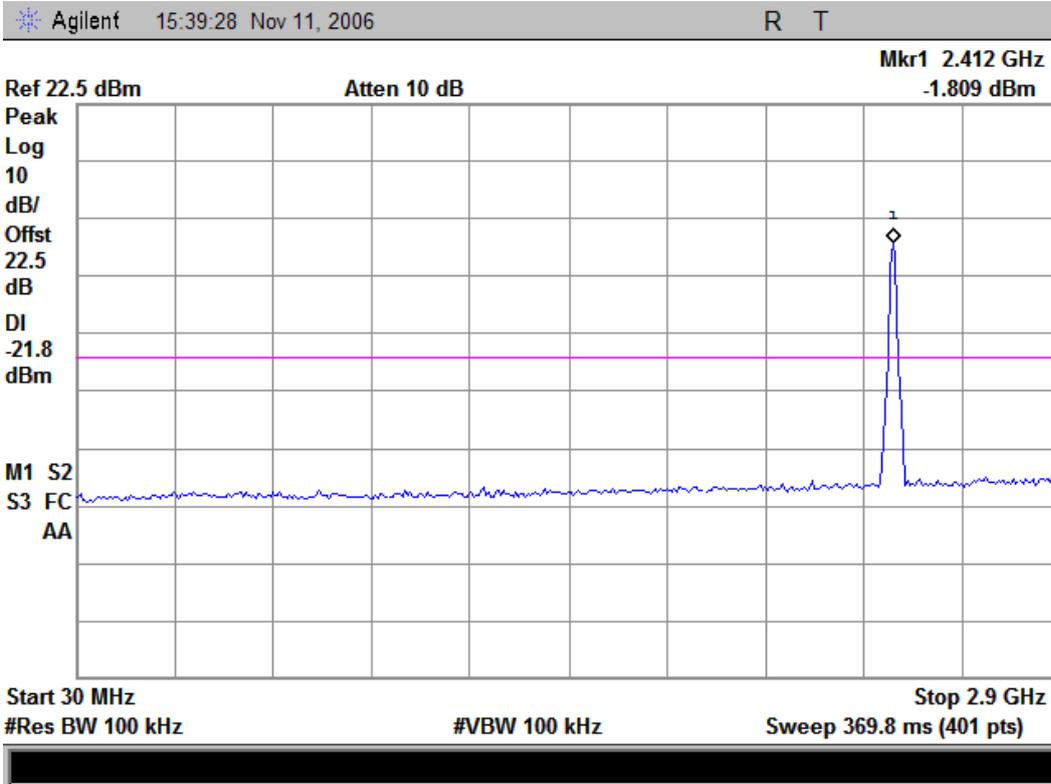
Agilent 15:42:36 Nov 11, 2006 R T



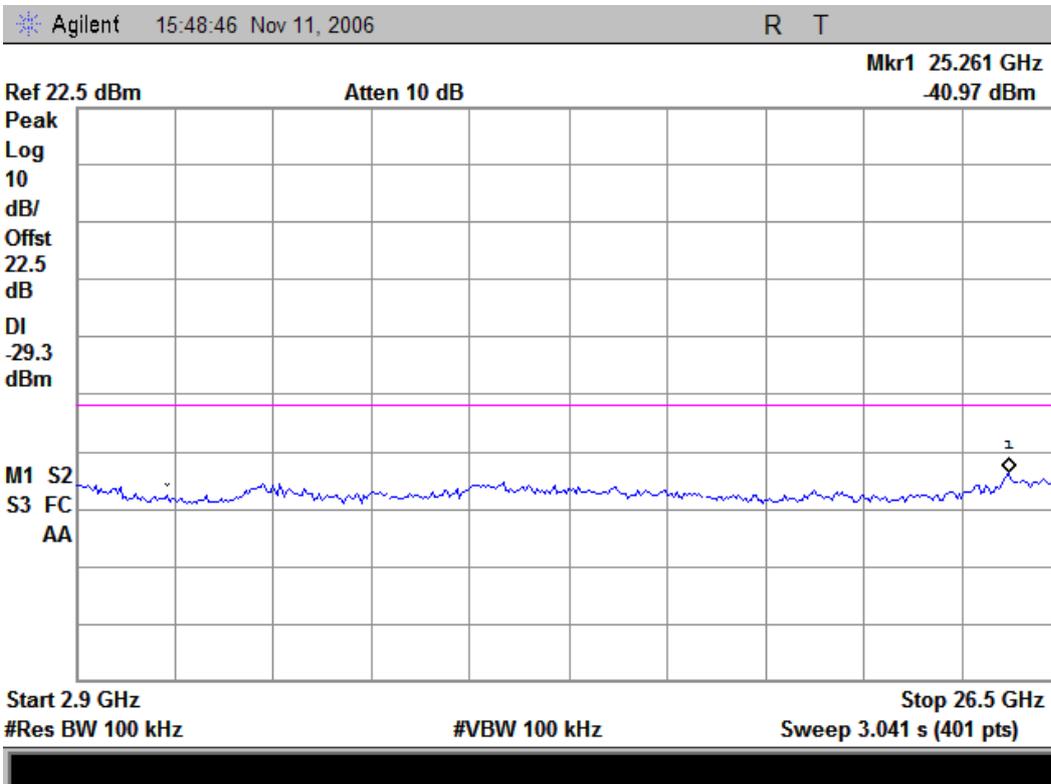
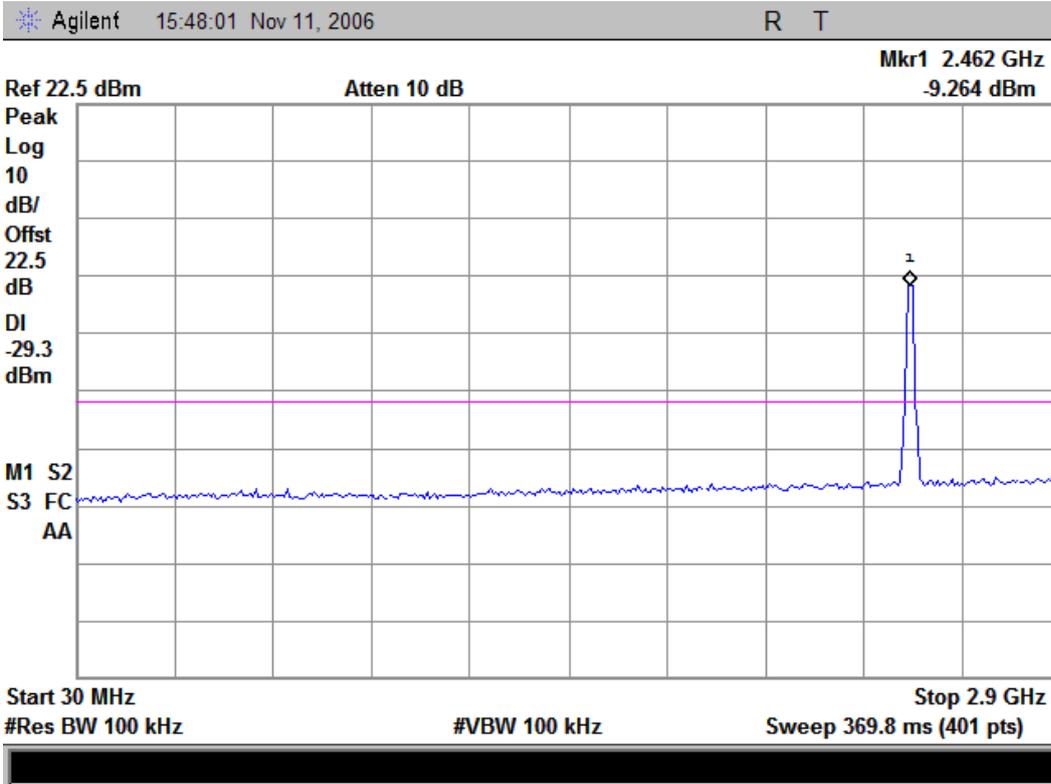
Agilent 15:43:19 Nov 11, 2006 R T



