



# FCC TEST REPORT (15.247)

**REPORT NO.:** RF960123A03

**MODEL NO.:** SG22 series

(Refer to item 3.1 for the more details)

**RECEIVED:** Jan. 24, 2007

**TESTED:** Feb. 07 ~ Feb. 09, 2007

**ISSUED:** Apr. 04, 2007

**APPLICANT:** TWINHEAD INTERNATIONAL CORP.

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No. 2177-01





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## 1. CERTIFICATION

**PRODUCT:** 12.1" Tablet PC

**MODEL:** SG22 series (Refer to item 3.1 for the more details)

**BRAND:** Sahara (Refer to item 3.1 for the more details)

**APPLICANT:** TWINHEAD INTERNATIONAL CORP.

**TEST SAMPLE:** ENGINEERING SAMPLE

**TESTED:** Feb. 07 ~ Feb. 09, 2007

**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)

ANSI C63.4-2003

The above equipment (Model: SG22 series) 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** : Peggy Chen, **DATE:** Apr. 04, 2007  
Peggy Chen

**TECHNICAL  
ACCEPTANCE** : Long Chen, **DATE:** Apr. 04, 2007  
Responsible for RF  
Long Chen

**APPROVED BY** : Gary Chang, **DATE:** Apr. 04, 2007  
Gary Chang / Supervisor



## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

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 -17.59dB at 0.203MHz
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 -1.50dB 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.

### 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:

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.62 dB
	200MHz ~1000MHz	3.64 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	12.1" Tablet PC
<b>MODEL NO.</b>	SG22 series (Refer to Note for the more details)
<b>FCC ID</b>	FKGTKI400ABGSG22
<b>POWER SUPPLY</b>	20Vdc from AC Adapter
<b>MODULATION TYPE</b>	Wireless LAN: CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM Bluetooth: GFSK,π/4-DQPSK, 8DPSK for FHSS
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM, FHSS
<b>TRANSFER RATE</b>	Wireless LAN: 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 Bluetooth: 1/2/3Mbps
<b>FREQUENCY RANGE</b>	Wireless LAN: 802.11b & 802.11g: 2.412 ~ 2.462GHz 802.11a: 5.150 ~ 5.350GHz , 5.745 ~ 5.825GHz Bluetooth: 2.402 ~ 2.480GHz
<b>NUMBER OF CHANNEL</b>	Wireless LAN: 802.11b & 802.11g: 11 802.11a: 13 Bluetooth: 79
<b>CHANNEL SPACING</b>	Wireless LAN: 802.11b & 802.11g: 5MHz 802.11a: 20MHz Bluetooth: 1MHz
<b>OUTPUT POWER</b>	Wireless LAN: 100.231mW for 802.11b 63.826mW for 802.11g 40.738mW for 5.180 ~ 5.350GHz 50.816mW for 5.745 ~ 5.825GHz Bluetooth: 1.570mW
<b>ANTENNA TYPE</b>	Wireless LAN: PIFA antenna with 0.62dBi gain for 802.11b/g PIFA antenna with 1.83dBi gain for 802.11a (5.15-5.35GHz) PIFA antenna with 2.63dBi gain for 802.11a (5.785-5.85GHz) Bluetooth: PIFA antenna with -1.36dBi gain
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	Refer to user's manual
<b>ASSOCIATED DEVICES</b>	Adapter

**NOTE:**

1. The models as below are identical to each other except for their model designation and brand name due to marketing requirement.

