

# FCC TEST REPORT (15.247)

**REPORT NO.:** RF960427H02

**MODEL NO.:** NP01LM

**RECEIVED:** April 27, 2007

**TESTED:** May 02 to June 07, 2007

**ISSUED:** June 11, 2007

**APPLICANT:** Alpha Networks Inc.

**ADDRESS:** No.8 Li-shing 7th Rd., Science-based  
Industrial Park, Hsinchu, Taiwan, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

**TEST LOCATION:** No. 81-1, Lu Liao Keng, 9 Ling, Wu Lung  
Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien,  
Taiwan, R.O.C.

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No. 2177-01

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## 1. CERTIFICATION

**PRODUCT:** USB Wireless LAN unit  
**BRAND NAME:** NEC  
**MODEL NO.:** NP01LM  
**TEST SAMPLE:** MASS-PRODUCTION  
**TESTED:** May 02 to June 07, 2007  
**APPLICANT:** Alpha Networks Inc.  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247),  
ANSI C63.4-2003

The above equipment (Model: NP01LM) has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Carol Liao , **DATE:** June 11, 2007  
( Carol Liao, Specialist )

**TECHNICAL**  
**ACCEPTANCE :** Hank Chung , **DATE:** June 11, 2007  
Responsible for RF ( Hank Chung, Deputy Manager )

**APPROVED BY :** May Chen , **DATE:** June 11, 2007  
( May Chen, Deputy Manager )

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 802.11b & g, 2412~2462MHz Band

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -12.98dB at 0.177MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -0.20dB at 4924.00MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.

For 802.11a, 5725~5850MHz Band

APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.247)			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -13.31dB at 0.154MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -0.22dB at 4660.00MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.

**NOTE:**

1. The EUT was operating in 2.412 ~ 2.462GHz, 5.15~5.35GHz, 5.47~5.725GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2.412 ~ 2.462GHz and 5.725 ~ 5.850GHz. For the 5.15~5.35GHz and 5.47~5.725GHz RF parameters was recorded in another test report.



## 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

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

Measurement	Value
Conducted emissions	2.41 dB
Radiated emissions (30MHz-1GHz)	3.89 dB
Radiated emissions (1GHz -18GHz)	2.21 dB
Radiated emissions (18GHz -40GHz)	1.88 dB

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	USB Wireless LAN unit
<b>MODEL NO.</b>	NP01LM
<b>FCC ID</b>	RRK-NECNP01LM
<b>POWER SUPPLY</b>	DC 5V +/-10% from host equipment
<b>MODULATION TYPE</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM
<b>TRANSFER RATE</b>	802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11a: 54/48/36/24/18/12/9/6Mbps
<b>FREQUENCY RANGE</b>	For 15.407 802.11a: 5.18 ~ 5.32GHz and 5.50 ~ 5.70GHz
	For 15.247 802.11b & 802.11g: 2412 ~ 2462MHz 802.11a: 5.745 ~ 5.825GHz
<b>NUMBER OF CHANNEL</b>	For 15.407 802.11a (5.15 ~ 5.35GHz):8 802.11a (5.47 ~ 5.725GHz):11
	For 15.247 802.11b & 802.11g: 11 802.11a (5.725 ~ 5.850GHz):5
<b>CHANNEL SPACING</b>	802.11b & 802.11g: 5MHz 802.11a: 20MHz
<b>OUTPUT POWER</b>	For 802.11b: 81.658mW For 802.11g: 79.433mW For 802.11a (FCC15.247): 26.915mW For 802.11a (FCC15.407): 30.832mW
<b>DATA CABLE</b>	NA
<b>ANTENNA TYPE</b>	Please see note 3 (on next page)
<b>INTERFACE</b>	USB
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:**

1. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a and 802.11b, 802.11g technology.
2. The EUT was manufactured by following manufacturers:

Manufacturer	Manufacturer Address
Alpha Networks Inc. (Taiwan)	No.8 Li-shing 7th Rd., Science-based Industrial Park, Hsinchu, Taiwan, R.O.C.
Alpha Networks Inc. (China)	523850 Jie Kuo Zhuan Chang District, Chang An Dongguan City,Guangdong Province, China

3. There are two antennas provided to this EUT, please refer to the following table:

For 2.4GHz				
Brand Name	Model No.	Gain (dBi)	Antenna Type	Connector
Advanced Ceramic X corp.	AT5020-B2R5HAA__	0	Multilayer Chip Antenna	N/A
For 5GHz				
Brand Name	Model No.	Gain (dBi)	Antenna Type	Connector
Advanced Ceramic X corp.	AT3216-B2R5HAA_/LF	2	Multilayer Chip Antenna	N/A

4. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### 3.2 DESCRIPTION OF TEST MODES

#### Operated in 2400 ~ 2483.5MHz band:

For 802.11b/g: Eleven channels are provided to this EUT.

Channel	Frequency	Channel	Frequency
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

#### Operated in 5725 ~ 5850MHz band:

For 802.11a (5725 ~ 5850MHz band): Five channels are provided to this EUT.

Channel	Frequency
1	5745 MHz
2	5765 MHz
3	5785 MHz
4	5805 MHz
5	5825 MHz

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE <sup>≥</sup> 1G	APCM	
-	√	√	√	√	NA

Where PLC: Power Line Conducted Emission

RE<1G RE: Radiated Emission below 1GHz

RE<sup>≥</sup>1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

#### **Power Line Conducted Emission Test:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1	DSSS	CCK	1
802.11a	1 to 5	1	OFDM	BPSK	6

#### **Radiated Emission Test (Below 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1	DSSS	CCK	1
802.11a	1 to 5	1	OFDM	BPSK	6

#### **Radiated Emission Test (Above 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	CCK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11a	1 to 5	1, 3, 5	OFDM	BPSK	6

### **Bandedge Measurement:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 11	DSSS	CCK	1
802.11g	1 to 11	1, 11	OFDM	BPSK	6
802.11a	1 to 5	1, 5	OFDM	BPSK	6

### **Antenna Port Conducted Measurement:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	CCK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11a	1 to 5	1, 3, 5	OFDM	BPSK	6

### **3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is an USB Wireless LAN unit. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C. (15.247)**

**ANSI C63.4-2003**

All test items have been performed and recorded as per the above standards.

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

### 3.4 DESCRIPTION OF SUPPORT UNITS

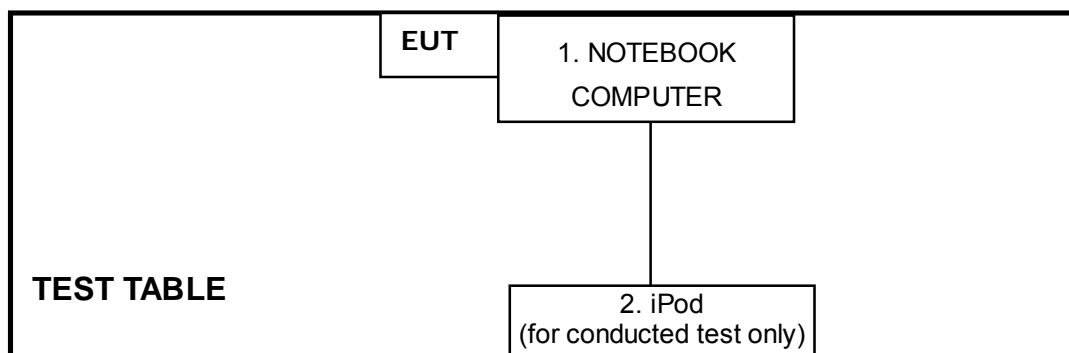
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP21L	CN-0GD366-70166-5B3-09ZX	QDS-BRCM1016
2	iPod (for conducted test only)	Apple	A1137	6U6078CDUPR	DoC

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.2m shielded wire, w/o core.

**NOTE:** All power cords of the above support units are non shielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST





## 4. TEST TYPES AND RESULTS (802.11b & g, 2400 ~ 2483.5MHz Band)

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver	ESCS 30	847124/029	Mar. 01, 2008
Line-Impedance Stabilization Network(for EUT)	ENV-216	100071	Nov. 26, 2007
Line-Impedance Stabilization Network(for Peripheral)	ESH3-Z5	848773/004	Oct. 26, 2007
RF Cable (JETBAO)	RG233/U	Cable_CB_01	Dec. 09, 2007
Terminator	50	2	Oct. 30, 2007
Software	ADT_Cond_V7.3.2	NA	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in ADT Shielded Room No. B.
  3. The VCCI Con B Registration No. is C-2193.

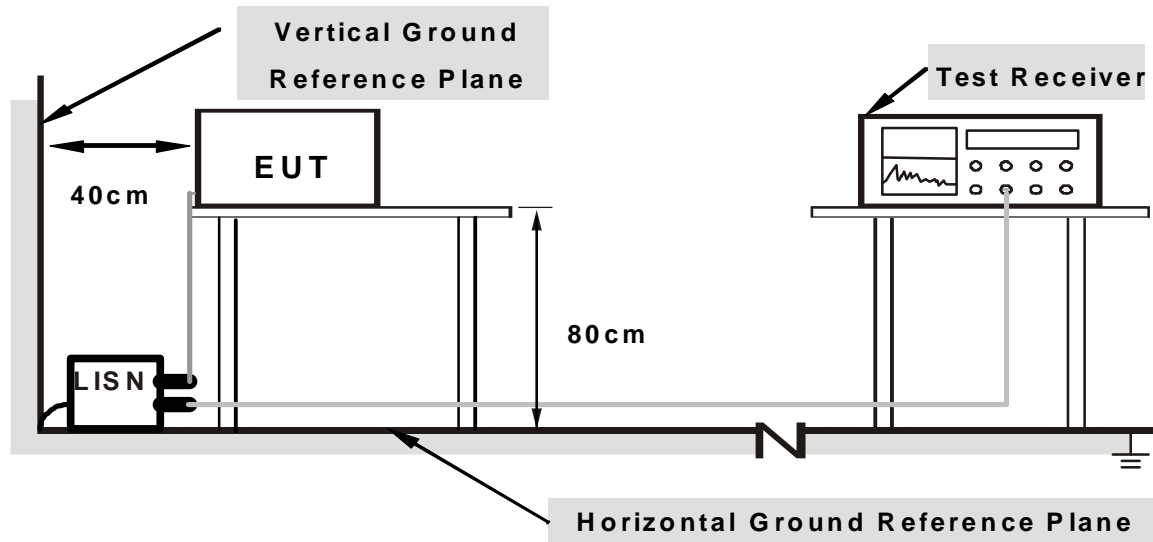
#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



**Note: 1. Support units were connected to second LISN.**

**2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

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

#### 4.1.6 EUT OPERATING CONDITIONS

- a. Plug the EUT into the support unit 1 (Notebook computer) which placed on a testing table.
- b. The support unit 1 (Notebook computer) ran a test program “Ralink QA test QAU2571W” to enable EUT under transmission condition continuously.

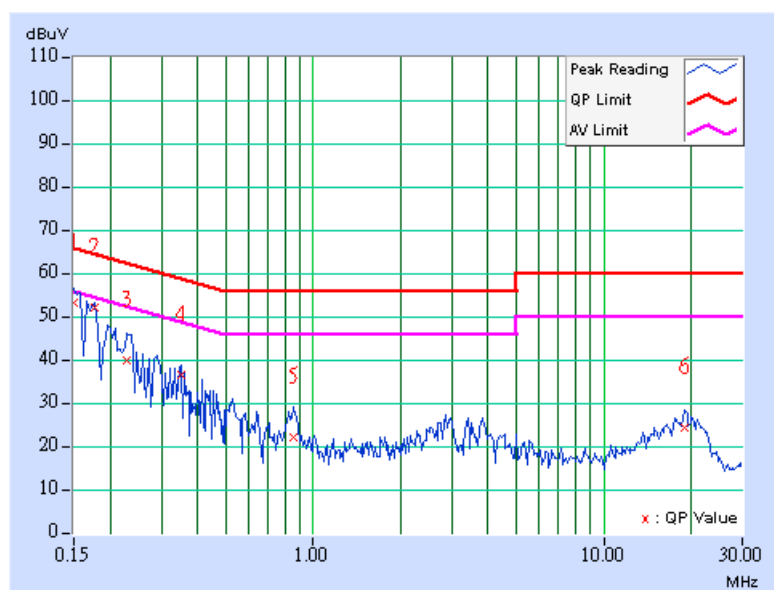
#### 4.1.7 TEST RESULTS

##### Conducted Worst-Case Data

<b>MODULATION TYPE</b>	CCK	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>TRANSFER RATE</b>	1Mbps
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 68%RH, 960hPa	<b>PHASE</b>	Line (L)
<b>TESTED BY</b>	Sky Liao		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.40	52.16	-	52.56	-	66.00	56.00	-13.44	-
2	0.177	0.40	51.23	-	51.63	-	64.61	54.61	-12.98	-
3	0.228	0.40	38.86	-	39.26	-	62.52	52.52	-23.26	-
4	0.349	0.40	35.60	-	36.00	-	58.98	48.98	-22.98	-
5	0.853	0.40	21.35	-	21.75	-	56.00	46.00	-34.25	-
6	19.004	1.02	23.41	-	24.43	-	60.00	50.00	-35.57	-

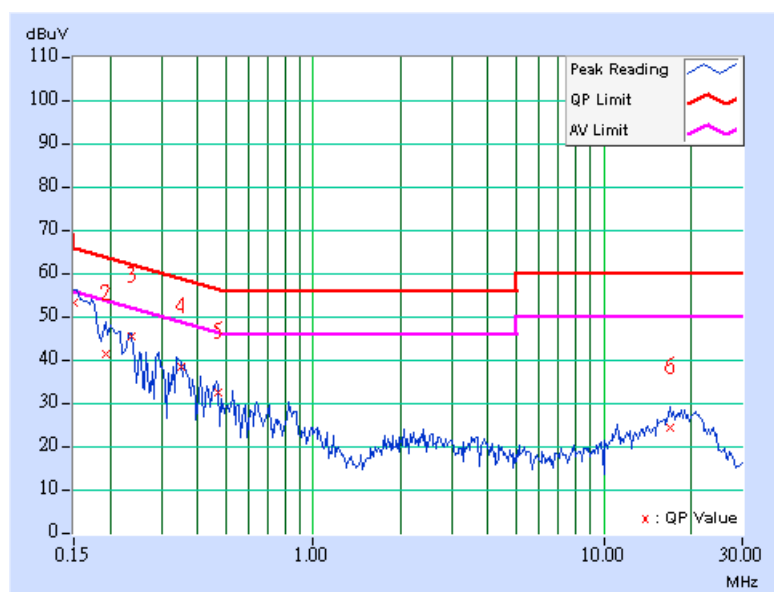
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



<b>MODULATION TYPE</b>	CCK	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>TRANSFER RATE</b>	1Mbps
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 68%RH, 960hPa	<b>PHASE</b>	Neutral (N)
<b>TESTED BY</b>	Sky Liao		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.20	51.92	-	52.12	-	66.00	56.00	-13.88	-
2	0.193	0.20	40.14	-	40.34	-	63.91	53.91	-23.57	-
3	0.236	0.20	44.40	-	44.60	-	62.24	52.24	-17.64	-
4	0.353	0.20	37.11	-	37.31	-	58.89	48.89	-21.58	-
5	0.472	0.21	31.36	-	31.57	-	56.48	46.48	-24.91	-
6	16.891	1.24	23.11	-	24.35	-	60.00	50.00	-35.65	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

#### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	R3271A	85060311	July 03, 2007
HP Pre_Amplifier	8449B	3008A01922	Sep. 18, 2007
ROHDE & SCHWARZ Test Receiver	ESCS30	100375	Sep. 20, 2007
CHASE Broadband Antenna	VULB9168	138	Dec. 10, 2007
Schwarzbeck Horn_Antenna	BBHA9120	D124	Jan. 01, 2008
Schwarzbeck Horn_Antenna	BBHA9170	BBHA9170153	Jan. 04, 2008
SCHWARZBECK Biconical Antenna	VHBA9123	459	Jun. 08, 2009
SCHWARZBECK Periodic Antenna	UPA6108	1148	Jun. 08, 2009
RF Switches (ARNITSU)	CS-201	1565157	NA
RF CABLE (Chaintek)	SF102	22054-2	Nov. 14, 2007
RF Cable(RICHTEC)	9913-30M N-N Cable	STCCAB-30M-1 GHz	Jul. 15, 2007
Software	ADT_Radiated_V 7.6.15.7	NA	NA
CHANCE MOST Antenna Tower	AT-100	0203	NA
CHANCE MOST Turn Table	TT-100	0203	NA

- Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Biconical and Periodic Antenna) and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in ADT Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 4824A-3.