802.11b, lowest channel

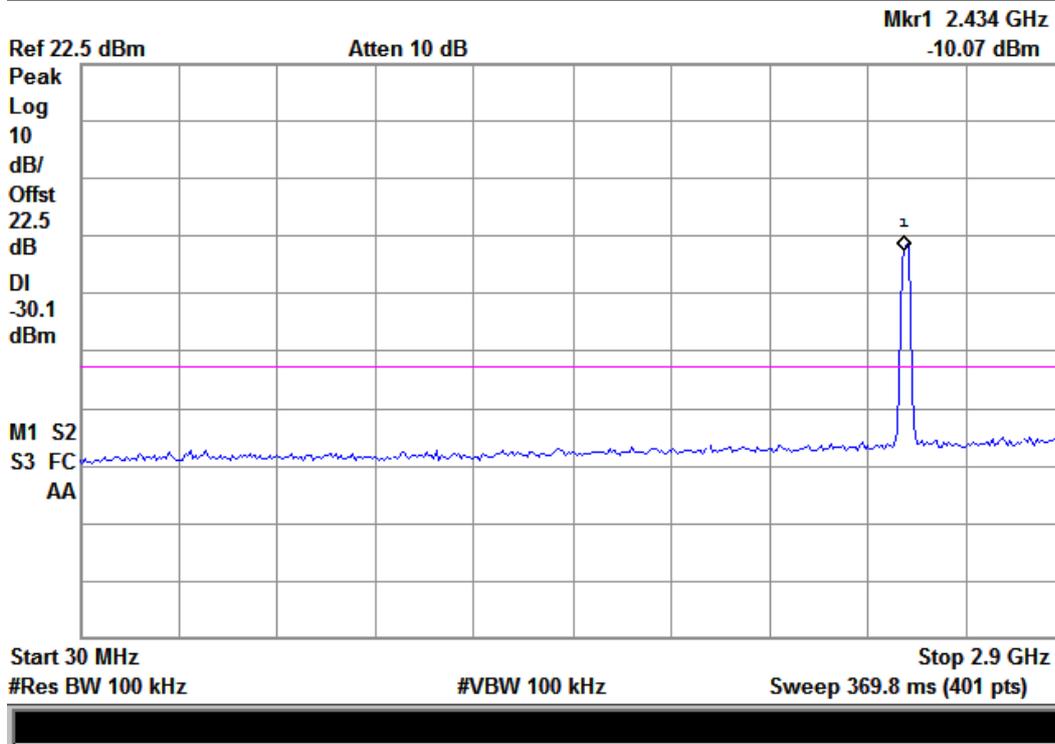


802.11g, highest channel

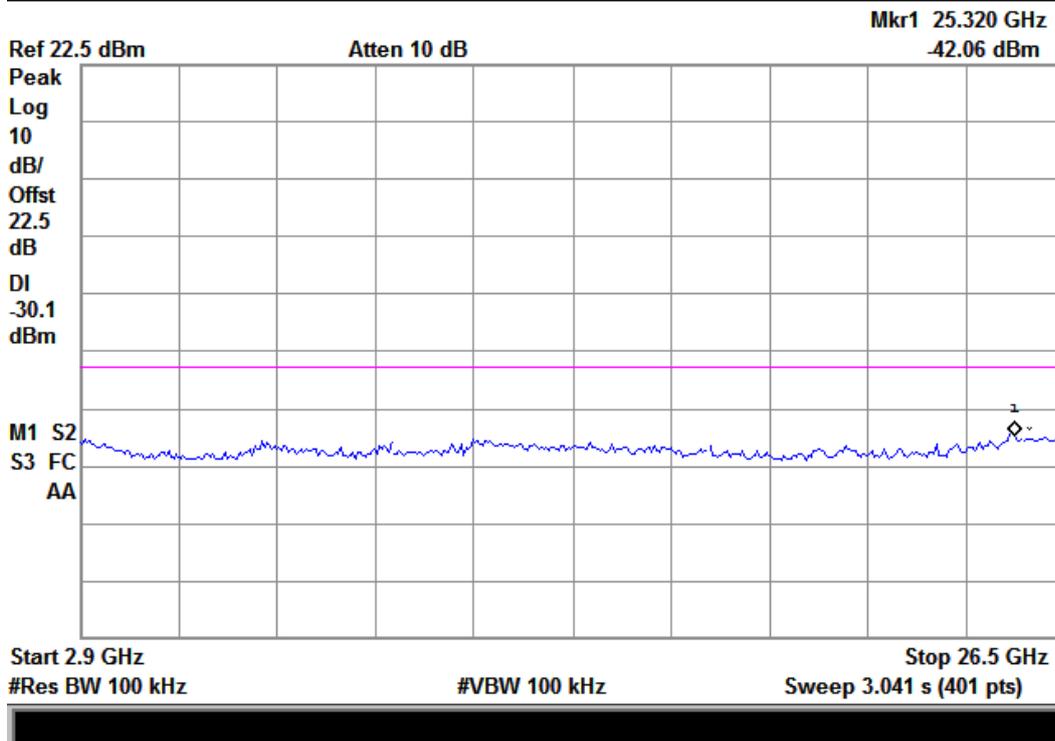


### 802.11g, middle channel

Agilent 15:49:54 Nov 11, 2006 R T

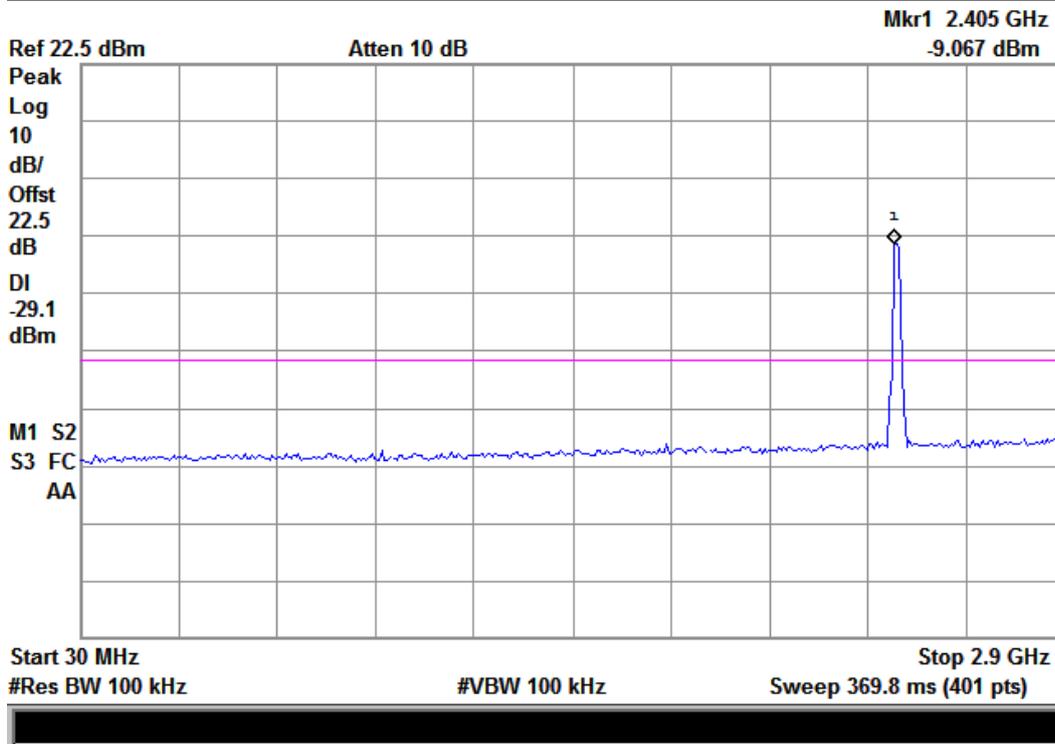


Agilent 15:50:37 Nov 11, 2006 R T

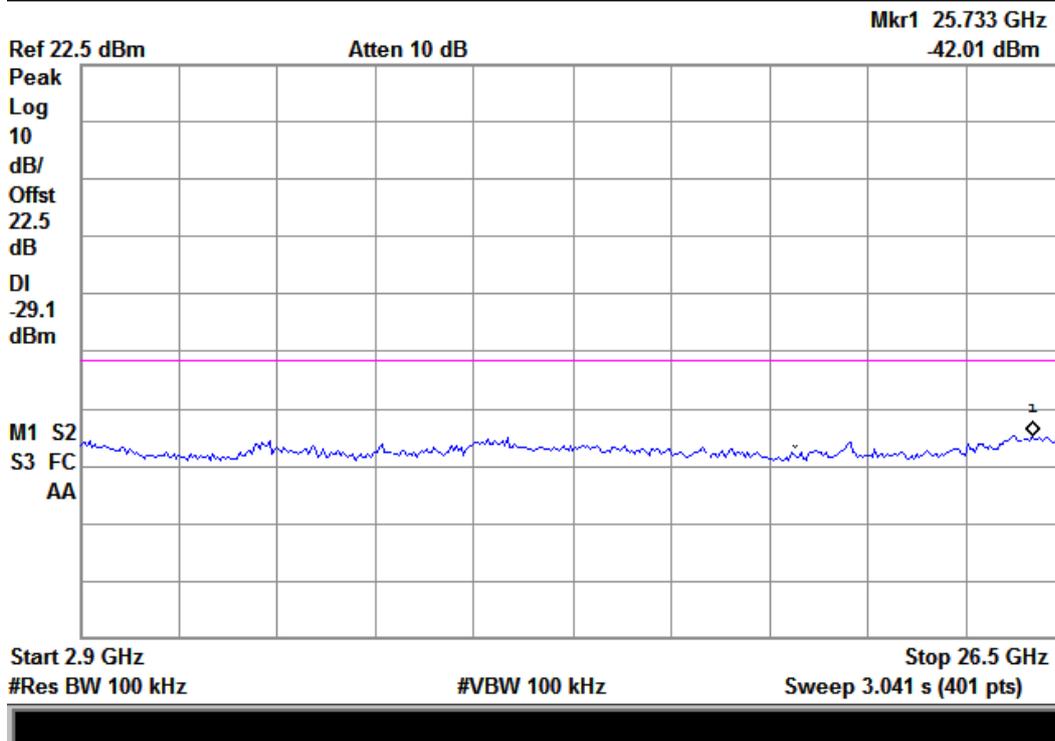


802.11g, lowest channel

Agilent 15:51:48 Nov 11, 2006 R T