Brand	Model No.
Sahara	SG22 series
Paceblade	SlimBook 200 series
Slate DT	SDT001 series

2. This report covers 802.11b/g and 802.11a (frequency: 5745 ~ 5825MHz band) only.

3. The EUT is a Tablet PC with wireless LAN and bluetooth functions.

4. The EUT was operated with following adapter:

<b>BRAND:</b>	LISHIN
<b>MODEL:</b>	0335A2065
<b>INPUT:</b>	100-240Vac, 50-60Hz, 1.7A
<b>OUTPUT:</b>	20Vdc, 3.25A, 65W
<b>POWER LINE:</b>	AC 1.80m non-shielded cable without core DC 1.80m non-shielded cable with one core

5. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a and 802.11b, 802.11g technology.
6. 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:

11 channels are provided to the EUT for wireless LAN function:

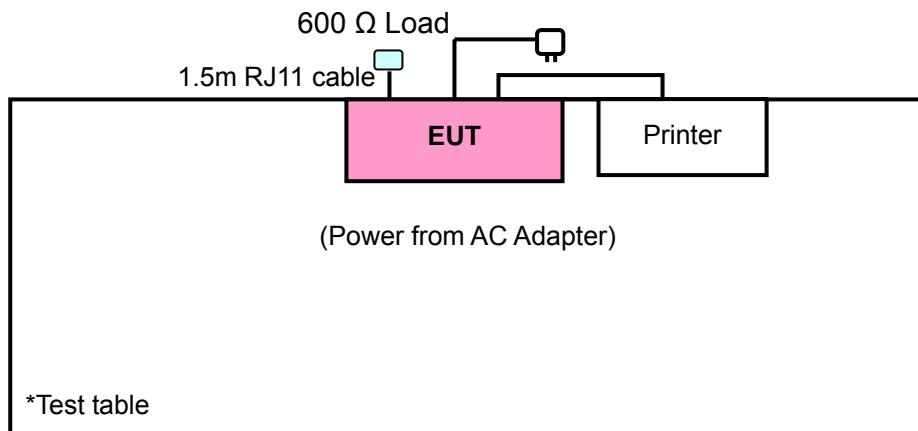
CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

#### Operated in 5745 ~ 5825MHz band:

5 channels are provided to this EUT for wireless LAN function:

CHANNEL	FREQUENCY
1	5745 MHz
2	5765 MHz
3	5785 MHz
4	5805 MHz
5	5825 MHz

### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT configure mode	Applicable to				Description
	PLC	RE<1G	RE≥1G	APCM	
-	√	√	√	√	-

Where PLC: Power Line Conducted Emission

RE<1G: Radiated Emission below 1GHz

RE≥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)
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11a	1 to 5	5	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), and X, Y, Z axis.
- 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)	AXIS
802.11g	1 to 11	11	OFDM	BPSK	6	Z
802.11a	1 to 5	5	OFDM	BPSK	6	Z

#### **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), and X, Y, Z axis.
- 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)	AXIS
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1	Z
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6	Z
802.11a	1 to 5	1, 3, 5	OFDM	BPSK	6	Z



**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	DBPSK	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	DBPSK	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 a RF Product. 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	PRINTER	HP	hp-1015	Q2462A -CNFG149502	FCC DoC Approved
2	600Ω Load	NA	NA	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.8 m shielded cable without core
2	1.5 m RJ11 non-shielded cable

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



## 4. TEST TYPES AND RESULTS (FOR 802.11b & g 2412~2462MHz BAND)

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	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 ROHDE & SCHWARZ	ESCS30	100288	Sep. 25, 2007
RF signal cable Woken	5D-FB	Cable-HYCO3-01	Jan. 06, 2008
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Jan. 08, 2008
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Jan. 16, 2008
Software ADT	ADT_Cond_V3	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 HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.