#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters 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.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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 emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

**NOTE:**

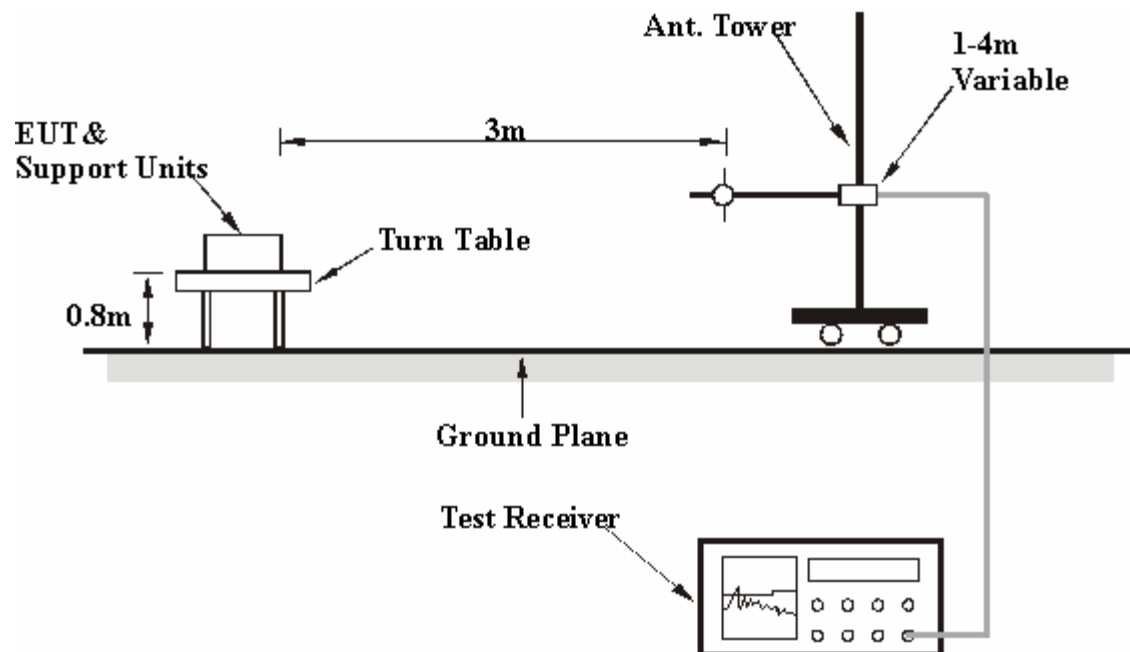
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation



#### 4.2.5 TEST SETUP



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

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

#### 4.2.7 TEST RESULTS

##### Below 1GHz Worst-Case Data

<b>MODULATION TYPE</b>	CCK	<b>FREQUENCY RANGE</b>	Below 1000MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>TRANSFER RATE</b>	1Mbps
<b>ENVIRONMENTAL CONDITIONS</b>	23deg. C, 70%RH, 960hPa	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>TESTED BY</b>	Phoenix Huang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	120.40	25.88 QP	43.50	-17.62	1.03 H	136	14.03	11.85
2	168.00	28.25 QP	43.50	-15.25	1.03 H	130	14.57	13.68
3	335.46	30.31 QP	46.00	-15.69	1.00 H	328	13.09	17.22
4	600.00	38.98 QP	46.00	-7.02	1.36 H	237	14.50	24.48
5	749.98	32.77 QP	46.00	-13.23	1.33 H	270	5.42	27.35
6	840.00	39.03 QP	46.00	-6.97	1.00 H	350	10.80	28.23
7	960.00	40.36 QP	46.00	-5.64	1.00 H	331	10.47	29.89

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	39.47	24.33 QP	40.00	-15.67	1.00 V	150	10.22	14.11
2	120.00	25.24 QP	43.50	-18.26	1.00 V	145	13.42	11.82
3	168.00	30.02 QP	43.50	-13.48	1.00 V	115	16.34	13.68
4	499.49	36.53 QP	46.00	-9.47	1.13 V	156	14.78	21.75
5	566.79	30.48 QP	46.00	-15.52	1.00 V	76	6.82	23.66
6	749.24	39.64 QP	46.00	-6.36	1.64 V	160	12.31	27.33
7	960.00	37.01 QP	46.00	-8.99	1.44 V	128	7.12	29.89

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value

## 802.11b DSSS modulation

<b>CHANNEL</b>	Channel 1	<b>FREQUENCY RANGE</b>	1 ~ 25GHz
<b>MODULATION TYPE</b>	CCK	<b>TRANSFER RATE</b>	1Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 65%RH, 960hPa	<b>TESTED BY</b>	Phoenix Huang

### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.90 PK	74.00	-16.10	1.38 H	71	25.97	31.93
2	2390.00	45.80 AV	54.00	-8.20	1.38 H	71	13.87	31.93
3	*2412.00	103.60 PK			1.38 H	67	71.58	32.02
4	*2412.00	98.50 AV			1.38 H	67	66.48	32.02
5	4824.00	45.30 PK	74.00	-28.70	1.47 H	8	9.33	35.97
6	4824.00	34.50 AV	54.00	-19.50	1.47 H	8	-1.47	35.97
7	7236.00	51.50 PK	74.00	-22.50	1.32 H	66	9.26	42.24
8	7236.00	38.90 AV	54.00	-15.10	1.32 H	66	-3.34	42.24

### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	59.90 PK	74.00	-14.10	1.23 V	157	27.97	31.93
2	2390.00	48.51 AV	54.00	-5.49	1.23 V	157	16.58	31.93
3	*2412.00	107.80 PK			1.15 V	163	75.78	32.02
4	*2412.00	103.10 AV			1.15 V	163	71.08	32.02
5	4824.00	47.10 PK	74.00	-26.90	1.42 V	0	11.13	35.97
6	4824.00	38.00 AV	54.00	-16.00	1.42 V	0	2.03	35.97
7	7236.00	51.20 PK	74.00	-22.80	1.31 V	20	8.96	42.24
8	7236.00	38.30 AV	54.00	-15.70	1.31 V	20	-3.94	42.24

#### REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The limit value is defined as per 15.247
6. “ \* “ : Fundamental frequency

<b>CHANNEL</b>	Channel 6	<b>FREQUENCY RANGE</b>	1 ~ 25GHz
<b>MODULATION TYPE</b>	CCK	<b>TRANSFER RATE</b>	1Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 65%RH, 960hPa	<b>TESTED BY</b>	Phoenix Huang

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	105.83 PK			1.51 H	187	73.72	32.11
2	*2437.00	100.39 AV			1.51 H	187	68.28	32.11
3	4874.00	53.43 PK	74.00	-20.57	1.78 H	273	17.35	36.08
4	4874.00	49.14 AV	54.00	-4.86	1.78 H	273	13.06	36.08
5	7311.00	52.95 PK	74.00	-21.05	1.48 H	124	10.43	42.52
6	7311.00	39.29 AV	54.00	-14.71	1.48 H	124	-3.23	42.52

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	109.32 PK			1.44 V	171	77.21	32.11
2	*2437.00	104.02 AV			1.44 V	171	71.91	32.11
3	4874.00	53.00 PK	74.00	-21.00	1.42 V	5	16.92	36.08
4	4874.00	48.98 AV	54.00	-5.02	1.42 V	5	12.90	36.08
5	7311.00	53.57 PK	74.00	-20.43	1.38 V	26	11.05	42.52
6	7311.00	39.72 AV	54.00	-14.28	1.38 V	26	-2.80	42.52

#### REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The limit value is defined as per 15.247
6. “ \* ” : Fundamental frequency

<b>CHANNEL</b>	Channel 11	<b>FREQUENCY RANGE</b>	1 ~ 25GHz
<b>MODULATION TYPE</b>	CCK	<b>TRANSFER RATE</b>	1Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 65%RH, 960hPa	<b>TESTED BY</b>	Phoenix Huang

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

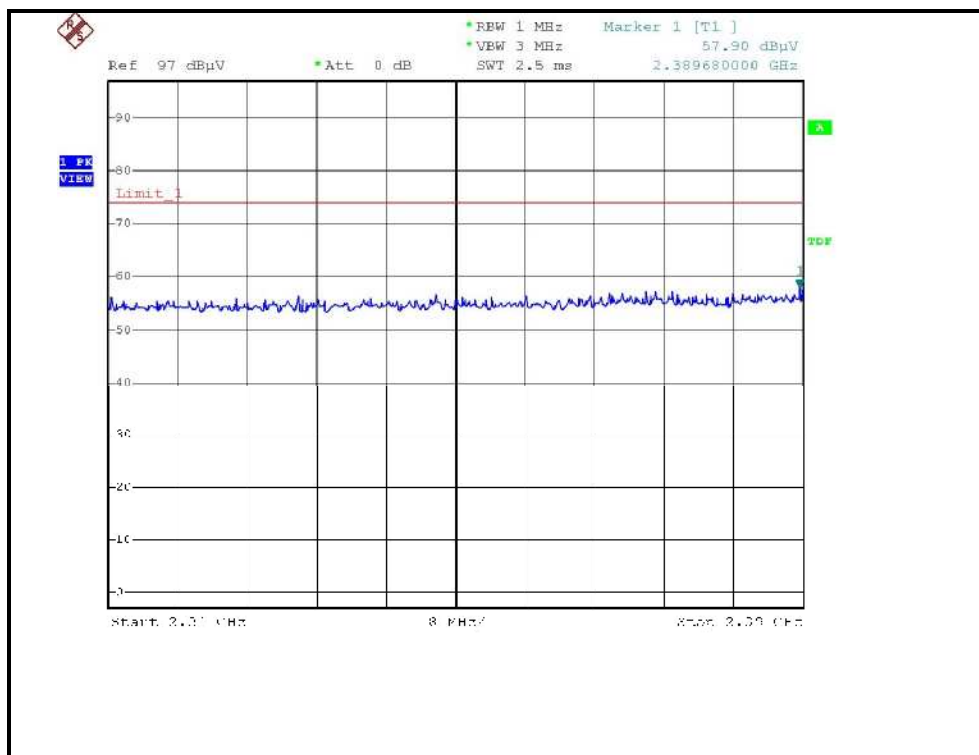
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	103.10 PK			1.28 H	50	70.89	32.21
2	*2462.00	98.00 AV			1.28 H	50	65.79	32.21
3	2483.50	57.80 PK	74.00	-16.20	1.27 H	51	25.51	32.29
4	2483.50	45.00 AV	54.00	-9.00	1.27 H	51	12.71	32.29
5	4924.00	54.40 PK	74.00	-19.60	1.65 H	3	18.21	36.19
6	4924.00	52.20 AV	54.00	-1.80	1.65 H	3	16.01	36.19
7	7386.00	52.50 PK	74.00	-21.50	1.66 H	72	9.70	42.80
8	7386.00	39.70 AV	54.00	-14.30	1.66 H	72	-3.10	42.80

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

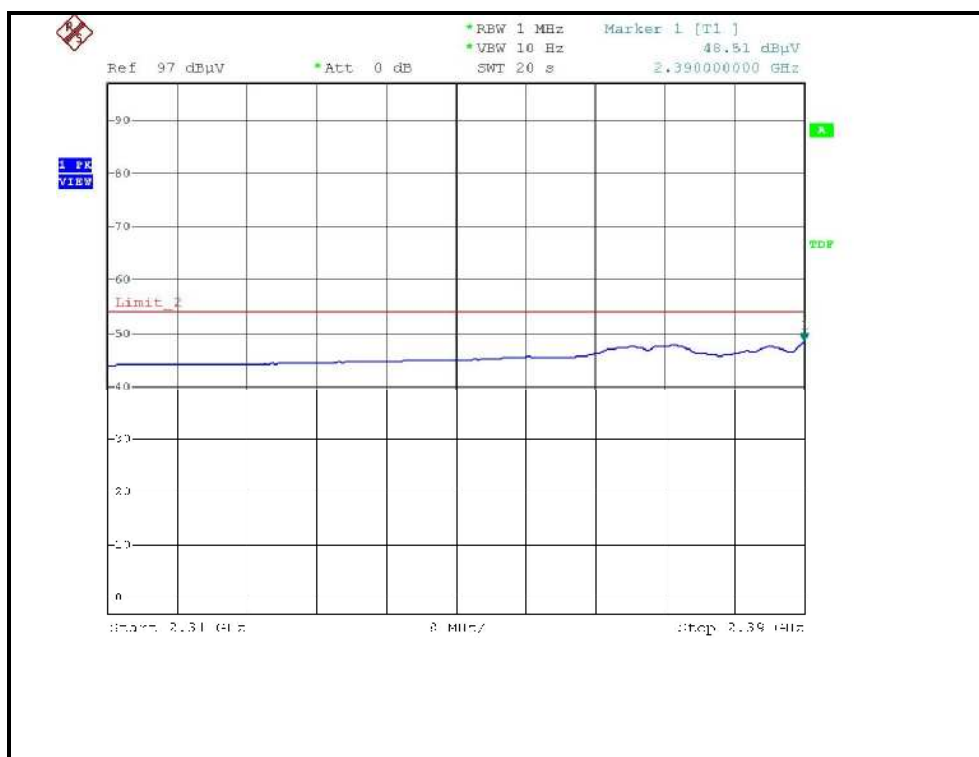
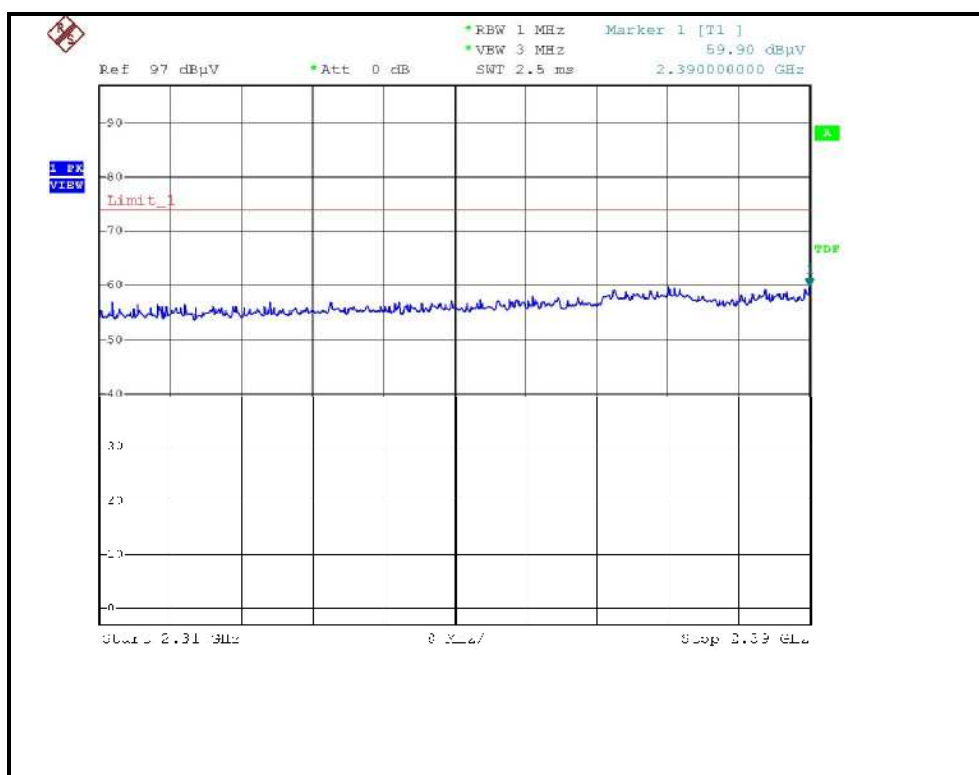
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	109.90 PK			1.43 V	172	77.69	32.21
2	*2462.00	105.10 AV			1.43 V	172	72.89	32.21
3	2498.90	60.40 PK	74.00	-13.60	1.43 V	169	28.05	32.35
4	2498.90	48.70 AV	54.00	-5.30	1.43 V	169	16.35	32.35
5	4924.00	55.70 PK	74.00	-18.30	1.38 V	185	19.51	36.19
<b>6</b>	<b>4924.00</b>	<b>53.80 AV</b>	<b>54.00</b>	<b>-0.20</b>	<b>1.38 V</b>	<b>185</b>	<b>17.61</b>	<b>36.19</b>
7	7386.00	53.50 PK	74.00	-20.50	1.33 V	27	10.70	42.80
8	7386.00	39.90 AV	54.00	-14.10	1.33 V	27	-2.90	42.80

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. The limit value is defined as per 15.247
  6. “ \* “ : Fundamental frequency

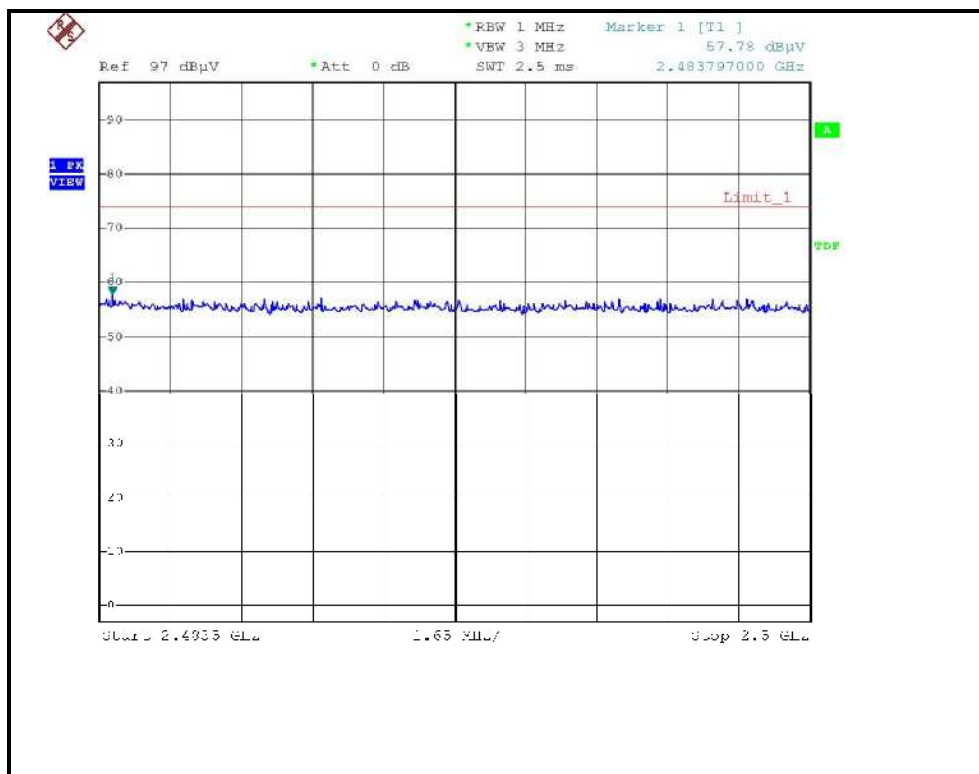
# RESTRICTED BANDEDGE (802.11b MODE, CH1, HORIZONTAL )



# RESTRICTED BANDEDGE (802.11b MODE, CH1, VERTICAL )

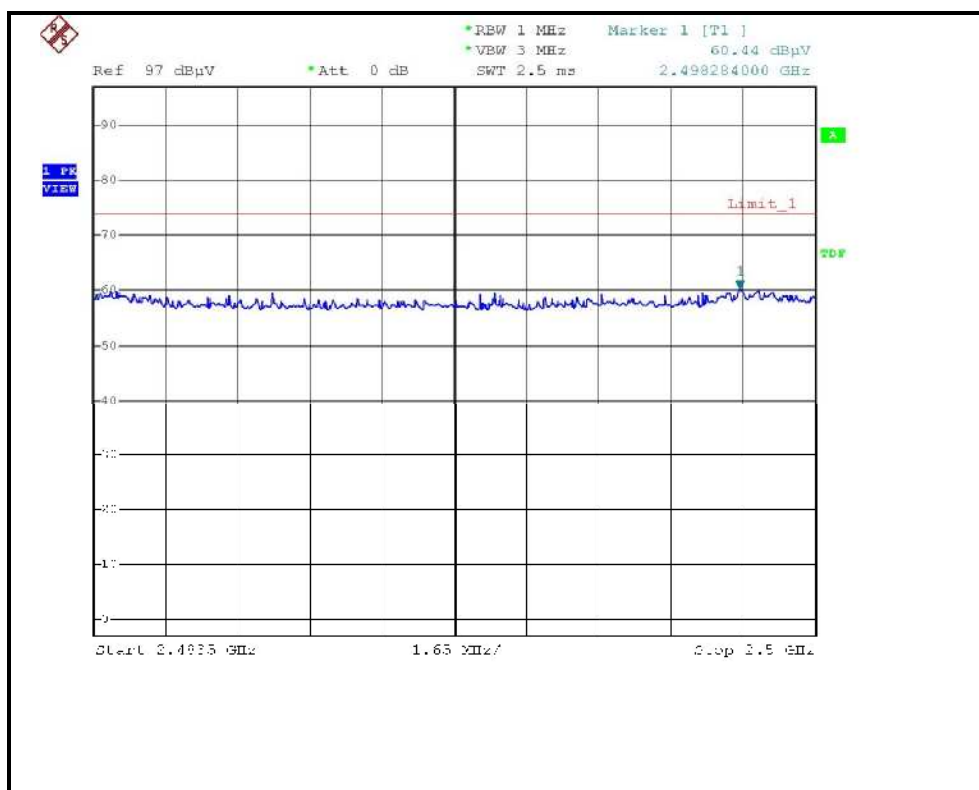


# RESTRICTED BANDEDGE (802.11b MODE, CH11, HORIZONTAL )





# RESTRICTED BANDEDGE (802.11b MODE, CH11, VERTICAL )



## 802.11g OFDM modulation

<b>CHANNEL</b>	Channel 1	<b>FREQUENCY RANGE</b>	1 ~ 25GHz
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 65%RH, 960hPa	<b>TESTED BY</b>	Phoenix Huang

### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.80 PK	74.00	-10.20	1.36 H	37	31.87	31.93
2	2390.00	46.90 AV	54.00	-7.10	1.36 H	37	14.97	31.93
3	*2412.00	103.20 PK			1.37 H	10	71.18	32.02
4	*2412.00	92.80 AV			1.37 H	10	60.78	32.02
5	4824.00	51.20 PK	74.00	-22.80	1.47 H	144	15.23	35.97
6	4824.00	37.50 AV	54.00	-16.50	1.47 H	144	1.53	35.97
7	7236.00	52.90 PK	74.00	-21.10	1.23 H	256	10.66	42.24
8	7236.00	39.30 AV	54.00	-14.70	1.23 H	256	-2.94	42.24

### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	71.37 PK	74.00	-2.63	1.12 V	165	39.44	31.93
2	2390.00	53.04 AV	54.00	-0.96	1.12 V	165	21.11	31.93
3	*2412.00	106.90 PK			1.44 V	174	74.88	32.02
4	*2412.00	96.60 AV			1.44 V	174	64.58	32.02
5	4824.00	53.60 PK	74.00	-20.40	1.29 V	174	17.63	35.97
6	4824.00	39.10 AV	54.00	-14.90	1.29 V	174	3.13	35.97
7	7236.00	52.70 PK	74.00	-21.30	1.31 V	187	10.46	42.24
8	7236.00	39.60 AV	54.00	-14.40	1.31 V	187	-2.64	42.24

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. The limit value is defined as per 15.247
  6. “ \* ” : Fundamental frequency

<b>CHANNEL</b>	Channel 6	<b>FREQUENCY RANGE</b>	1 ~ 25GHz
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 65%RH, 960hPa	<b>TESTED BY</b>	Phoenix Huang

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	106.69 PK			1.51 H	187	74.58	32.11
2	*2437.00	95.38 AV			1.51 H	187	63.27	32.11
3	4874.00	49.91 PK	74.00	-24.09	1.78 H	283	13.83	36.08
4	4874.00	35.82 AV	54.00	-18.18	1.78 H	283	-0.26	36.08
5	7311.00	52.83 PK	74.00	-21.17	1.49 H	126	10.31	42.52
6	7311.00	39.16 AV	54.00	-14.84	1.49 H	126	-3.36	42.52

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	109.60 PK			1.45 V	170	77.49	32.11
2	*2437.00	98.66 AV			1.45 V	170	66.55	32.11
3	4874.00	48.91 PK	74.00	-25.09	1.41 V	5	12.83	36.08
4	4874.00	34.93 AV	54.00	-19.07	1.41 V	5	-1.15	36.08
5	7311.00	53.62 PK	74.00	-20.38	1.38 V	27	11.10	42.52
6	7311.00	39.87 AV	54.00	-14.13	1.38 V	27	-2.65	42.52

#### REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The limit value is defined as per 15.247
6. “ \* ” : Fundamental frequency

<b>CHANNEL</b>	Channel 11	<b>FREQUENCY RANGE</b>	1 ~ 25GHz
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 65%RH, 960hPa	<b>TESTED BY</b>	Phoenix Huang

#### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

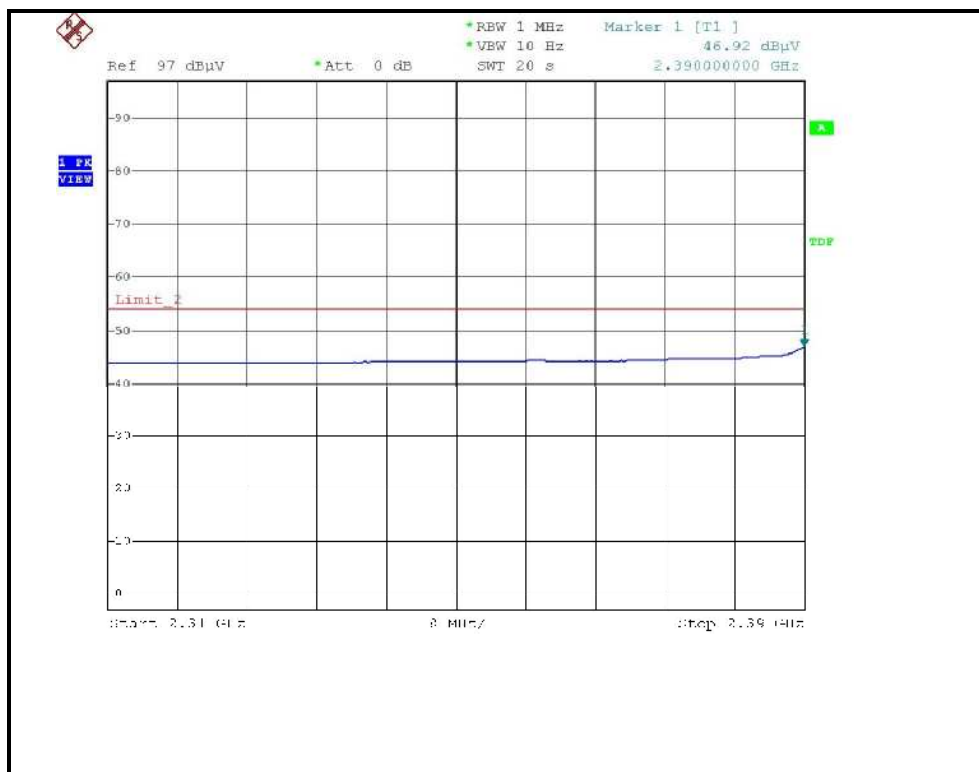
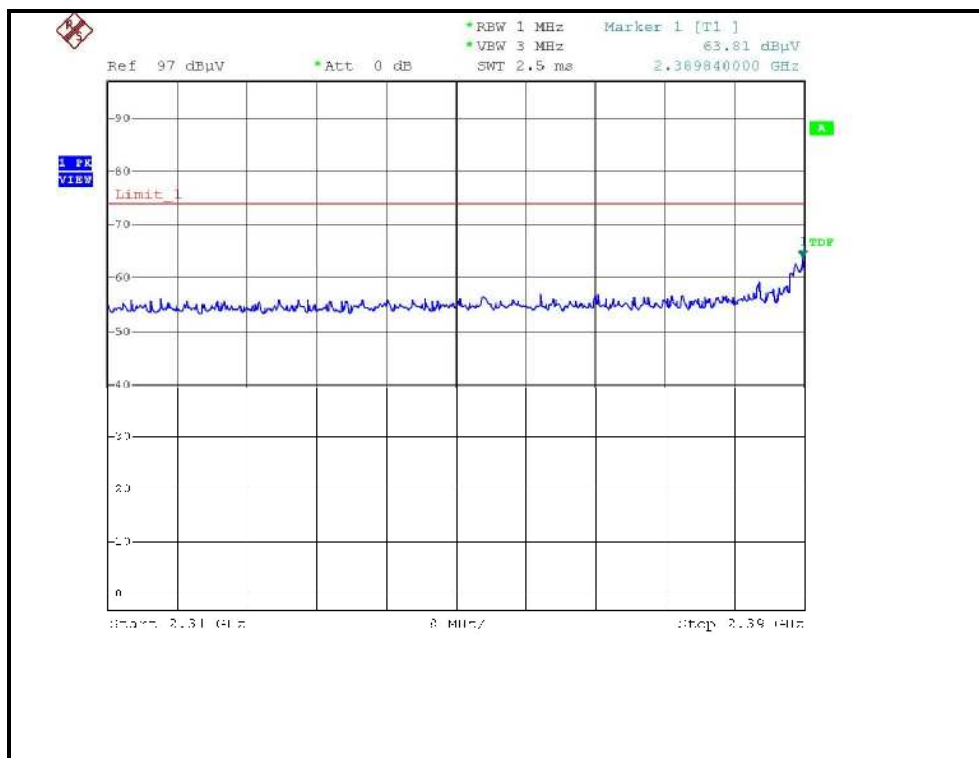
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	105.50 PK			2.01 H	42	73.29	32.21
2	*2462.00	94.90 AV			2.01 H	42	62.69	32.21
3	2483.50	68.90 PK	74.00	-5.10	1.94 H	43	36.61	32.29
4	2483.50	49.60 AV	54.00	-4.40	1.94 H	43	17.31	32.29
5	4924.00	50.80 PK	74.00	-23.20	1.50 H	152	14.61	36.19
6	4924.00	36.60 AV	54.00	-17.40	1.50 H	152	0.41	36.19
7	7386.00	52.60 PK	74.00	-21.40	1.43 H	147	9.80	42.80
8	7386.00	38.90 AV	54.00	-15.10	1.43 H	147	-3.90	42.80

#### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

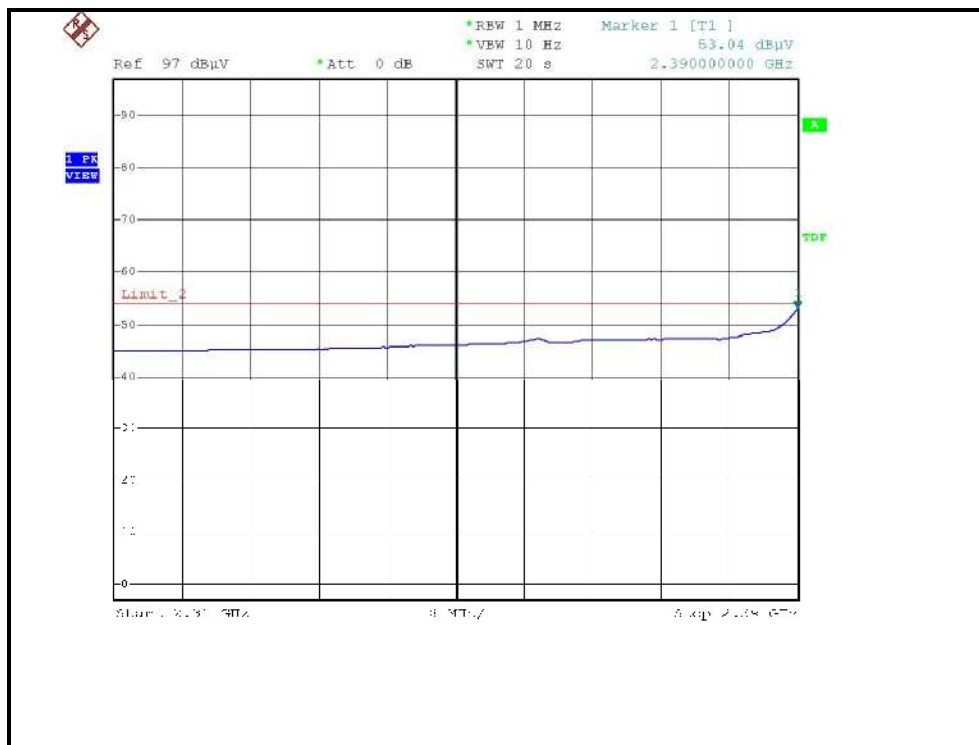
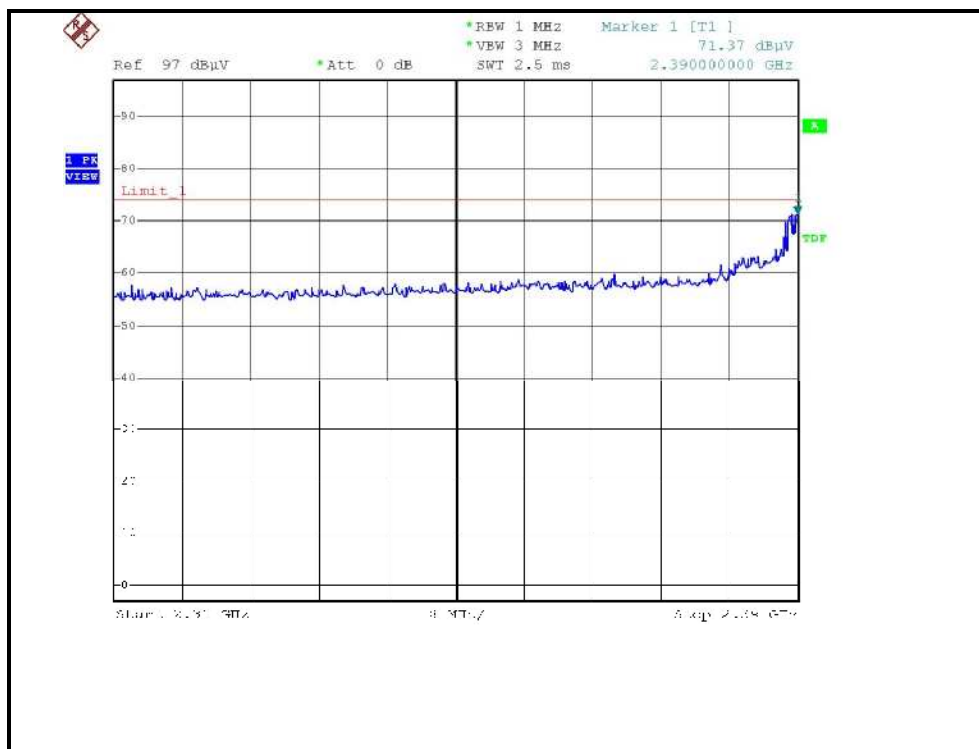
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	109.00 PK			1.17 V	17	76.79	32.21
2	*2462.00	98.90 AV			1.17 V	17	66.69	32.21
3	2483.50	71.92 PK	74.00	-2.08	1.17 V	17	39.63	32.29
4	2483.50	52.84 AV	54.00	-1.16	1.17 V	17	20.55	32.29
5	4924.00	52.30 PK	74.00	-21.70	1.38 V	186	16.11	36.19
6	4924.00	38.40 AV	54.00	-15.60	1.38 V	186	2.21	36.19
7	7386.00	52.60 PK	74.00	-21.40	1.22 V	179	9.80	42.80
8	7386.00	38.60 AV	54.00	-15.40	1.22 V	179	-4.20	42.80

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. The limit value is defined as per 15.247
  6. “ \* “ : Fundamental frequency

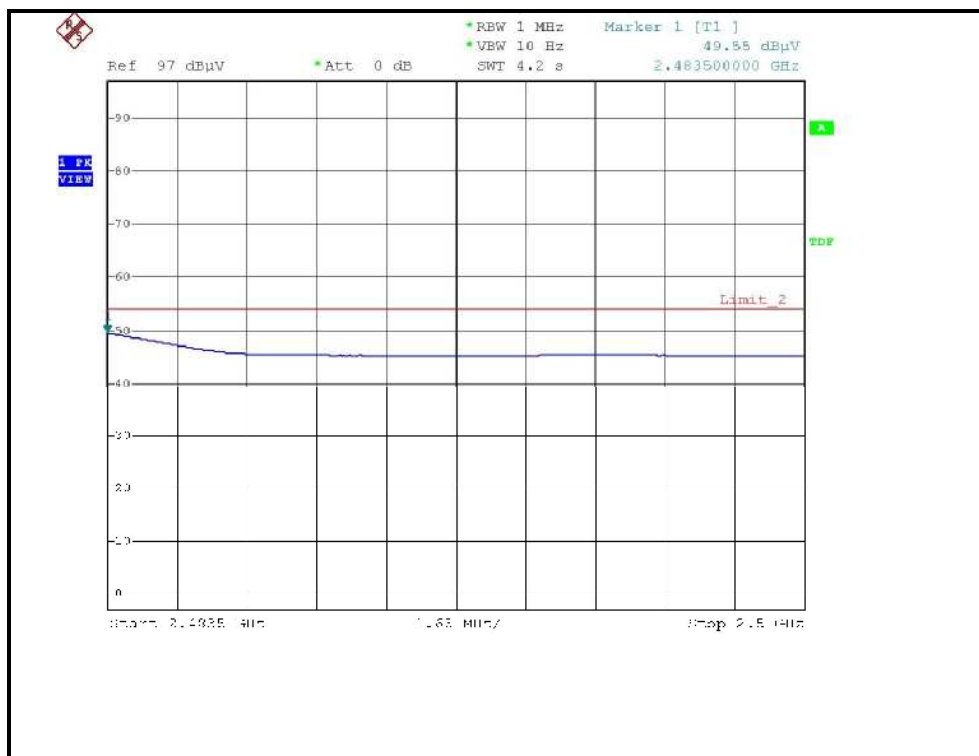
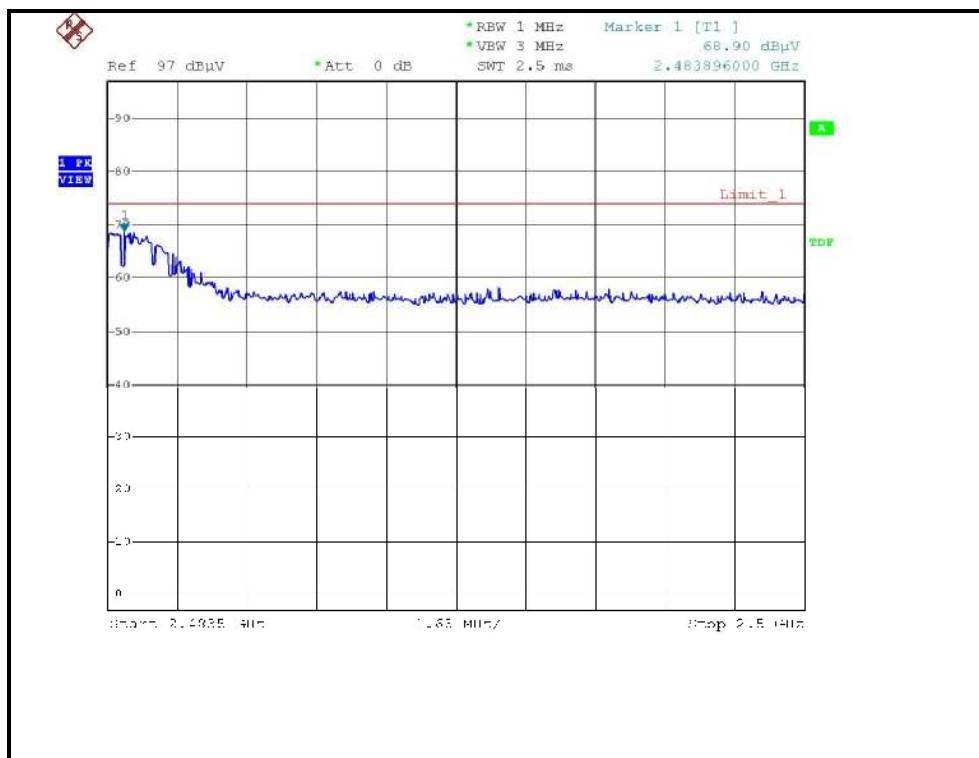
# RESTRICTED BANDEDGE (802.11g MODE, CH1, HORIZONTAL )