Agilent 15:52:25 Nov 11, 2006 R T



## 9 Power Spectrum Density Measurements

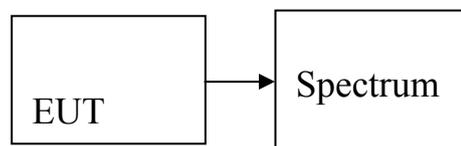
### 9.1 limits of Power Spectrum Density

1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

### 9.2 Test Procedure

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.

### 9.3 Test Setup



### 9.4 EUT Setup and Operating Conditions

Controlled by an embedded test program provided by applicant, the EUT was set to continuous transmitting at maximum peak output power and different data rate(802.11b 11Mbps,802.11g 54Mbps),Lowest ,middle and highest channel were measured respectively.

### 9.5 Test Result

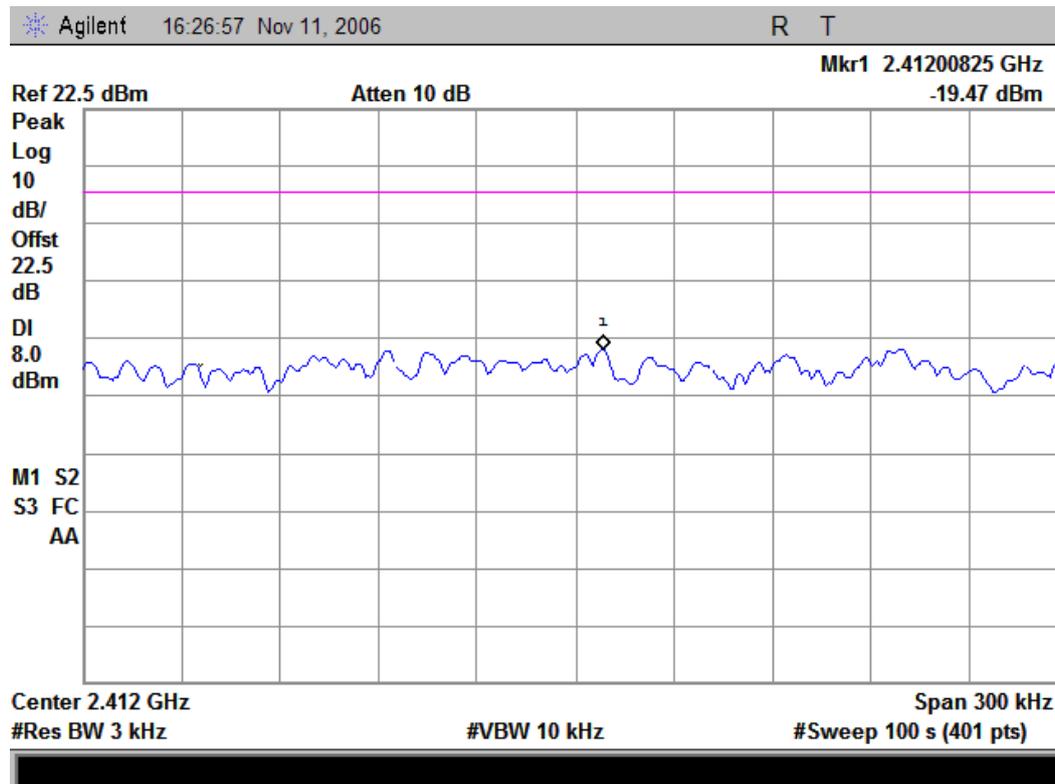
802.11b

Channel	Frequency	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-19.47	8.00	PASS
Mid	2437	-20.20		PASS
High	2462	-19.30		PASS