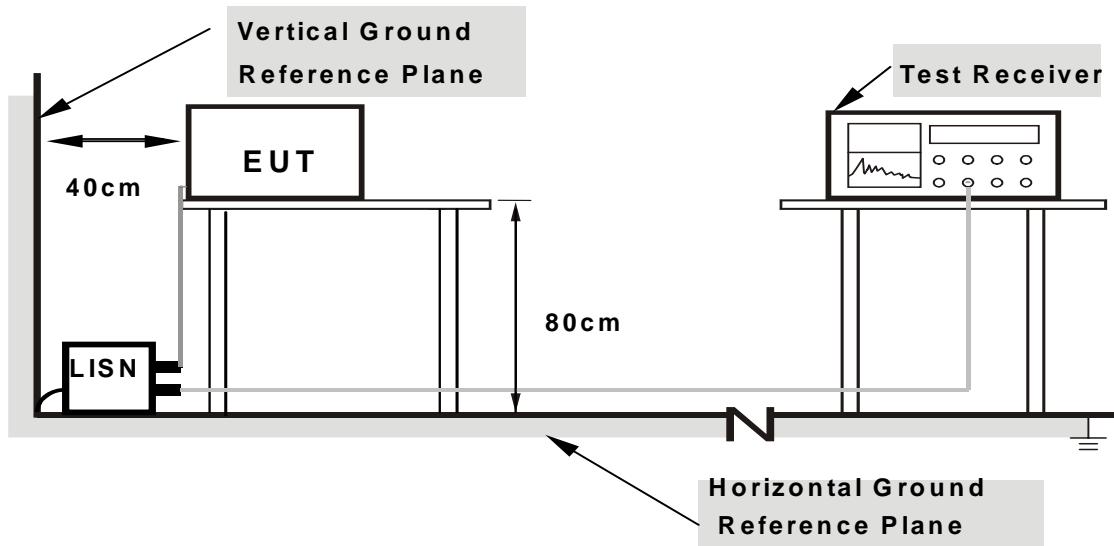
#### 4.1.3 TEST PROCEDURES

- 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) was 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 cm from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT OPERATING CONDITIONS

- a. Placed the EUT on a testing table.
- b. The EUT ran a test program (provided by manufacturer) to enable all functions under transmission condition continuously at specific channel frequency.
- c. The necessary accessories enable the EUT in full functions.

#### 4.1.7 TEST RESULTS

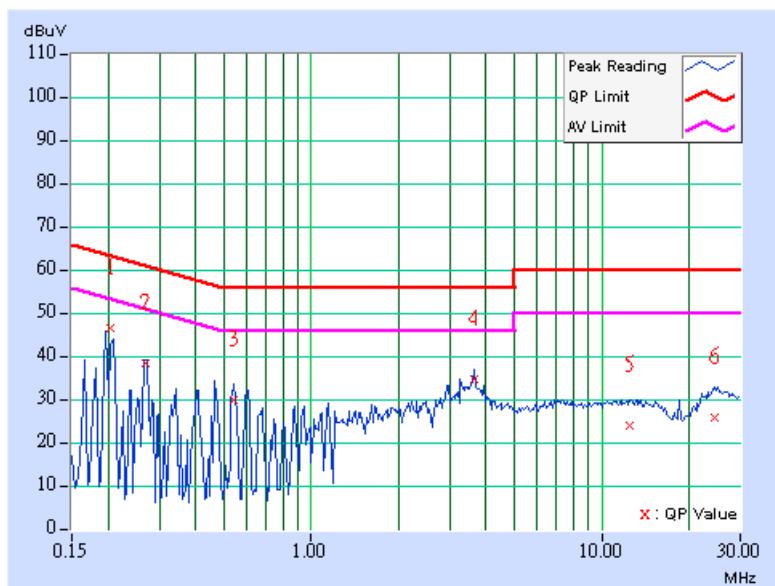
##### Conducted Worst-Case Data

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	PHASE	Line 1
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Dean Wang

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.203	0.10	45.81	-	45.91	-	63.50	53.50	-17.59	-
2	0.269	0.10	37.82	-	37.92	-	61.14	51.14	-23.22	-
3	0.539	0.10	29.13	-	29.23	-	56.00	46.00	-26.77	-
4	3.641	0.27	34.18	-	34.45	-	56.00	46.00	-21.55	-
5	12.563	0.41	23.24	-	23.65	-	60.00	50.00	-36.35	-
6	24.441	0.79	25.16	-	25.95	-	60.00	50.00	-34.05	-