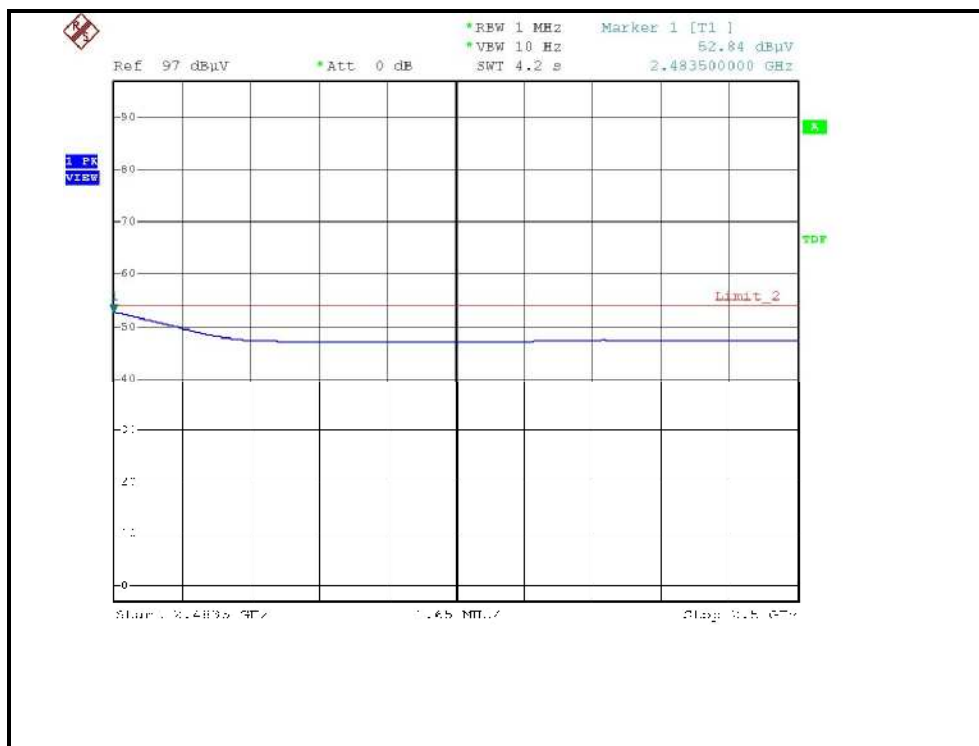
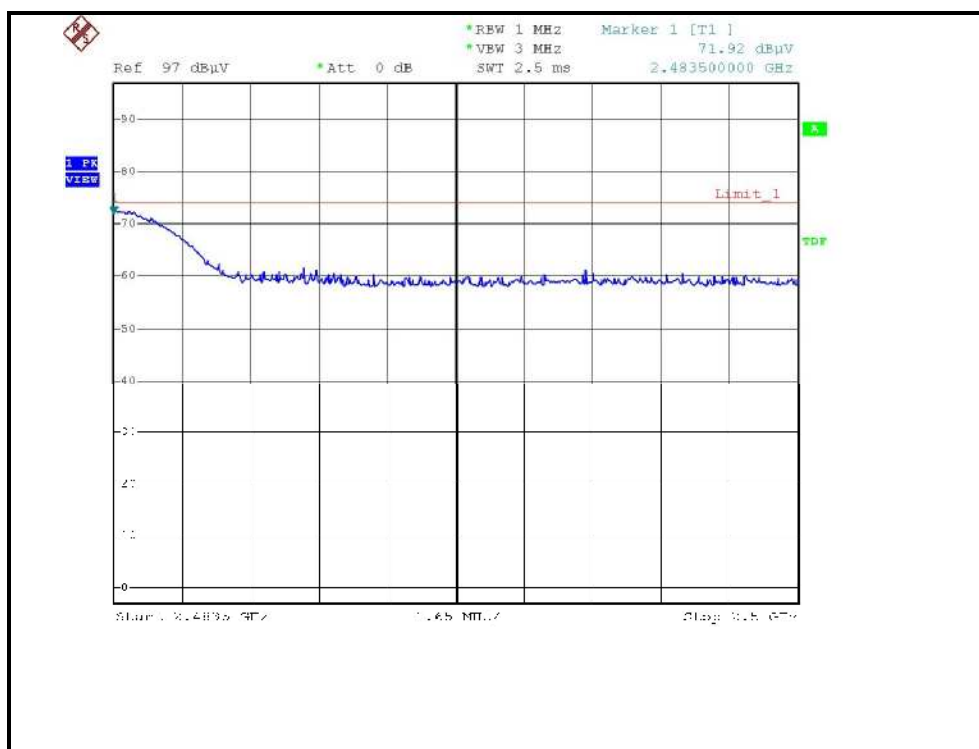
# RESTRICTED BANDEDGE (802.11g MODE, CH1, VERTICAL )



# RESTRICTED BANDEDGE (802.11g MODE, CH11, HORIZONTAL )



# RESTRICTED BANDEDGE (802.11g MODE, CH11, VERTICAL )





### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

**NOTE:**

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

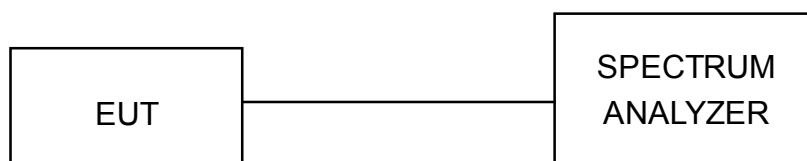
#### 4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

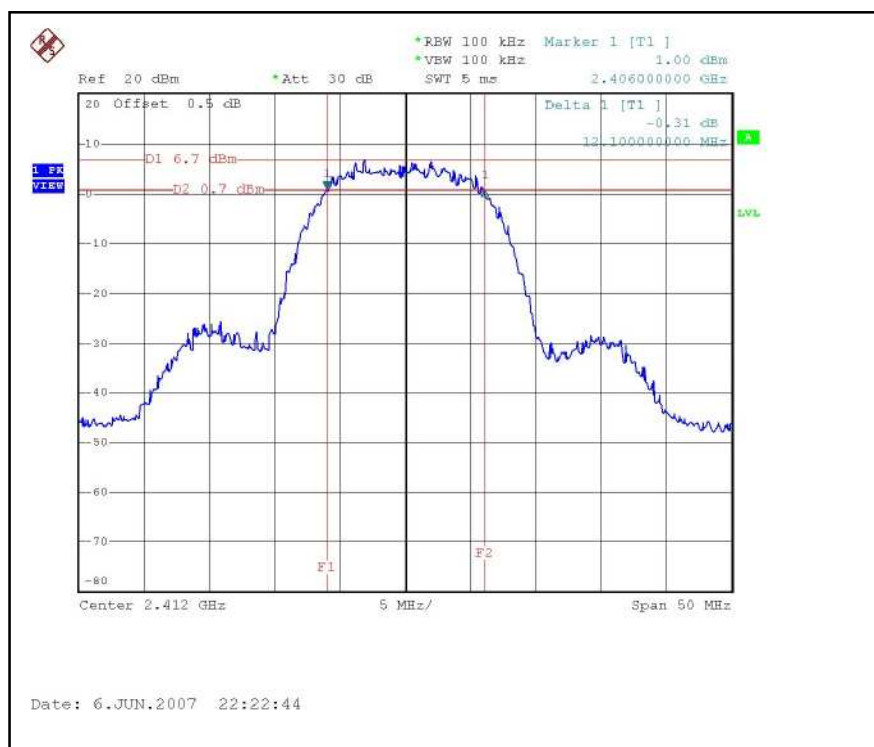
#### 4.3.7 TEST RESULTS

##### 802.11b DSSS modulation

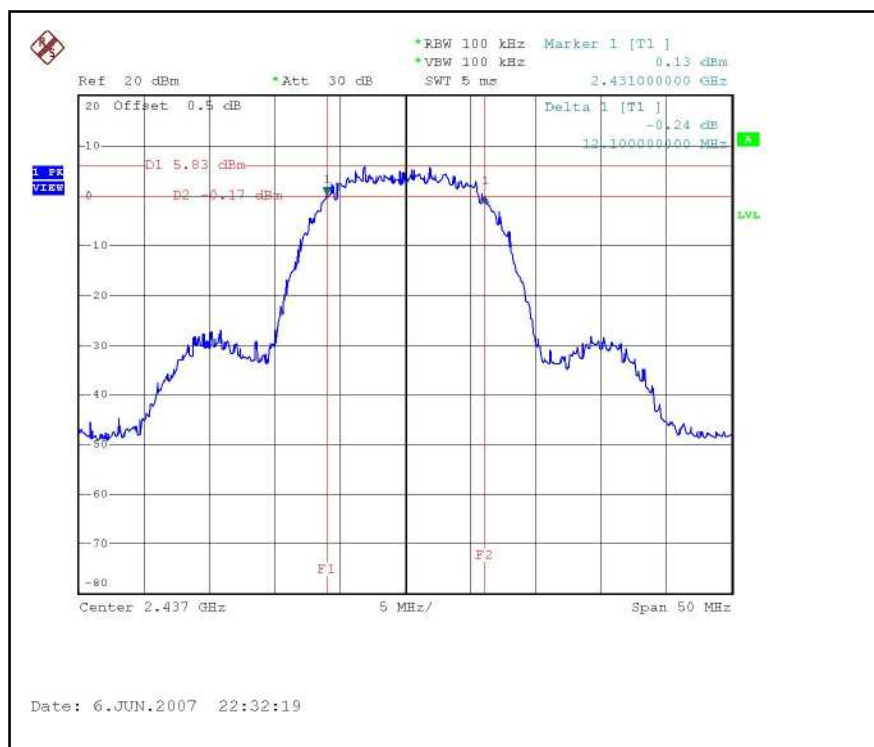
<b>MODULATION TYPE</b>	CCK	<b>TRANSFER RATE</b>	1Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	19deg. C, 60%RH, 960hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	12.1	0.5	PASS
6	2437	12.1	0.5	PASS
11	2462	12.1	0.5	PASS

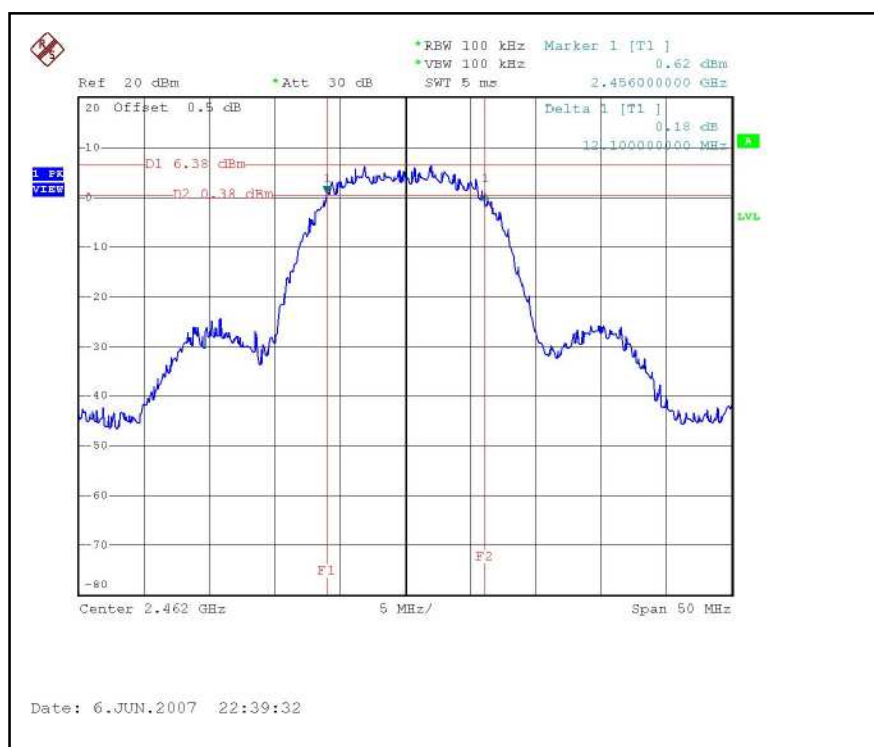
## CH1



## CH6



# CH11

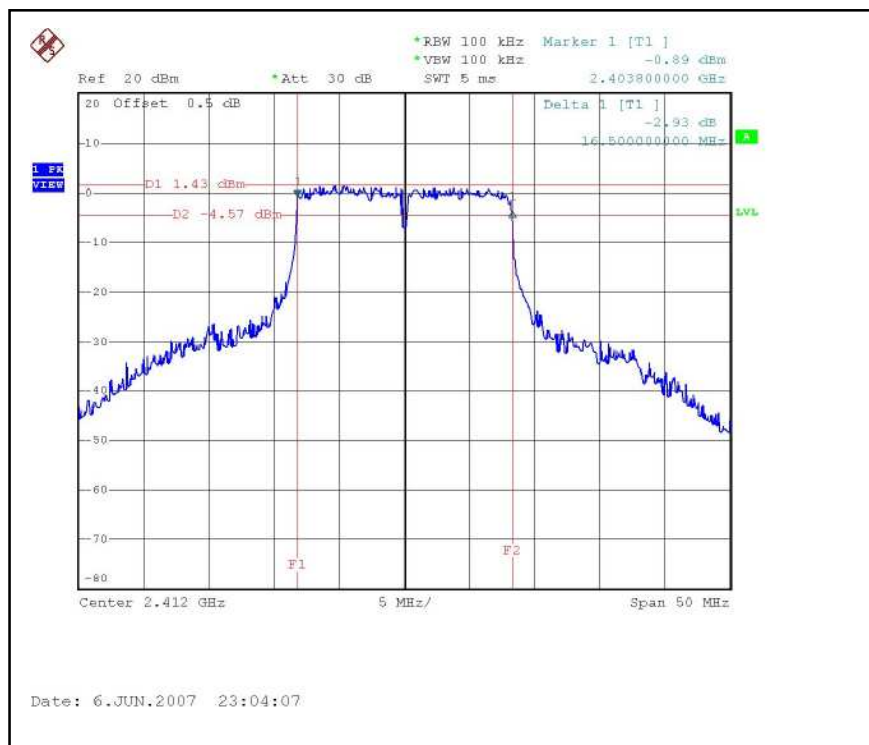


### 802.11g OFDM modulation

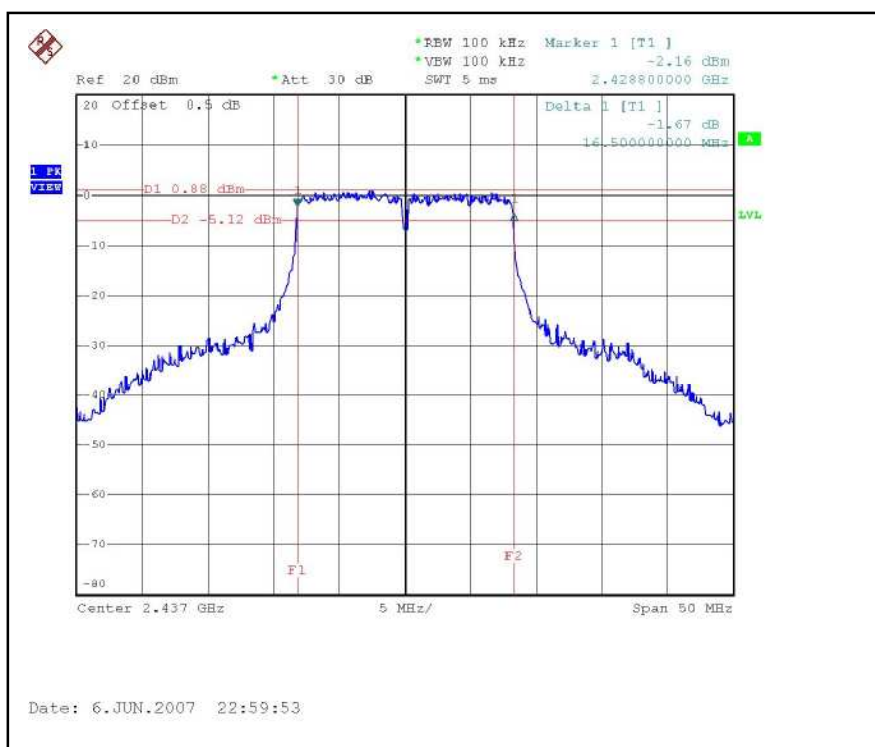
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	19deg. C, 60%RH, 960hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.5	0.5	PASS
6	2437	16.5	0.5	PASS
11	2462	16.5	0.5	PASS

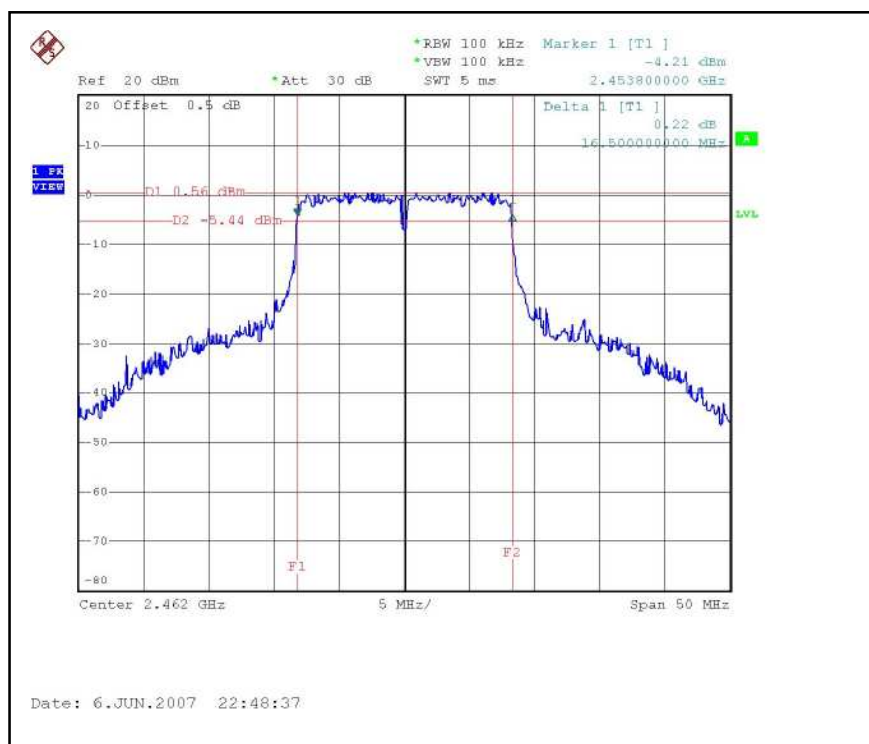
## CH1



## CH6



CH11





#### 4.4 MAXIMUM PEAK OUTPUT POWER

##### 4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

##### 4.4.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007
Agilent SIGNAL GENERATOR	E8257C	MY43320668	Dec. 07, 2007
TEKTRONIX OSCILLOSCOPE	TDS380	B016335	Jul. 04, 2007
NARDA DETECTOR	4503A	FSCM99899	NA

**NOTE:**

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.4.3 TEST PROCEDURES

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.5 TEST SETUP



#### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

#### 4.4.7 TEST RESULTS

##### 802.11b DSSS modulation

<b>MODULATION TYPE</b>	CCK	<b>TRANSFER RATE</b>	1Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	19deg. C, 60%RH, 960hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	81.470	19.11	30	PASS
6	2437	81.658	19.12	30	PASS
11	2462	80.910	19.08	30	PASS