802.11g

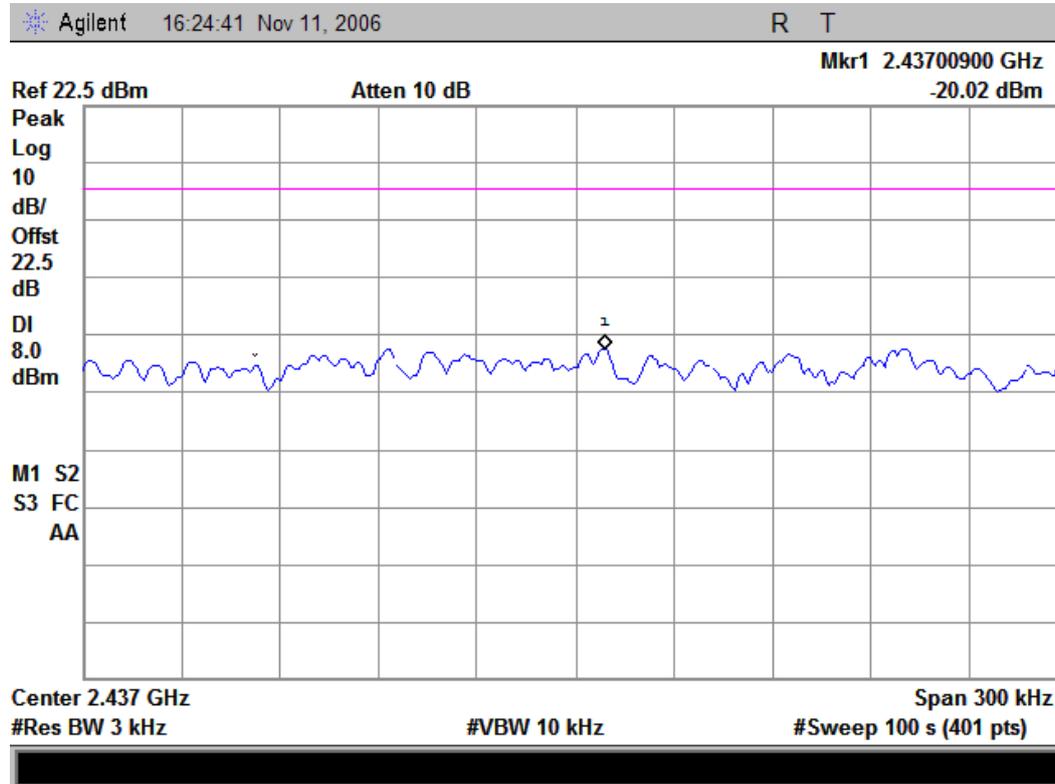
Channel	Frequency	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-29.42	8.00	PASS
Mid	2437	-30.15		PASS
High	2462	-29.98		PASS