**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.

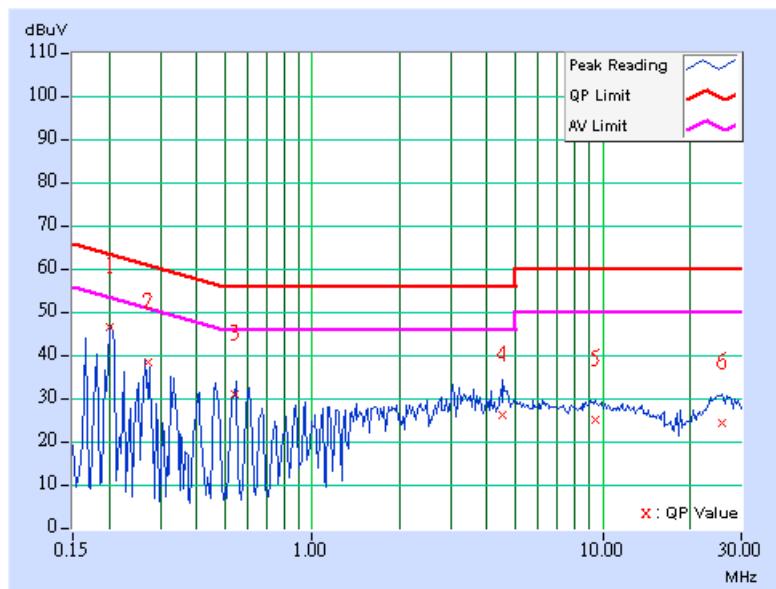


EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	PHASE	Line 2
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Dean Wang

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
			Factor [MHz]	[dB (uV)]	Factor [MHz]	[dB (uV)]	Factor [MHz]	[dB (uV)]	Factor [MHz]	[dB (uV)]
1	0.201	0.10	45.81	-	45.91	-	63.57	53.57	-17.66	-
2	0.271	0.10	37.92	-	38.02	-	61.09	51.09	-23.07	-
3	0.543	0.13	30.34	-	30.47	-	56.00	46.00	-25.53	-
4	4.531	0.29	25.63	-	25.92	-	56.00	46.00	-30.08	-
5	9.398	0.41	24.48	-	24.89	-	60.00	50.00	-35.11	-
6	25.789	0.75	23.87	-	24.62	-	60.00	50.00	-35.38	-

**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.

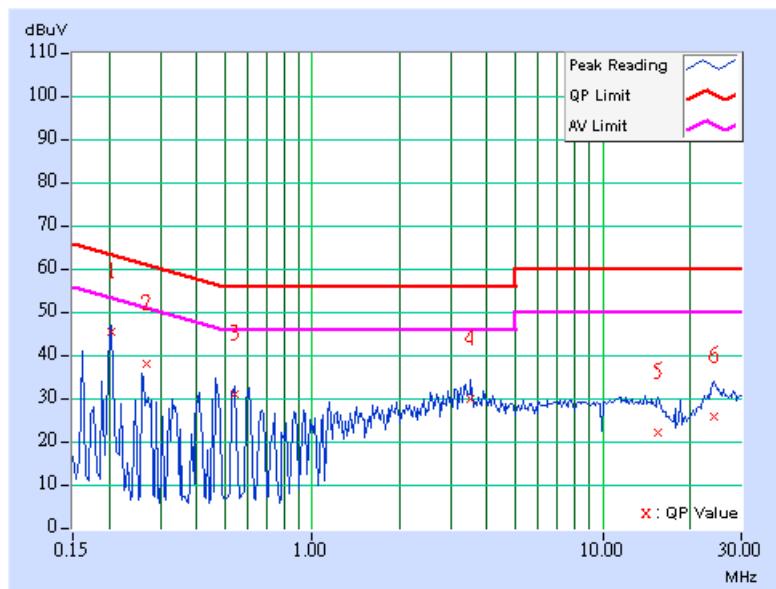


EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	PHASE	Line 1
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Dean Wang

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
			Factor [MHz]	Factor (dB)	[dB (uV)] Q.P.	[dB (uV)] AV.	[dB (uV)] Q.P.	[dB (uV)] AV.	(dB) Q.P.	(dB) AV.
1	0.205	0.10	44.67	-	44.77	-	63.42	53.42	-18.65	-
2	0.269	0.10	37.44	-	37.54	-	61.15	51.15	-23.61	-
3	0.542	0.10	30.38	-	30.48	-	56.00	46.00	-25.52	-
4	3.516	0.27	29.11	-	29.38	-	56.00	46.00	-26.62	-
5	15.527	0.49	21.29	-	21.78	-	60.00	50.00	-38.22	-
6	24.020	0.77	25.11	-	25.88	-	60.00	50.00	-34.12	-