### 802.11g OFDM modulation

<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	19deg. C, 60%RH, 960hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	78.343	18.94	30	PASS
6	2437	79.433	19.00	30	PASS
11	2462	77.268	18.88	30	PASS

## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

**NOTE:**

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

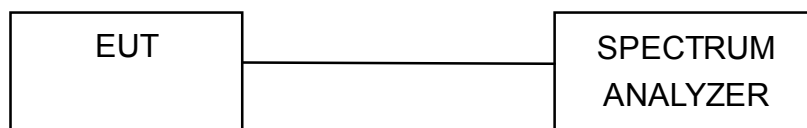
#### 4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

#### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.5.5 TEST SETUP



#### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

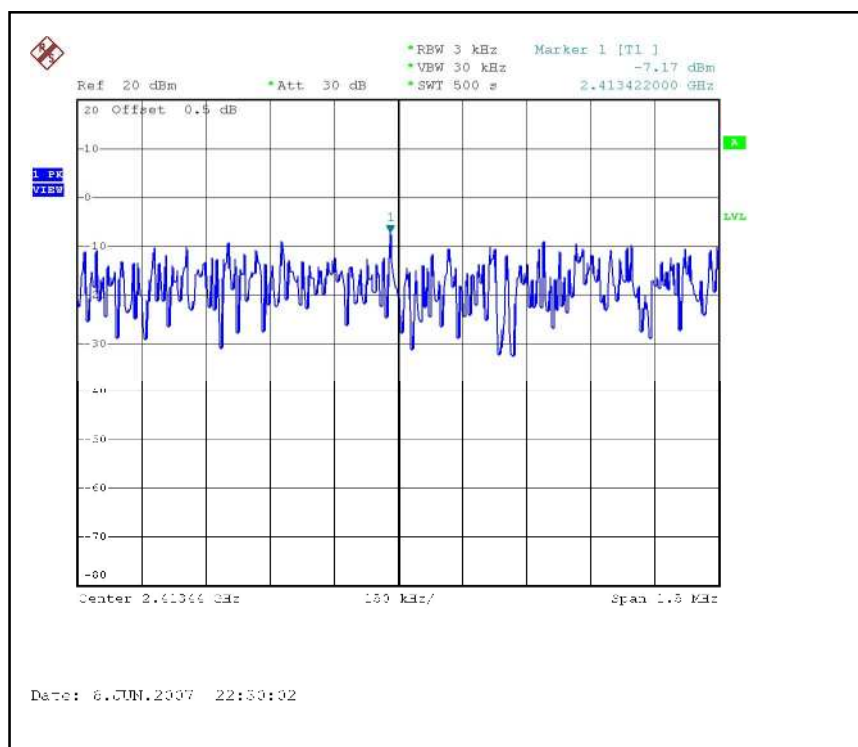
#### 4.5.7 TEST RESULTS

##### 802.11b DSSS modulation

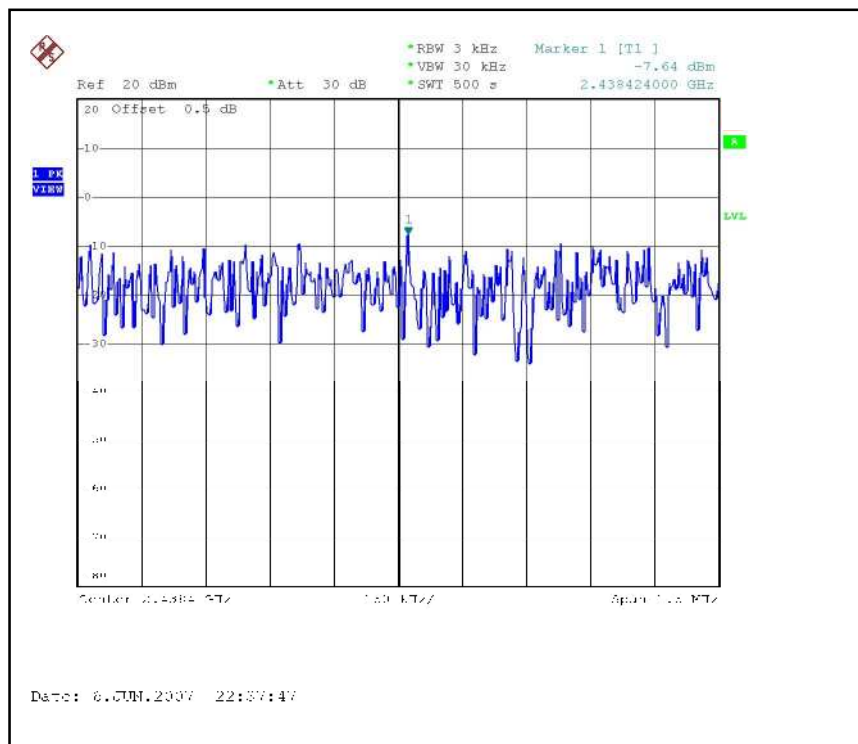
<b>MODULATION TYPE</b>	CCK	<b>TRANSFER RATE</b>	1Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	19deg. C, 60%RH, 960hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-7.17	8	PASS
6	2437	-7.64	8	PASS
11	2462	-7.11	8	PASS

## CH1

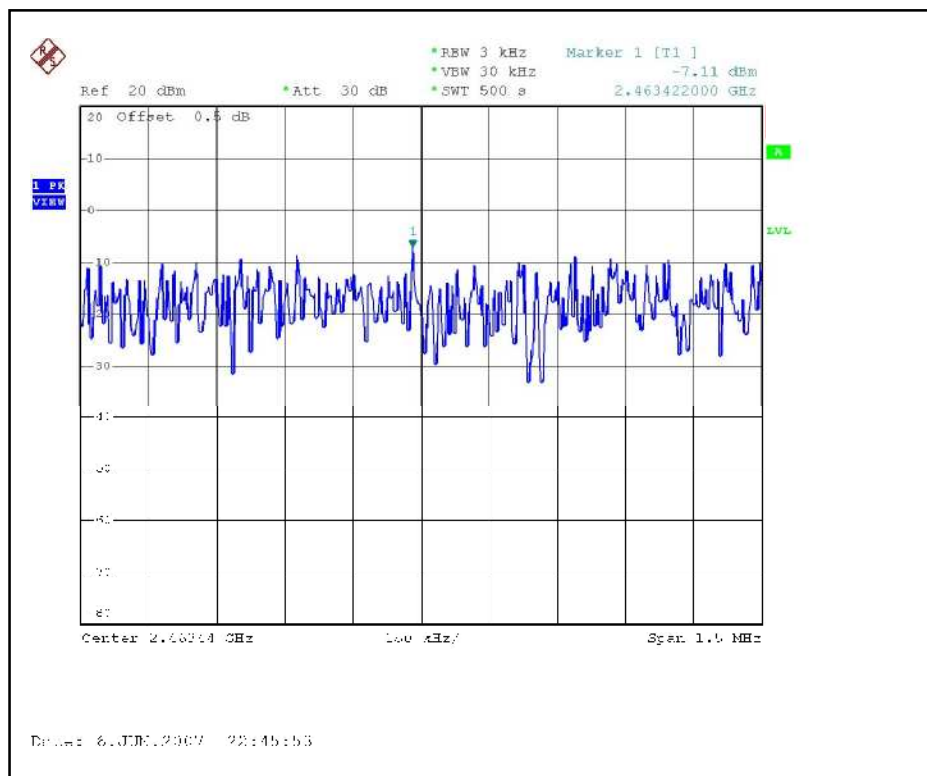


## CH6





## CH11

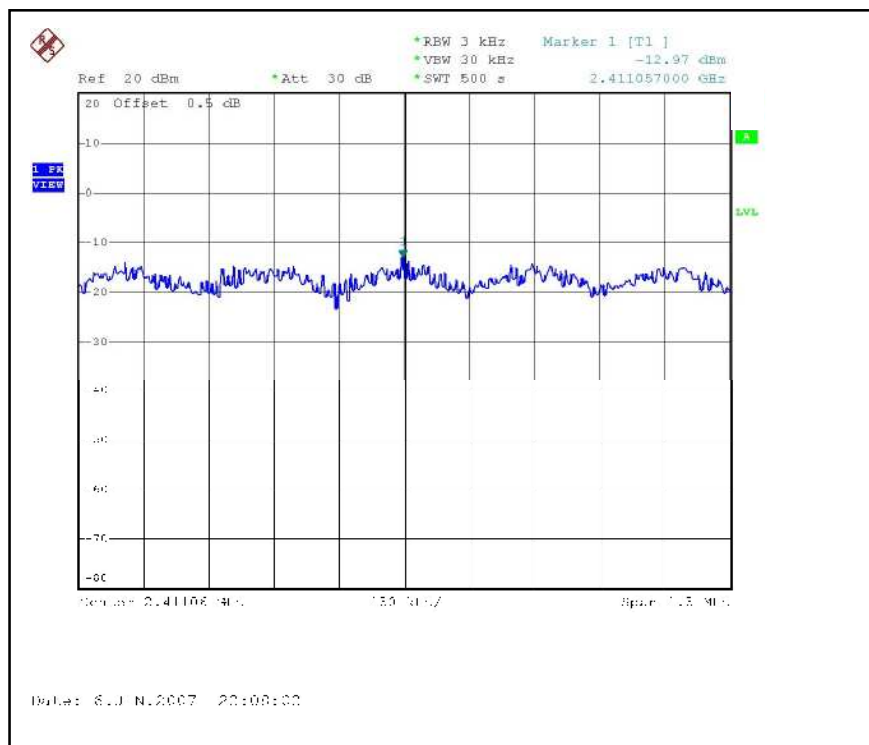


### 802.11g OFDM modulation

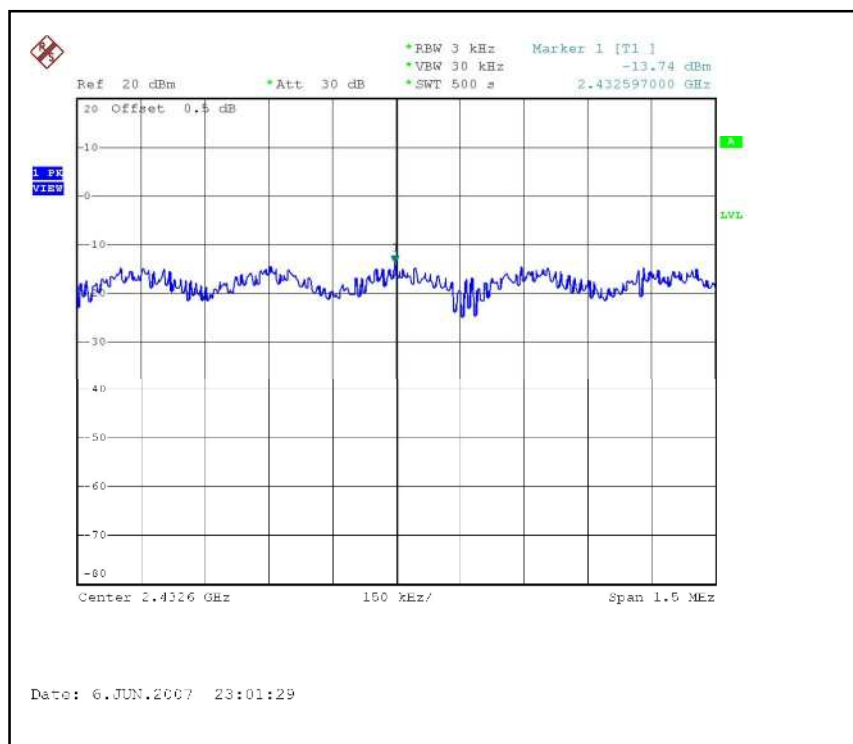
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	19deg. C, 60%RH, 960hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-12.97	8	PASS
6	2437	-13.74	8	PASS
11	2462	-13.26	8	PASS

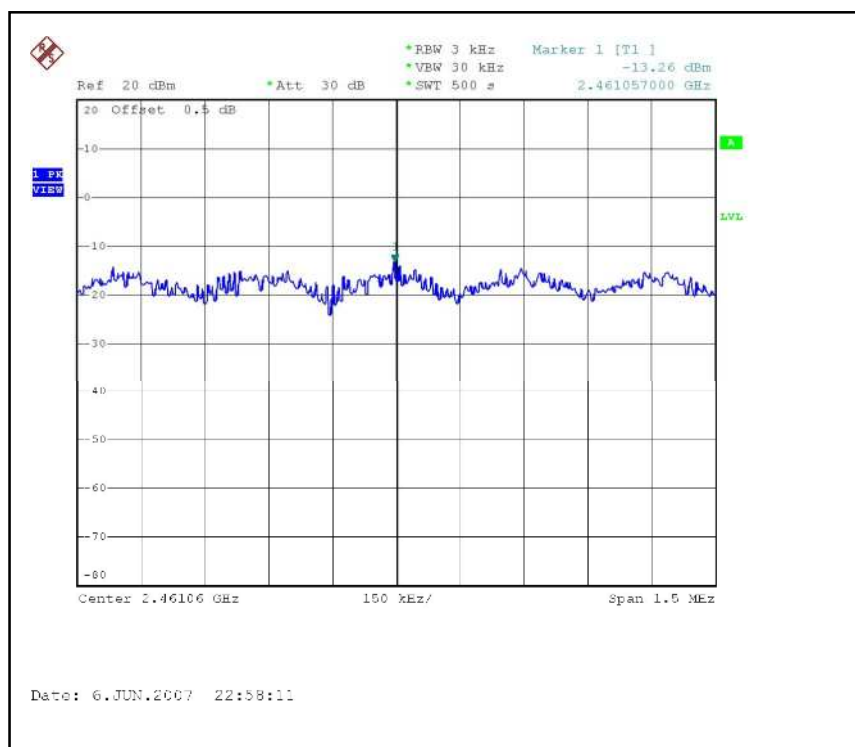
## CH1



## CH6



## CH11



## 4.6 BAND EDGES MEASUREMENT

### 4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

**NOTE:**

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (RBW = VBW = 100kHz) are attached on the following pages.

### 4.6.4 EUT OPERATING CONDITION

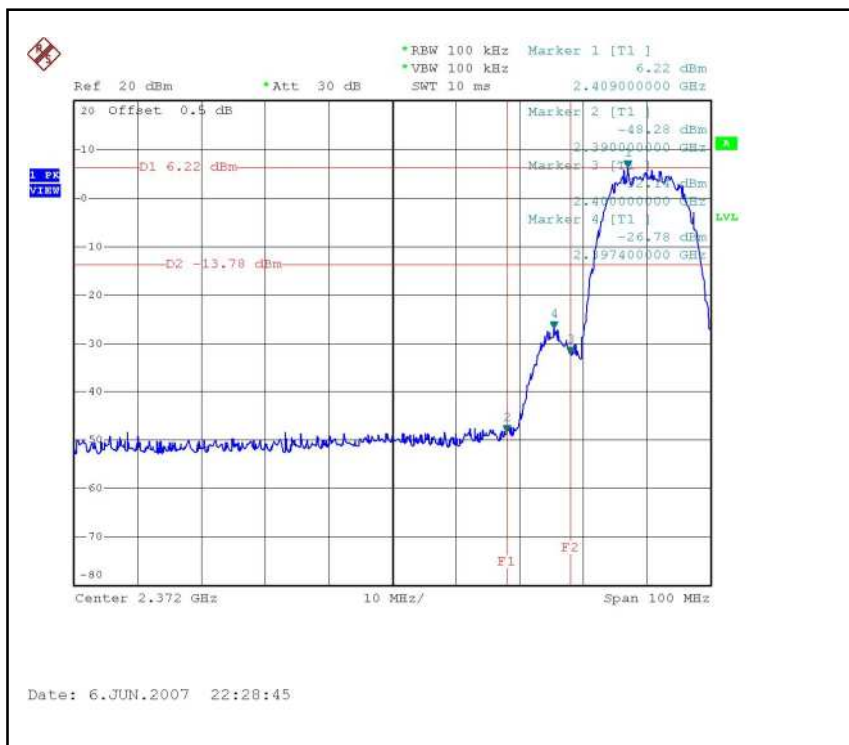
Same as Item 4.3.6

#### 4.6.5 TEST RESULTS

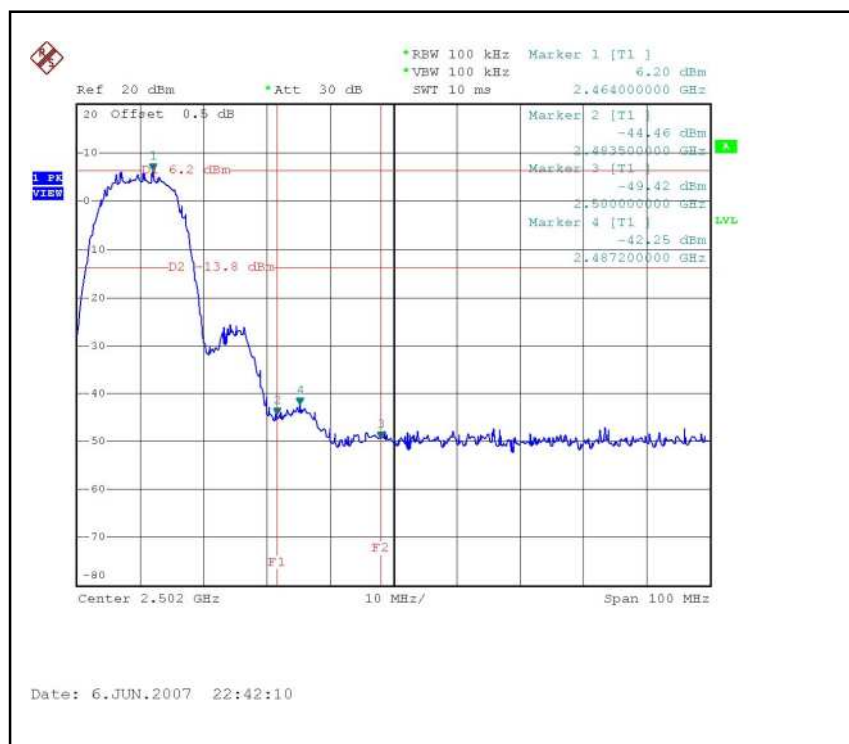
The spectrum plots are attached on the following 4 images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