802.11b, lowest channel

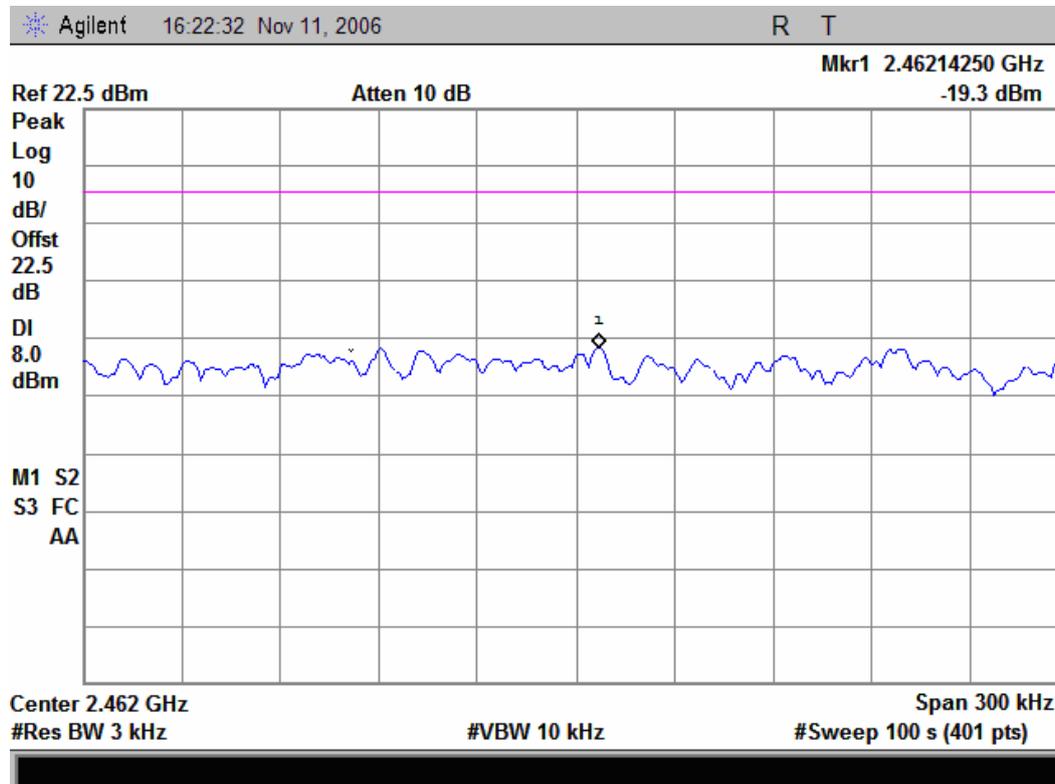




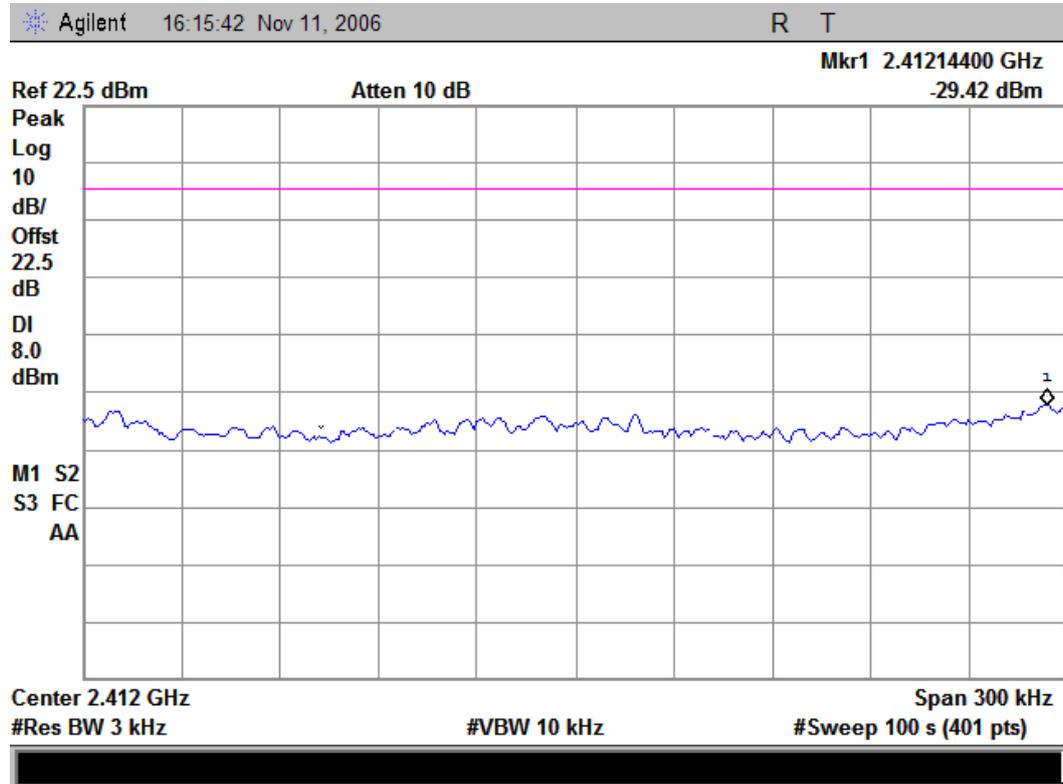
### 802.11b, middle channel



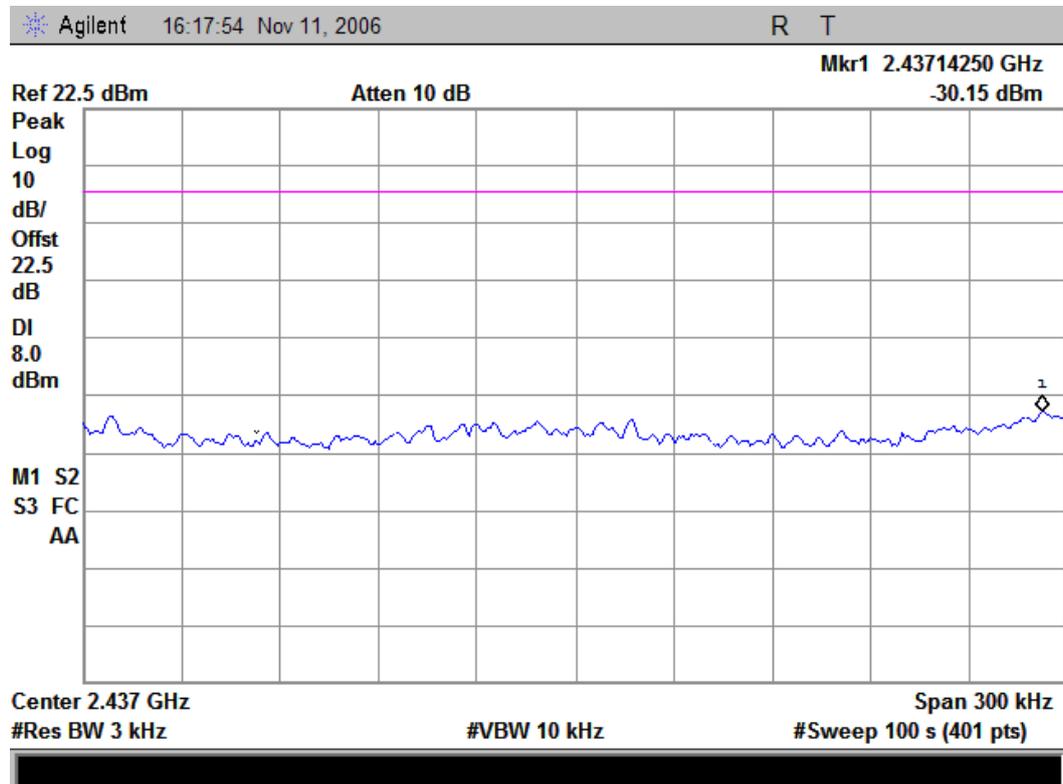