**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.

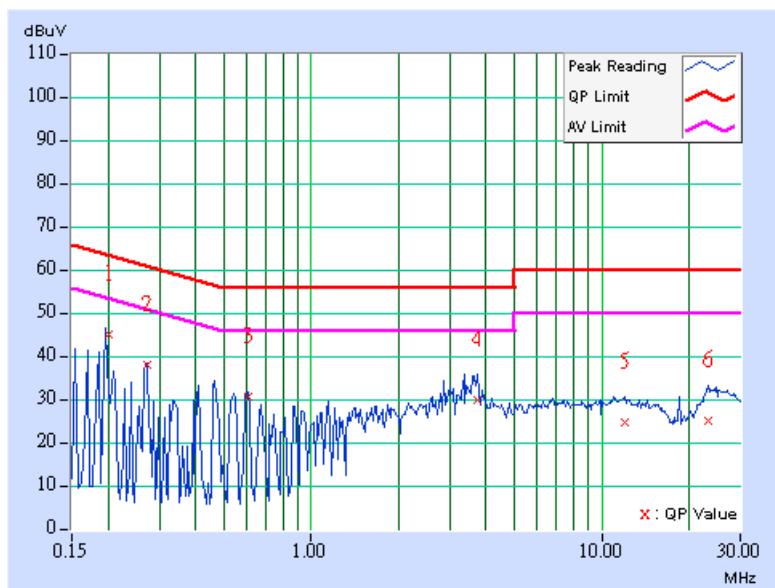


EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	PHASE	Line 2
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Dean Wang

No	Freq. [MHz]	Corr. (dB)	Reading Value		Emission Level		Limit		Margin	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.200	0.10	44.67	-	44.77	-	63.61	53.61	-18.84	-
2	0.271	0.10	37.30	-	37.40	-	61.08	51.08	-23.68	-
3	0.607	0.14	29.97	-	30.11	-	56.00	46.00	-25.89	-
4	3.711	0.27	29.51	-	29.78	-	56.00	46.00	-26.22	-
5	12.000	0.45	24.29	-	24.74	-	60.00	50.00	-35.26	-
6	23.313	0.67	24.56	-	25.23	-	60.00	50.00	-34.77	-

**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.

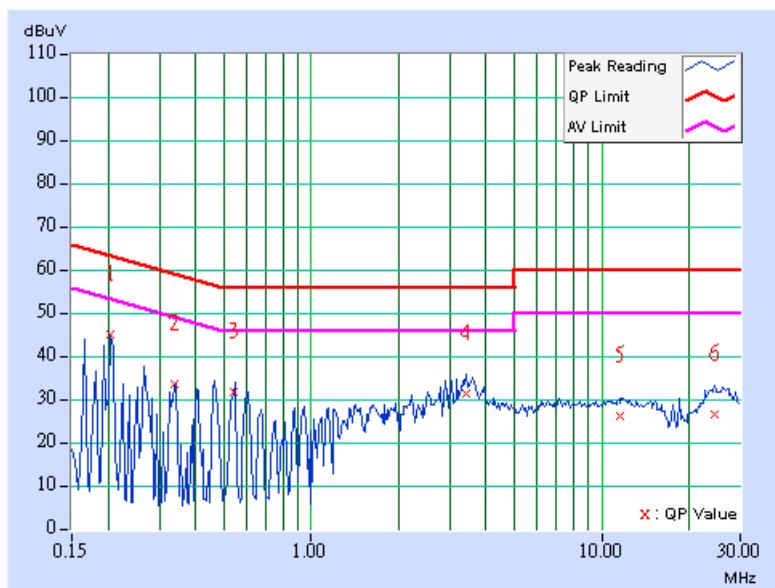


EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	PHASE	Line 1
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Dean Wang