## 802.11b DSSS modulation:

CH1

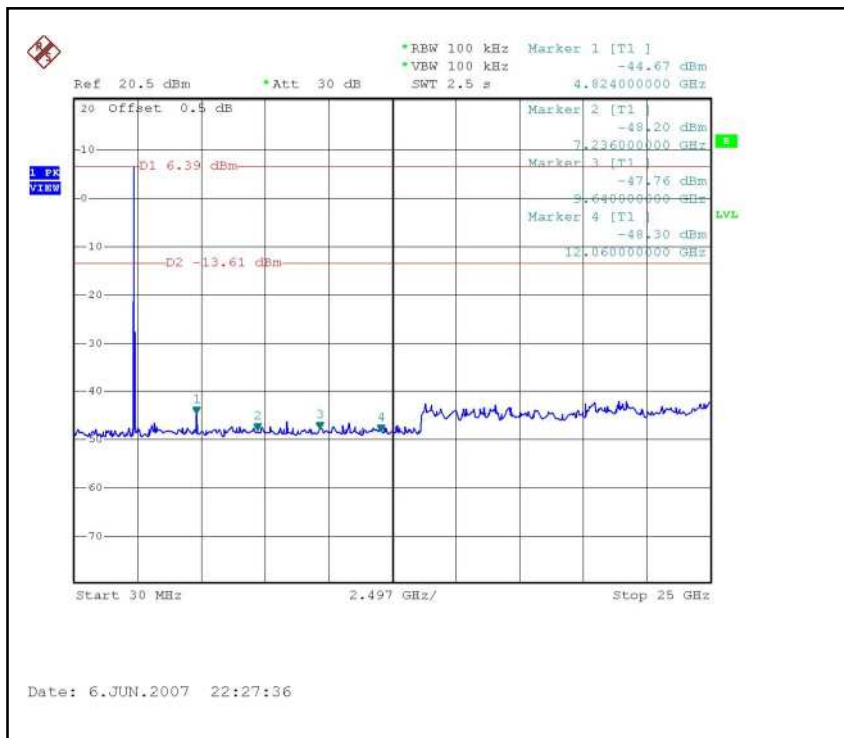


CH11

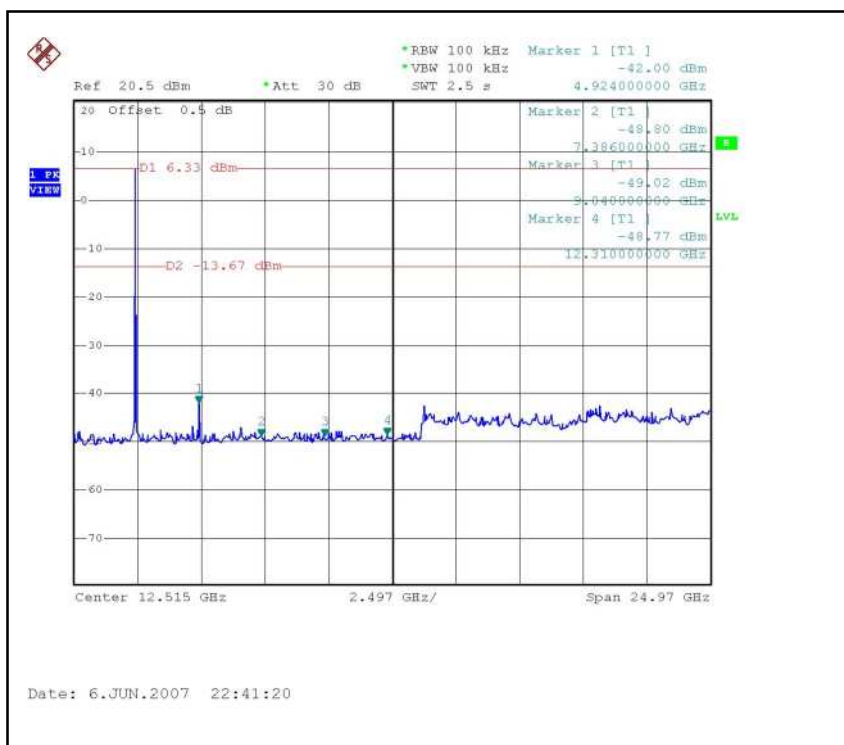


## 802.11b 10th conducted Harmonic

CH1



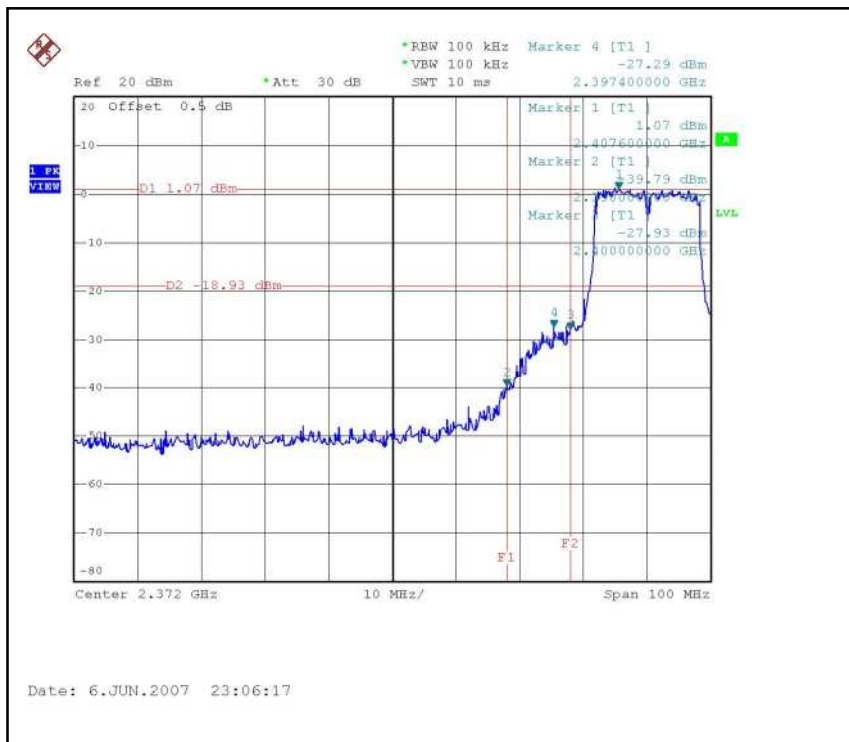
CH11



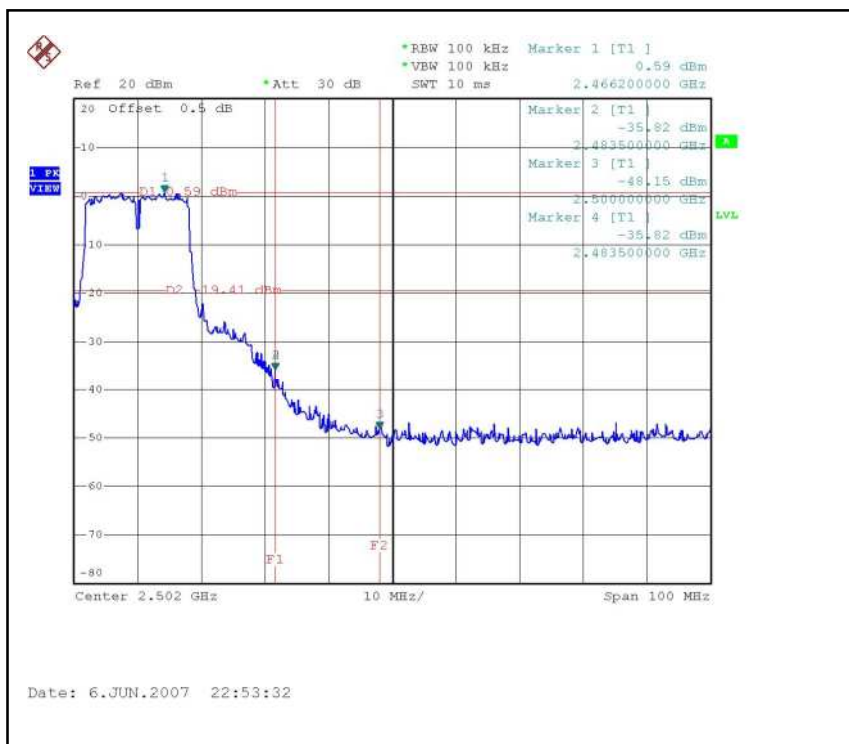


## 802.11g OFDM modulation:

CH1

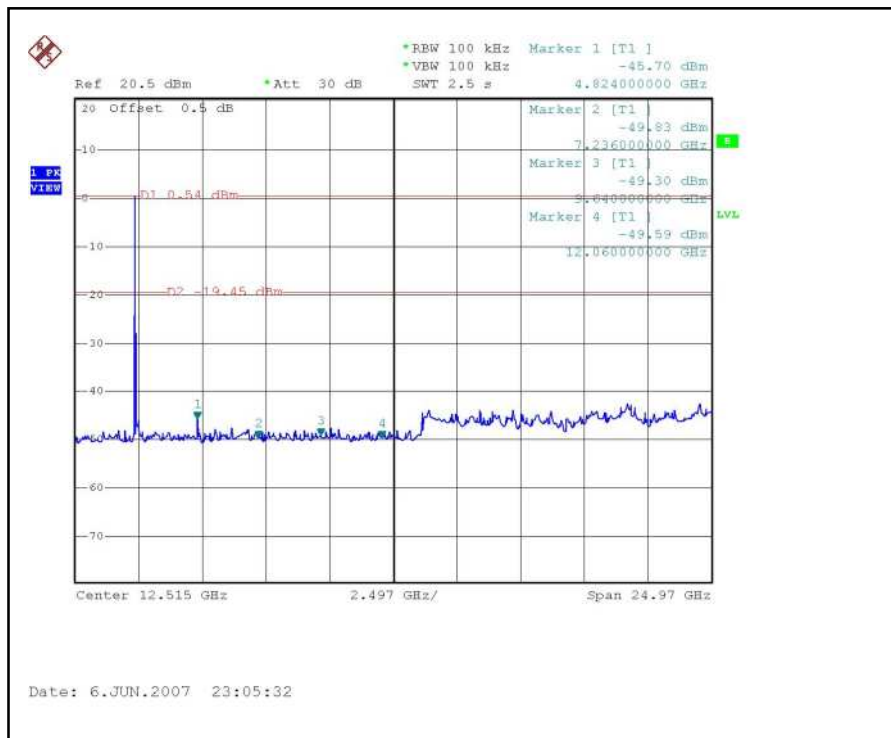


CH11

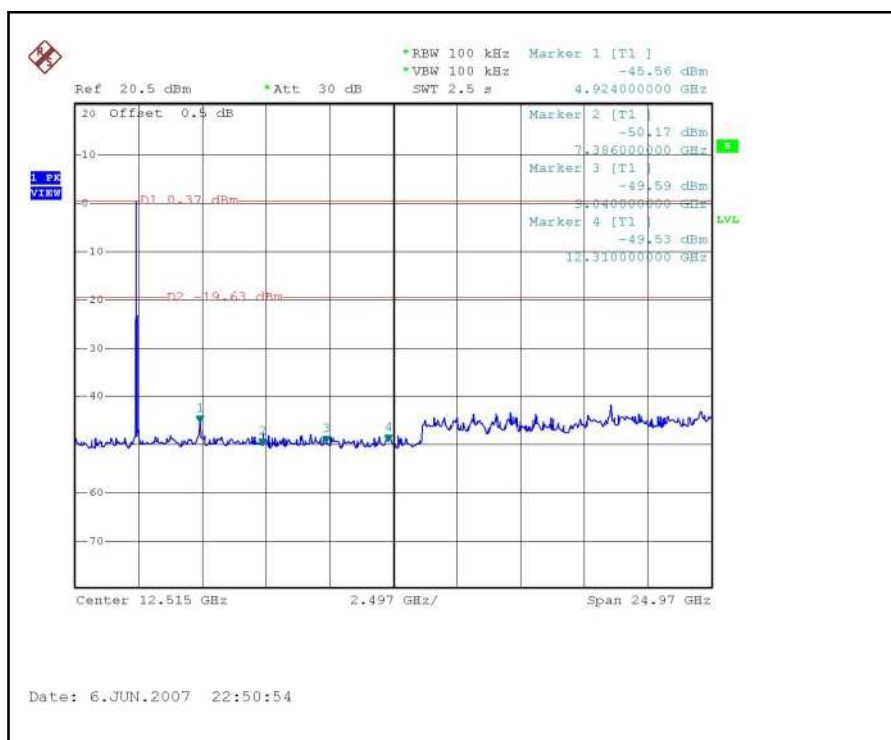


## 802.11g 10th conducted Harmonic

CH1



CH11



## **4.7 ANTENNA REQUIREMENT**

### **4.7.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **4.7.2 ANTENNA CONNECTED CONSTRUCTION**

The antenna used in this product is one Multilayer Chip Antenna without connector. The maximum Gain of the antenna is 0dBi.

## 5. TEST TYPES AND RESULTS (802.11a, 5725~5850MHz Band)

### 5.1 CONDUCTED EMISSION MEASUREMENT

#### 5.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver	ESCS 30	847124/029	Mar. 01, 2008
Line-Impedance Stabilization Network(for EUT)	ENV-216	100071	Nov. 26, 2007
Line-Impedance Stabilization Network(for Peripheral)	ESH3-Z5	848773/004	Oct. 26, 2007
RF Cable (JETBAO)	RG233/U	Cable_CB_01	Dec. 09, 2007
Terminator	50	2	Oct. 30, 2007
Software	ADT_Cond_V7.3.2	NA	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  4. The test was performed in ADT Shielded Room No. B.
  5. The VCCI Con B Registration No. is C-2193.

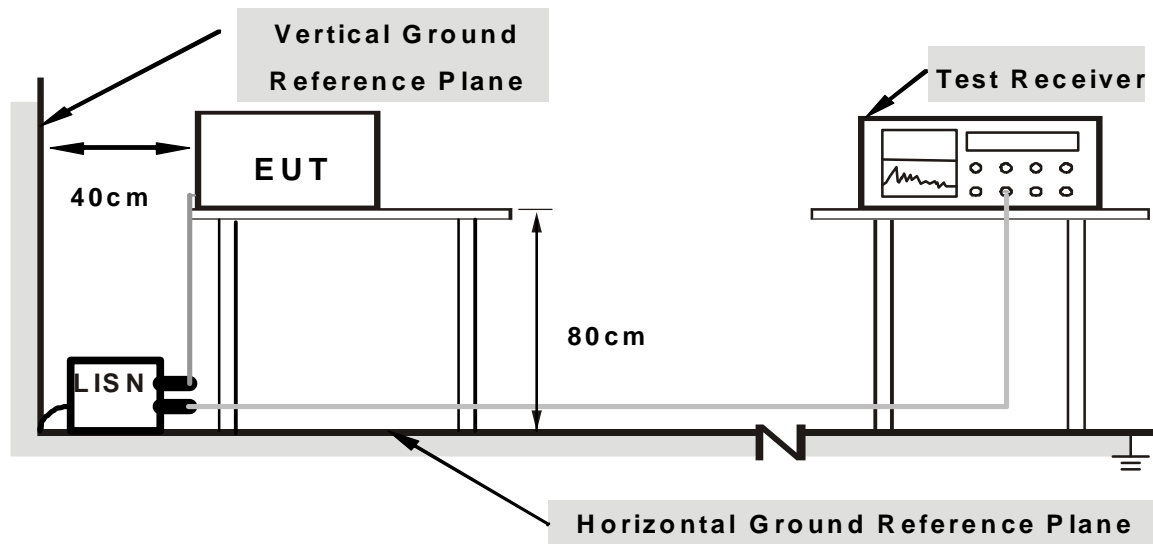
### 5.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit – 20dB) were not recorded.

### 5.1.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.1.5 TEST SETUP



**Note: 1. Support units were connected to second LISN.**

**2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

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

### 5.1.6 EUT OPERATING CONDITIONS

- a. Connect the EUT with the support unit 1 (Notebook computer) which placed on a testing table.
- b. The support unit 1 (Notebook computer) ran a test program “Ralink QA test QAU2571W” to enable EUT under transmission condition continuously.

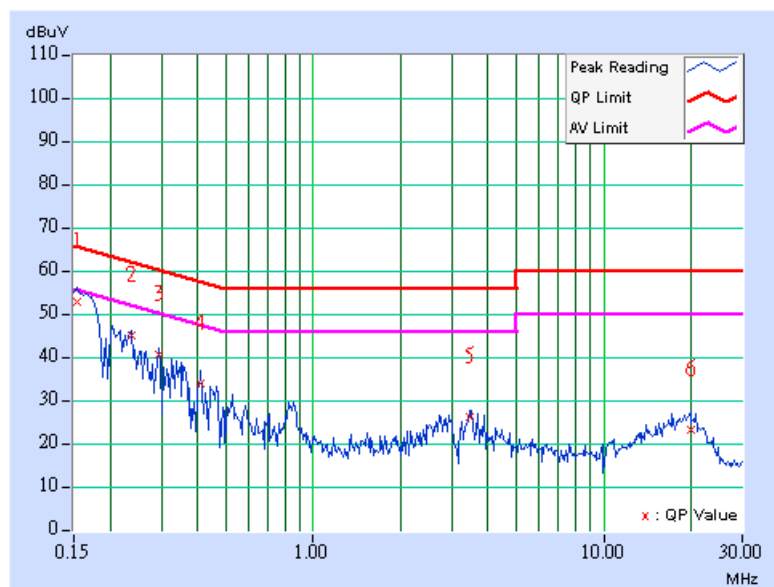
### 5.1.7 TEST RESULTS

#### Conducted Worst-Case Data

<b>MODULATION TYPE</b>	BPSK	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>TRANSFER RATE</b>	6Mbps
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 68%RH, 960hPa	<b>PHASE</b>	Line (L)
<b>TESTED BY</b>	Sky Liao		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.40	52.08	-	52.48	-	65.79	55.79	-13.31	-
2	0.236	0.40	44.08	-	44.48	-	62.24	52.24	-17.76	-
3	0.295	0.40	39.61	-	40.01	-	60.40	50.40	-20.39	-
4	0.412	0.40	32.91	-	33.31	-	57.61	47.61	-24.30	-
5	3.461	0.57	25.12	-	25.69	-	56.00	46.00	-30.31	-
6	19.887	1.00	22.49	-	23.49	-	60.00	50.00	-36.51	-

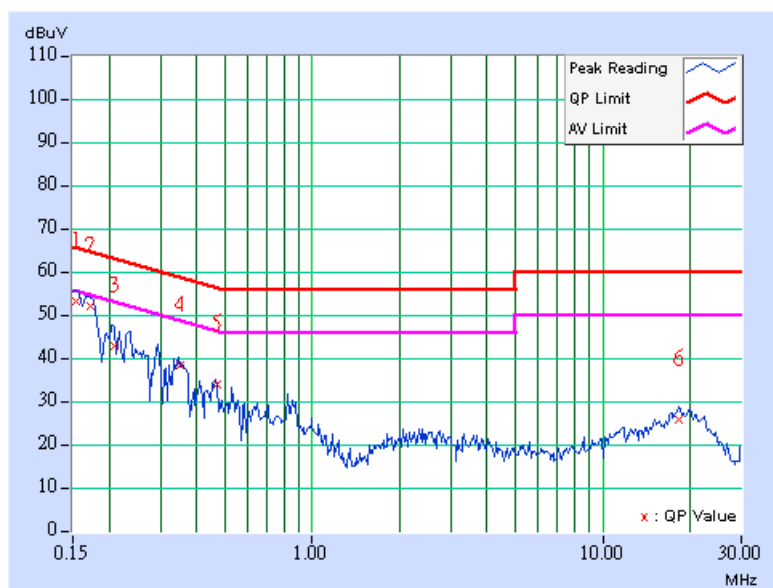
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



<b>MODULATION TYPE</b>	BPSK	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>TRANSFER RATE</b>	6Mbps
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 68%RH, 960hPa	<b>PHASE</b>	Neutral (N)
<b>TESTED BY</b>	Sky Liao		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.20	51.93	-	52.13	-	65.79	55.79	-13.66	-
2	0.173	0.20	50.96	-	51.16	-	64.83	54.83	-13.67	-
3	0.209	0.20	41.80	-	42.00	-	63.26	53.26	-21.26	-
4	0.351	0.20	37.39	-	37.59	-	58.93	48.93	-21.34	-
5	0.469	0.21	32.72	-	32.93	-	56.53	46.53	-23.59	-
6	18.184	1.26	24.64	-	25.90	-	60.00	50.00	-34.10	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.