### 802.11b, highest channel



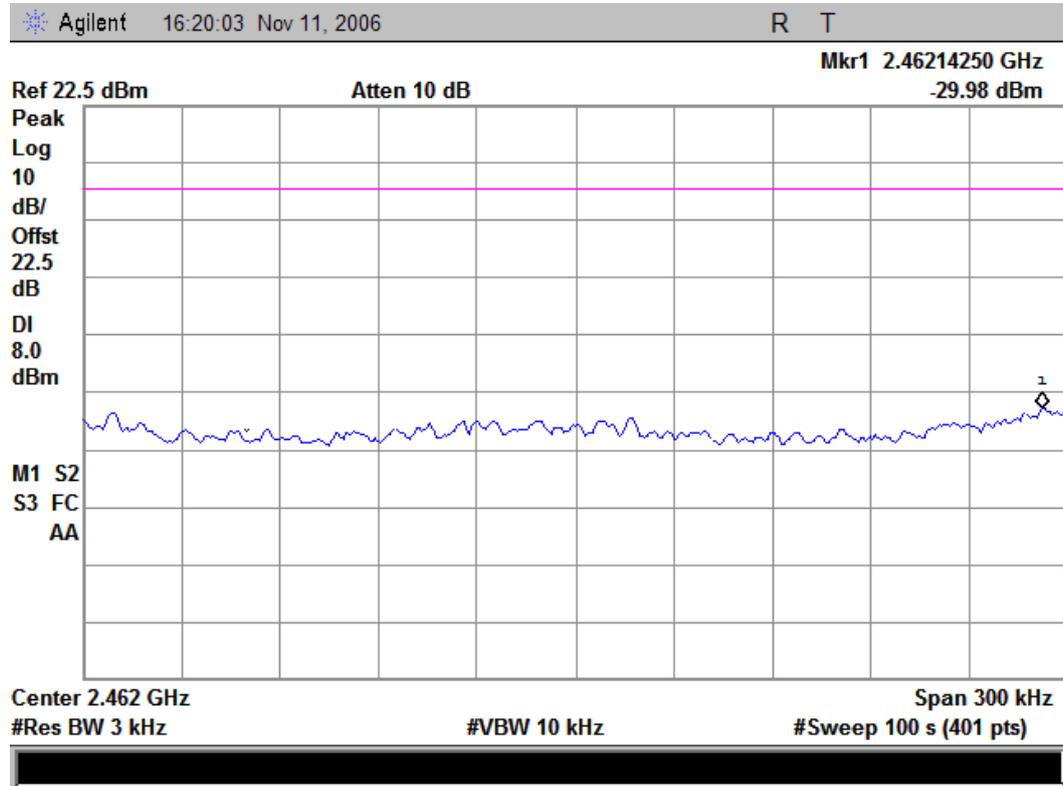
### 802.11g, lowest channel



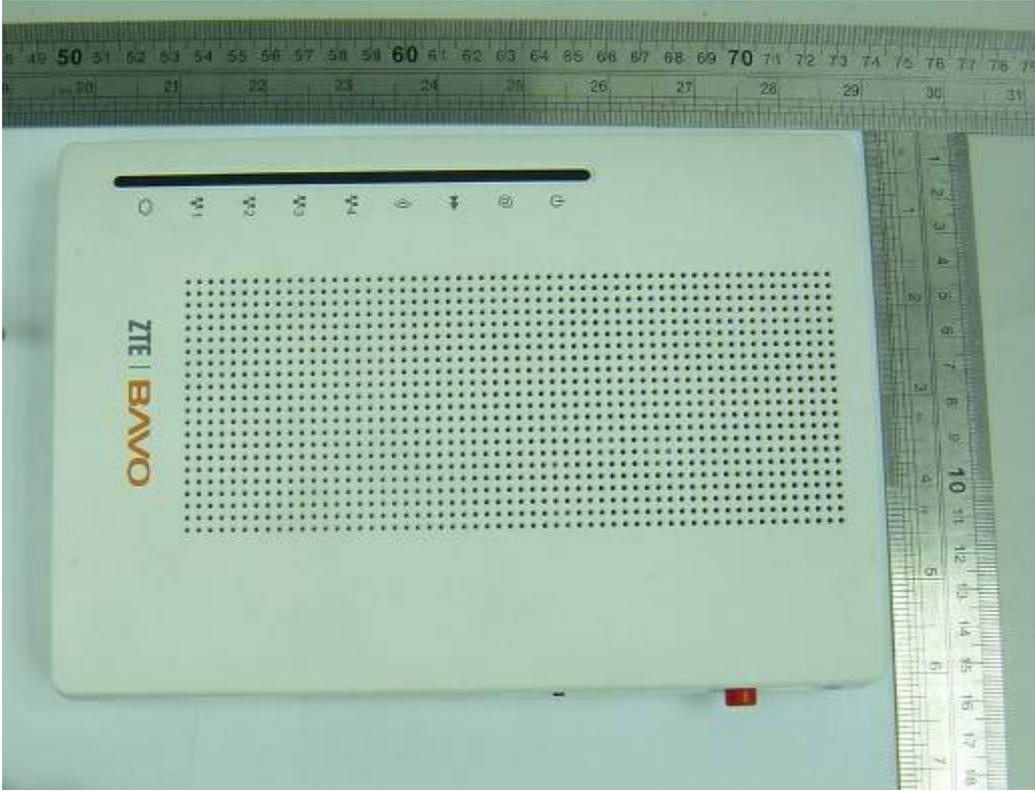
### 802.11g, middle channel

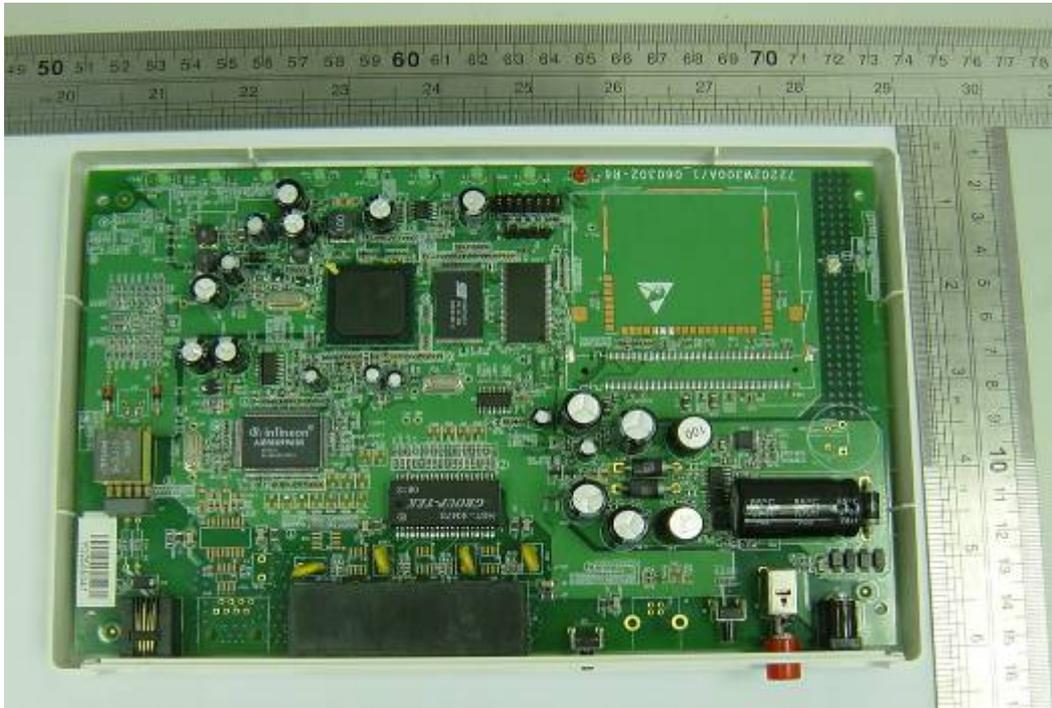