## 5.2 RADIATED EMISSION MEASUREMENT

### 5.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

## 5.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	R3271A	85060311	July 03, 2007
HP Pre_Amplifier	8449B	3008A01922	Sep. 18, 2007
ROHDE & SCHWARZ Test Receiver	ESCS30	100375	Sep. 20, 2007
CHASE Broadband Antenna	VULB9168	138	Dec. 10, 2007
Schwarzbeck Horn_Antenna	BBHA9120	D124	Jan. 01, 2008
Schwarzbeck Horn_Antenna	BBHA9170	BBHA9170153	Jan. 04, 2008
SCHWARZBECK Biconical Antenna	VHBA9123	459	Jun. 08, 2009
SCHWARZBECK Periodic Antenna	UPA6108	1148	Jun. 08, 2009
RF Switches (ARNITSU)	CS-201	1565157	NA
RF CABLE (Chaintek)	SF102	22054-2	Nov. 14, 2007
RF Cable(RICHTEC)	9913-30M N-N Cable	STCCAB-30M-1 GHz	Jul. 15, 2007
Software	ADT_Radiated_V 7.6.15.7	NA	NA
CHANCE MOST Antenna Tower	AT-100	0203	NA
CHANCE MOST Turn Table	TT-100	0203	NA

- Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Biconical and Periodic Antenna) and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in ADT Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 4824A-3.

### 5.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters 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.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

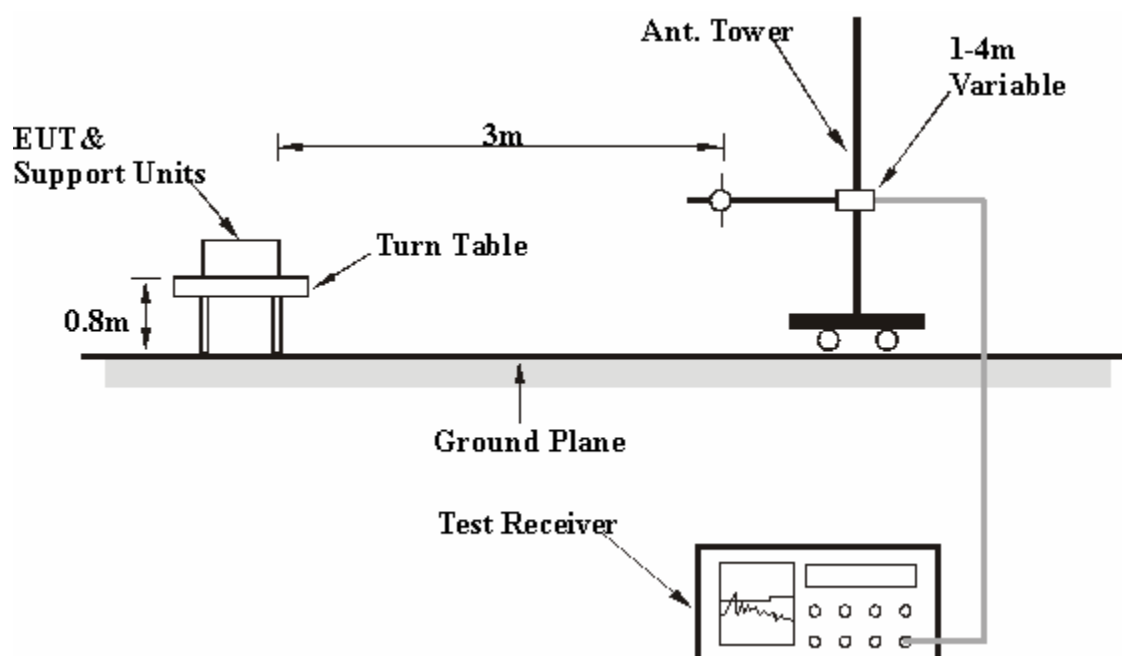
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

### 5.2.4 DEVIATION FROM TEST STANDARD

No deviation

## 5.2.5 TEST SETUP



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

## 5.2.6 EUT OPERATING CONDITIONS

Same as 5.1.6

## 5.2.7 TEST RESULTS

### Below 1GHz Worst-Case Data

<b>MODULATION TYPE</b>	BPSK	<b>FREQUENCY RANGE</b>	Below 1000MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>TRANSFER RATE</b>	6Mbps
<b>ENVIRONMENTAL CONDITIONS</b>	23deg. C, 70%RH, 960hPa	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>TESTED BY</b>	Phoenix Huang		

### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	121.00	25.77 QP	43.50	-17.73	1.04 H	135	13.87	11.90
2	168.03	29.35 QP	43.50	-14.15	1.05 H	133	15.68	13.67
3	335.50	30.87 QP	46.00	-15.13	1.00 H	325	13.65	17.22
4	600.00	39.52 QP	46.00	-6.48	1.35 H	237	15.04	24.48
5	749.97	32.44 QP	46.00	-13.56	1.33 H	271	5.09	27.35
6	840.00	39.46 QP	46.00	-6.54	1.00 H	354	11.23	28.23
7	960.00	40.33 QP	46.00	-5.67	1.00 H	337	10.44	29.89

### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.12	25.89 QP	40.00	-14.11	1.00 V	154	11.58	14.31
2	120.00	25.68 QP	43.50	-17.82	1.00 V	146	13.86	11.82
3	168.01	31.88 QP	43.50	-11.62	1.00 V	119	18.20	13.68
4	499.59	35.66 QP	46.00	-10.34	1.12 V	175	13.91	21.75
5	566.77	30.21 QP	46.00	-15.79	1.00 V	77	6.55	23.66
6	749.25	40.87 QP	46.00	-5.13	1.66 V	154	13.54	27.33
7	960.00	39.04 QP	46.00	-6.96	1.46 V	125	9.15	29.89

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value

## 802.11a OFDM modulation

<b>CHANNEL</b>	Channel 1	<b>FREQUENCY RANGE</b>	1 ~ 40 GHz
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 65%RH, 960hPa	<b>TESTED BY</b>	Phoenix Huang

### ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#4596.00	55.62 PK	74.00	-18.38	2.03 H	290	20.16	35.46
2	#4596.00	52.82 AV	54.00	-1.18	2.03 H	290	17.36	35.46
3	*5745.00	107.94 PK			1.77 H	10	70.30	37.64
4	*5745.00	98.00 AV			1.77 H	10	60.36	37.64
5	#9192.00	56.07 PK	74.00	-17.93	1.83 H	49	11.28	44.79
6	#9192.00	42.68 AV	54.00	-11.32	1.83 H	49	-2.11	44.79
7	#11490.00	58.47 PK	74.00	-15.53	1.55 H	312	11.45	47.02
8	#11490.00	45.16 AV	54.00	-8.84	1.55 H	312	-1.86	47.02

### ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#4596.00	55.59 PK	74.00	-18.41	1.38 V	348	20.13	35.46
2	#4596.00	52.35 AV	54.00	-1.65	1.38 V	348	16.89	35.46
3	*5745.00	102.89 PK			1.04 V	176	65.25	37.64
4	*5745.00	92.20 AV			1.04 V	176	54.56	37.64
5	#9192.00	55.56 PK	74.00	-18.44	1.32 V	355	10.77	44.79
6	#9192.00	43.38 AV	54.00	-10.62	1.32 V	355	-1.41	44.79
7	#11490.00	59.11 PK	74.00	-14.89	4.00 V	62	12.09	47.02
8	#11490.00	44.83 AV	54.00	-9.17	4.00 V	62	-2.19	47.02

- NOTE:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value
  5. “\*” : Fundamental frequency
  6. “#”The radiated frequency falling in the restricted band.
  7. The limit value is defined as per 15.247

<b>CHANNEL</b>	Channel 3	<b>FREQUENCY RANGE</b>	1 ~ 40 GHz
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 65%RH, 960hPa	<b>TESTED BY</b>	Phoenix Huang

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#4628.00	54.91 PK	74.00	-19.09	1.83 H	279	19.38	35.53
2	#4628.00	52.03 AV	54.00	-1.97	1.83 H	279	16.50	35.53
3	*5785.00	107.43 PK			1.77 H	14	69.69	37.74
4	*5785.00	97.15 AV			1.77 H	14	59.41	37.74
5	#9256.00	55.96 PK	74.00	-18.04	1.80 H	52	11.13	44.83
6	#9256.00	42.53 AV	54.00	-11.47	1.80 H	52	-2.30	44.83
7	#11570.00	58.56 PK	74.00	-15.44	1.53 H	322	11.61	46.95
8	#11570.00	45.23 AV	54.00	-8.77	1.53 H	322	-1.72	46.95

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#4628.00	54.48 PK	74.00	-19.52	1.21 V	345	18.95	35.53
2	#4628.00	51.21 AV	54.00	-2.79	1.21 V	345	15.68	35.53
3	*5785.00	102.82 PK			1.06 V	181	65.08	37.74
4	*5785.00	91.98 AV			1.06 V	181	54.24	37.74
5	#9256.00	55.43 PK	74.00	-18.57	1.36 V	327	10.60	44.83
6	#9256.00	43.25 AV	54.00	-10.75	1.36 V	327	-1.58	44.83
7	#11570.00	59.12 PK	74.00	-14.88	1.48 V	51	12.17	46.95
8	#11570.00	44.80 AV	54.00	-9.20	1.48 V	51	-2.15	46.95

- NOTE:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value
  5. “\*” : Fundamental frequency
  6. “#”The radiated frequency falling in the restricted band.
  7. The limit value is defined as per 15.247

<b>CHANNEL</b>	Channel 5	<b>FREQUENCY RANGE</b>	1 ~ 40 GHz
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	20deg. C, 65%RH, 960hPa	<b>TESTED BY</b>	Phoenix Huang

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#4660.00	55.79 PK	74.00	-18.21	1.62 H	278	20.18	35.61
2	#4660.00	53.78 AV	54.00	-0.22	1.62 H	278	18.17	35.61
3	*5825.00	106.22 PK			1.77 H	12	68.38	37.84
4	*5825.00	95.54 AV			1.77 H	12	57.70	37.84
5	#9320.00	56.13 PK	74.00	-17.87	1.75 H	66	11.25	44.88
6	#9320.00	42.69 AV	54.00	-11.31	1.75 H	66	-2.19	44.88
7	#11650.00	59.07 PK	74.00	-14.93	1.52 H	319	12.20	46.87
8	#11650.00	45.64 AV	54.00	-8.36	1.52 H	319	-1.23	46.87

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#4660.00	55.30 PK	74.00	-18.70	1.19 V	345	19.69	35.61
2	#4660.00	53.60 AV	54.00	-0.40	1.19 V	345	17.99	35.61
3	*5825.00	103.83 PK			1.05 V	181	65.99	37.84
4	*5825.00	92.83 AV			1.05 V	181	54.99	37.84
5	#9320.00	55.61 PK	74.00	-18.39	1.33 V	328	10.73	44.88
6	#9320.00	43.47 AV	54.00	-10.53	1.33 V	328	-1.41	44.88
7	#11650.00	59.26 PK	74.00	-14.74	1.51 V	57	12.39	46.87
8	#11650.00	44.92 AV	54.00	-9.08	1.51 V	57	-1.95	46.87

- NOTE:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value
  5. “\*” : Fundamental frequency
  6. “#”The radiated frequency falling in the restricted band.
  7. The limit value is defined as per 15.247



### 5.3 6dB BANDWIDTH MEASUREMENT

#### 5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 5.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

**NOTE:**

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

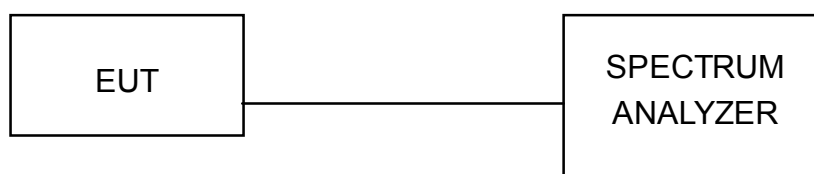
### 5.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

### 5.3.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.3.5 TEST SETUP



### 5.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

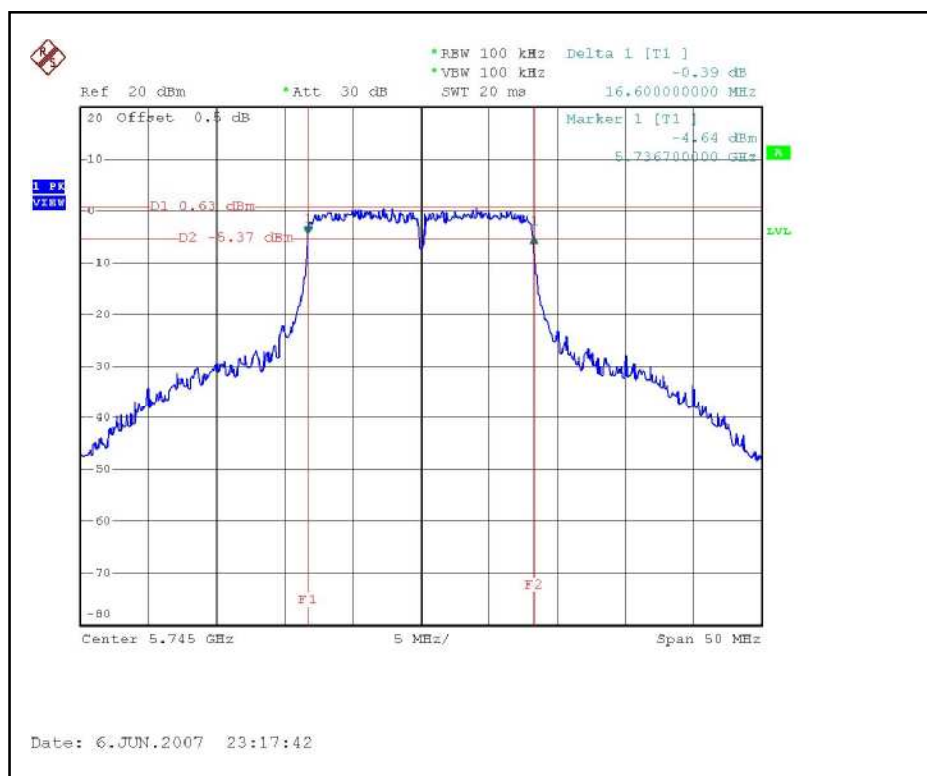
### 5.3.7 TEST RESULTS

#### 802.11a OFDM modulation

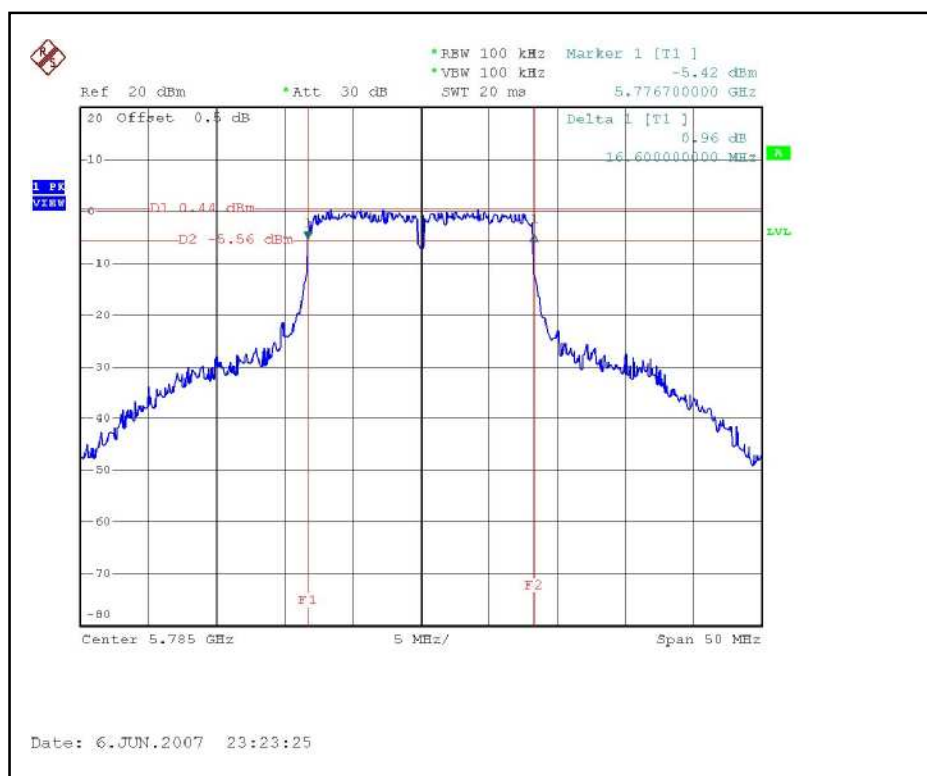
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	19deg. C, 60%RH, 960hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	5745	16.6	0.5	PASS
3	5785	16.6	0.5	PASS
5	5825	16.6	0.5	PASS

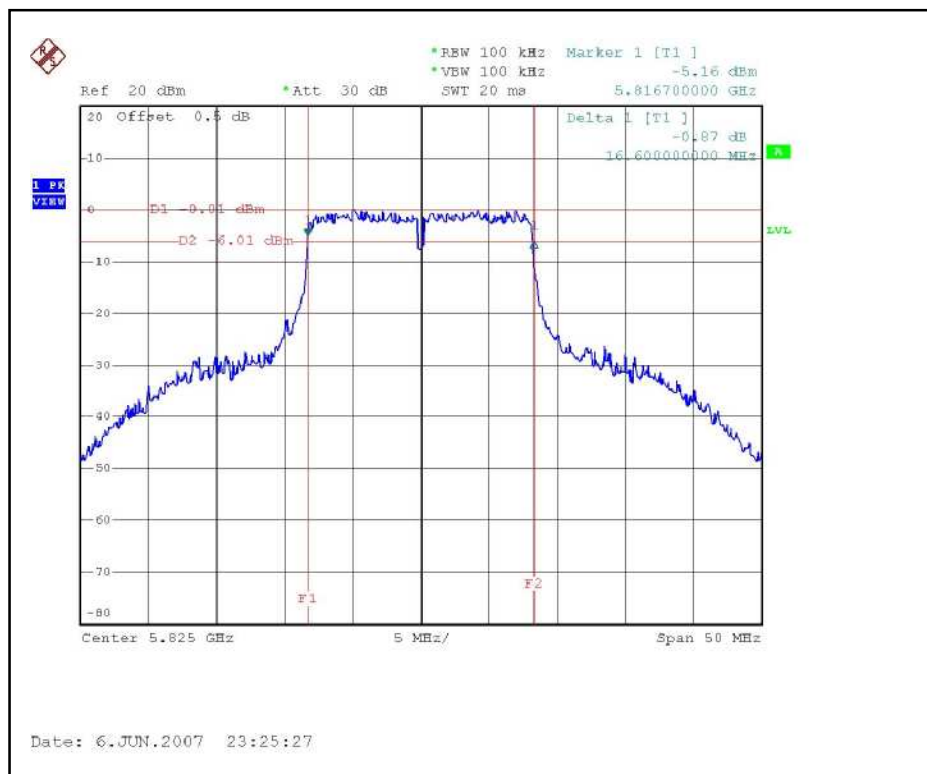
## CH1



## CH3



CH5



## 5.4 MAXIMUM PEAK OUTPUT POWER

### 5.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

### 5.4.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007
Agilent SIGNAL GENERATOR	E8257C	MY43320668	Dec. 07, 2007
TEKTRONIX OSCILLOSCOPE	TDS380	B016335	Jul. 04, 2007
NARDA DETECTOR	4503A	FSCM99899	NA

**NOTE:**

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 5.4.3 TEST PROCEDURES

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.
2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

### 5.4.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.4.5 TEST SETUP



### 5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

## 5.4.7 TEST RESULTS

### 802.11a OFDM modulation

<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	19deg. C, 60%RH, 960hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	5745	26.915	14.30	30	PASS
3	5785	26.607	14.25	30	PASS
5	5825	26.792	14.28	30	PASS



## 5.5 POWER SPECTRAL DENSITY MEASUREMENT

### 5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 5.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

**NOTE:**

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 5.5.3 TEST PROCEDURE

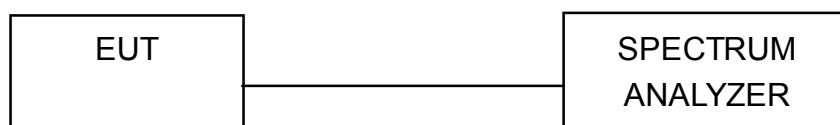
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time = span/3 kHz. The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3 kHz for a full response of the mixer in the spectrum analyzer.