### 802.11g, highest channel



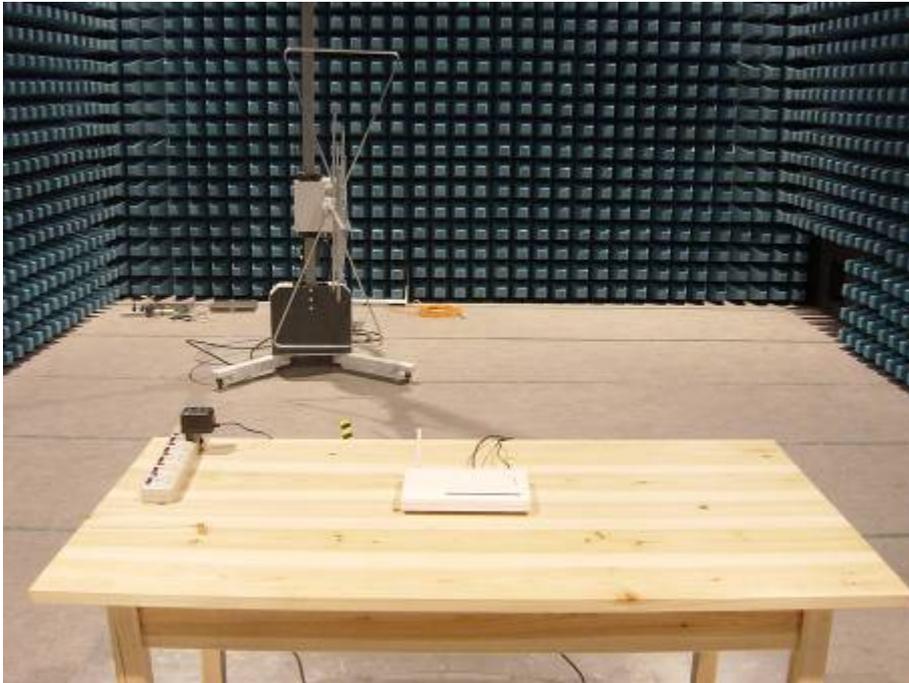
### Appendix I : Photographs of the EUT





## Appendix II : Photographs of the Test Setup

### 1. Radiated Emission Measurement



### 2. Conducted Emission Measurement