### 5.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.5.5 TEST SETUP



### 5.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

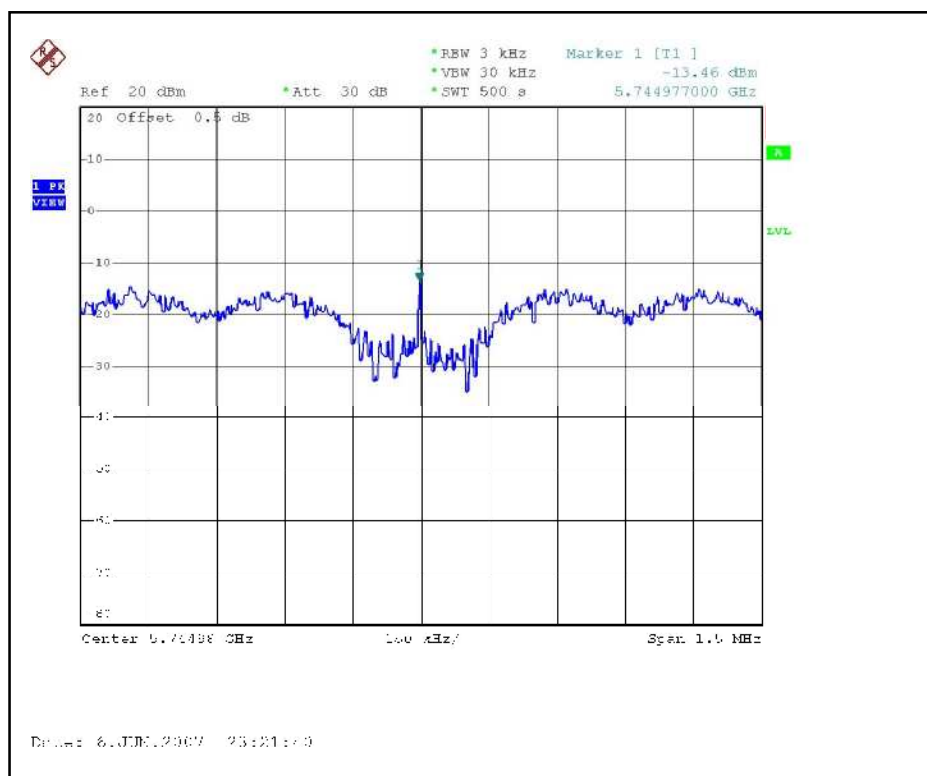
## 5.5.7 TEST RESULTS

### 802.11a OFDM modulation

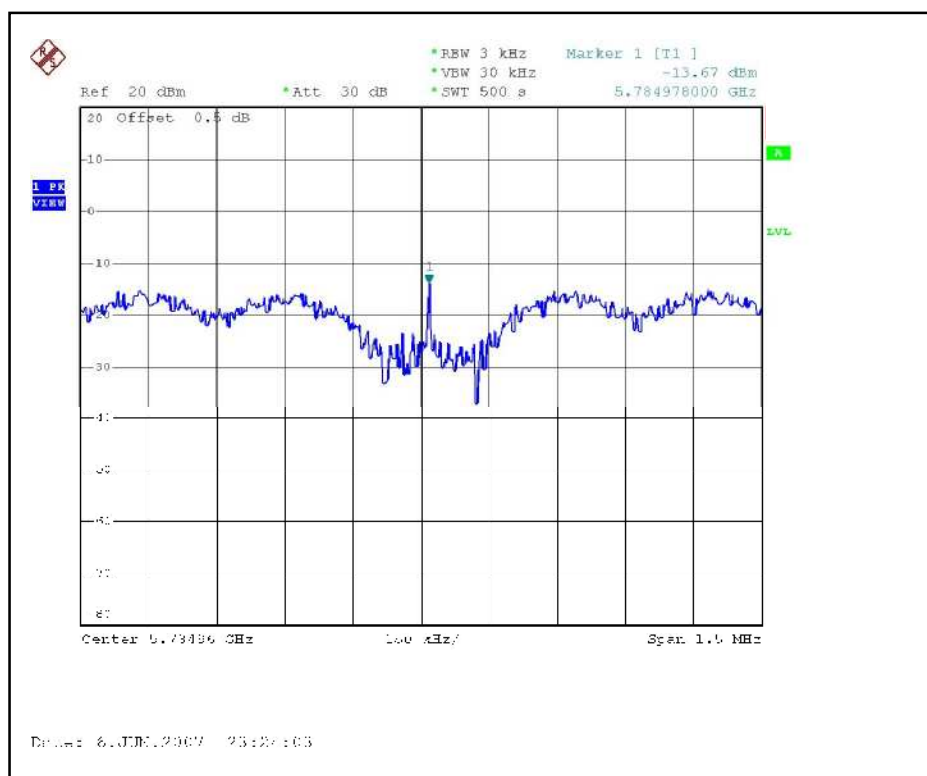
<b>MODULATION TYPE</b>	BPSK	<b>TRANSFER RATE</b>	6Mbps
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	19deg. C, 60%RH, 960hPa
<b>TESTED BY</b>	Wen Yu		

CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	5745	-13.46	8	PASS
3	5785	-13.67	8	PASS
5	5825	-14.01	8	PASS

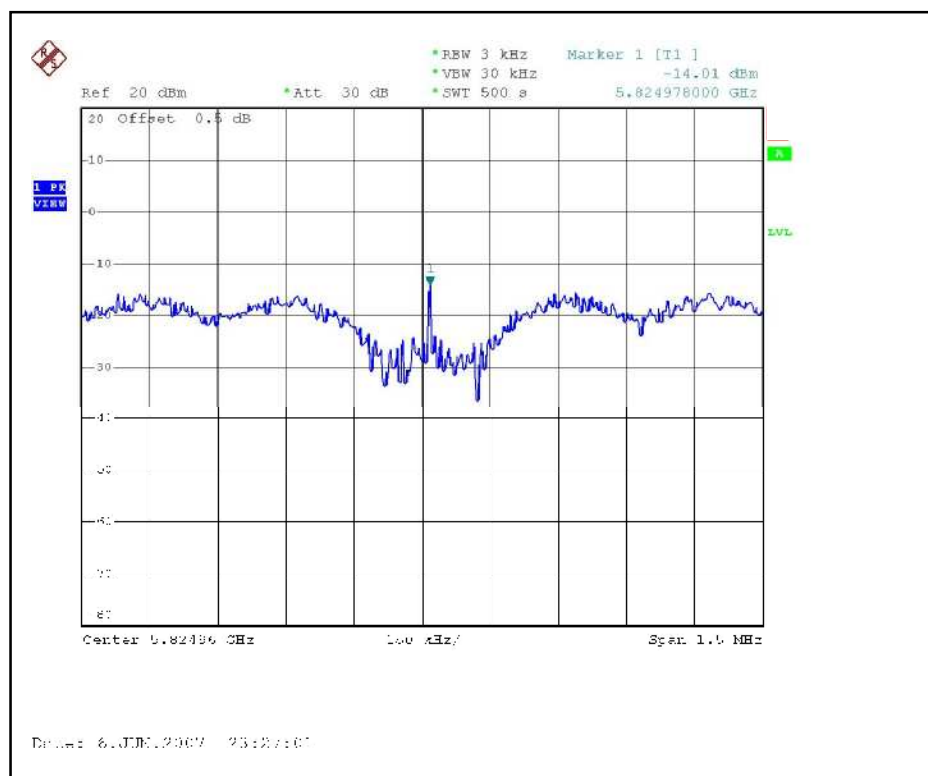
## CH1



## CH3



CH5



## 5.6 BAND EDGES MEASUREMENT

### 5.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 5.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

**NOTE:**

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 5.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

### 5.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

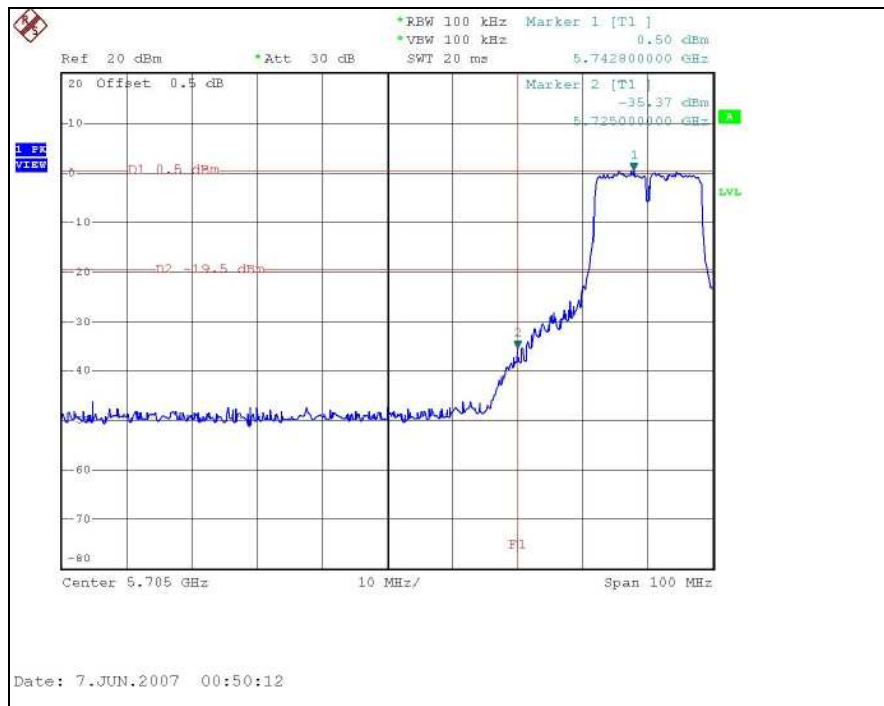
#### 5.6.6 TEST RESULTS

The spectrum plots are attached on the following pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(d).

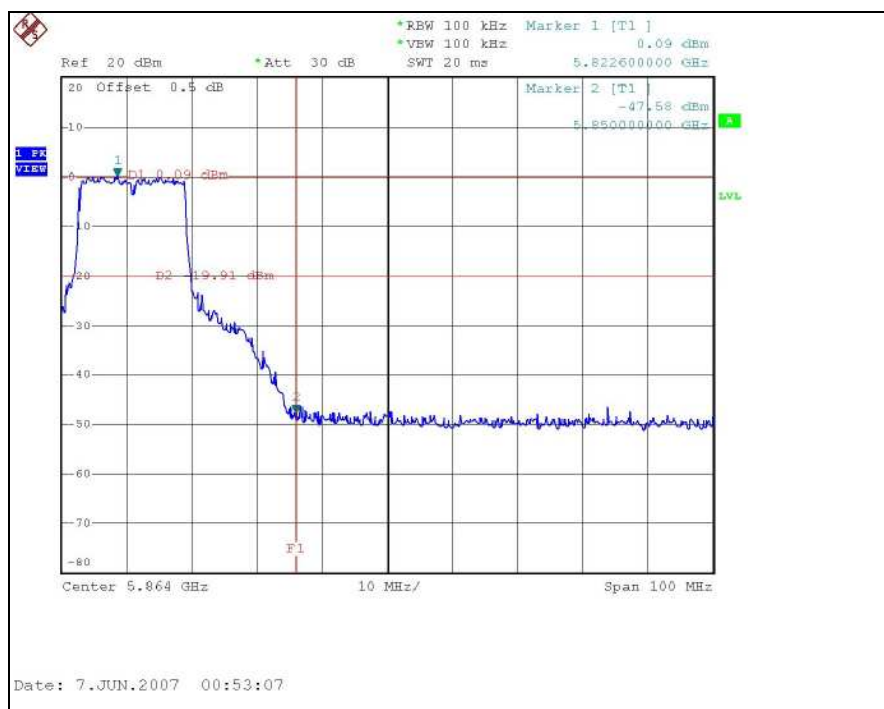


## 802.11a OFDM modulation

### CH1

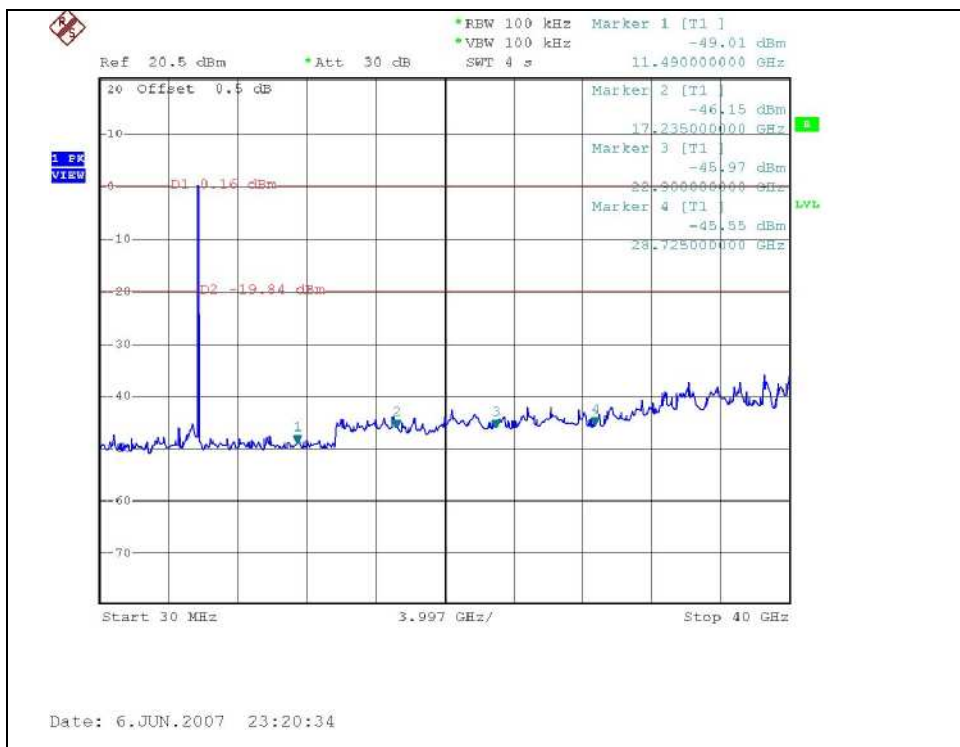


### CH5

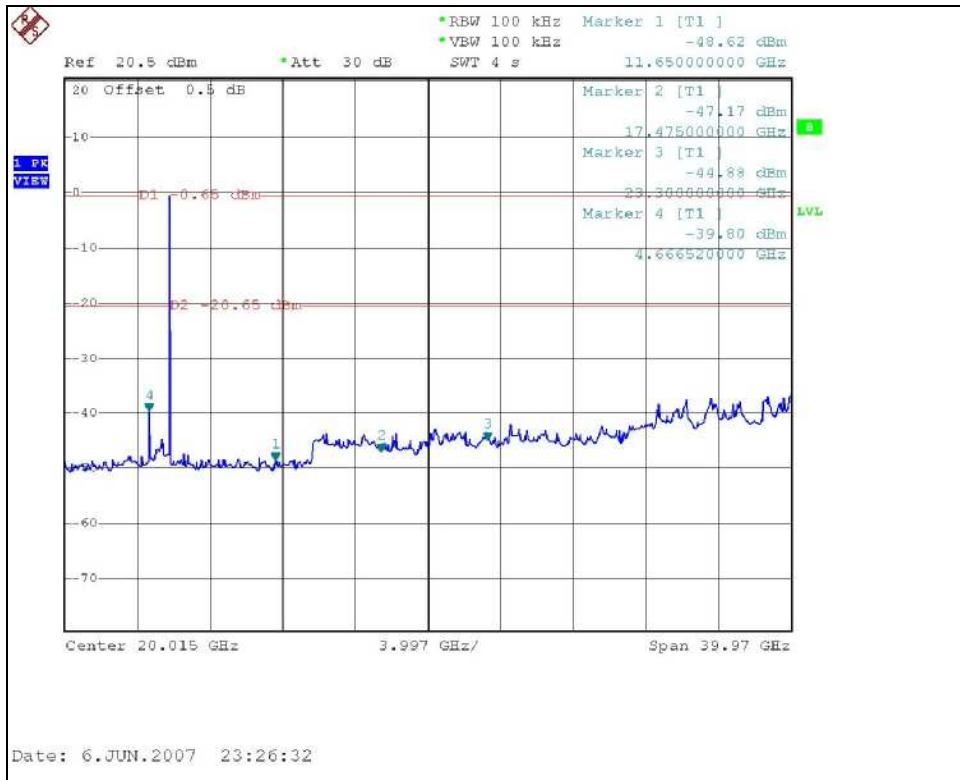


## 802.11a 10th conducted Harmonic

CH1



CH5



## **5.7 ANTENNA REQUIREMENT**

### **5.7.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247(a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **5.7.2 ANTENNA CONNECTED CONSTRUCTION**

The antenna used in this product is one Multilayer Chip Antenna without connector. The maximum Gain of the antenna is 2dBi.

## 6. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

<b>USA</b>	FCC, UL, A2LA
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>Norway</b>	NEMKO
<b>Canada</b>	INDUSTRY CANADA , CSA
<b>R.O.C.</b>	CNLA, BSMI, NCC
<b>Netherlands</b>	Telefication
<b>Singapore</b>	PSB , GOST-ASIA(MOU)
<b>Russia</b>	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

[www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml). If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26052943

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety Telecom Lab:**

Tel: 886-3-3183232

Fax: 886-3-3185050

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also

## **APPENDIX-A**

### **MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.