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
			Factor	[dB (uV)]	[dB (uV)]	[dB (uV)]	Q.P.	AV.	Q.P.	AV.
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.205	0.10	44.47	-	44.57	-	63.42	53.42	-18.85	-
2	0.338	0.10	32.75	-	32.85	-	59.26	49.26	-26.41	-
3	0.543	0.10	31.10	-	31.20	-	56.00	46.00	-24.80	-
4	3.436	0.26	30.85	-	31.11	-	56.00	46.00	-24.89	-
5	11.508	0.38	25.59	-	25.97	-	60.00	50.00	-34.03	-
6	24.422	0.79	25.97	-	26.76	-	60.00	50.00	-33.24	-

**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.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	PHASE	Line 2
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Dean Wang

No	Freq. [MHz]	Corr. (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]
1	0.201	0.10	45.11	-	45.21	-	63.57	53.57	-18.36	-
2	0.267	0.10	36.23	-	36.33	-	61.20	51.20	-24.87	-
3	0.545	0.13	31.85	-	31.98	-	56.00	46.00	-24.02	-
4	4.352	0.29	22.78	-	23.07	-	56.00	46.00	-32.93	-
5	10.449	0.43	22.15	-	22.58	-	60.00	50.00	-37.42	-
6	24.969	0.72	24.50	-	25.22	-	60.00	50.00	-34.78	-

**REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

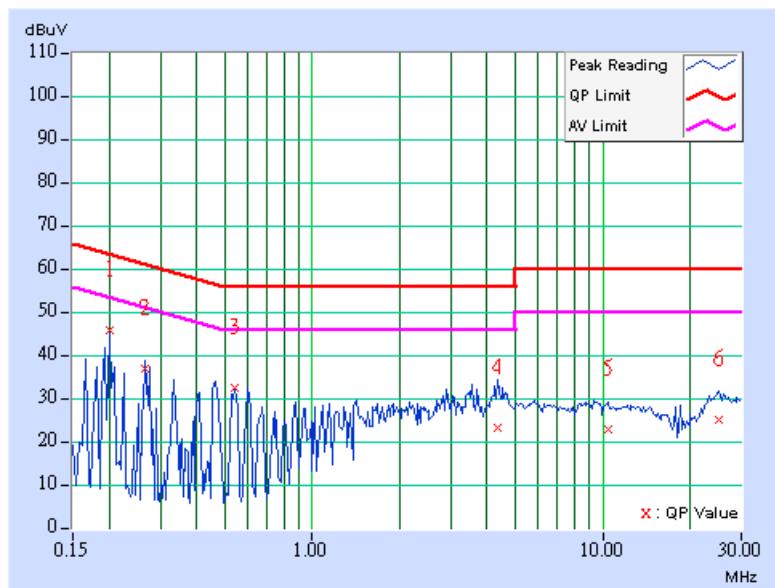
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

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
Test Receiver ROHDE & SCHWARZ	ESIB7	100188	Dec. 17, 2007
Spectrum Analyzer ROHDE & SCHWARZ	FSEK 30	100049	Aug. 21, 2007
BILOG Antenna SCHWARZBECK	VULB9168	9168-157	Jan. 04, 2008
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-408	Jan. 18, 2008
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170147	Jan. 16, 2008
Preamplifier Agilent	8449B	3008A01961	Oct. 15, 2007
Preamplifier Agilent	8447D	2944A10629	Oct. 16, 2007
RF signal cable HUBER+SUHNER	SUCOFLEX 106	25648/6	Dec. 19, 2007
RF signal cable HUBER+SUHNER	SUCOFLEX 104	251643/4	Dec. 11, 2007
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower ADT.	AT100	AT93021702	NA
Turn Table ADT.	TT100.	TT93021702	NA
Controller ADT.	SC100.	SC93021702	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 HwaYa Chamber 2.  
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.  
4. The IC Site Registration No. is IC3789B-2.



#### 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 meters 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 lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

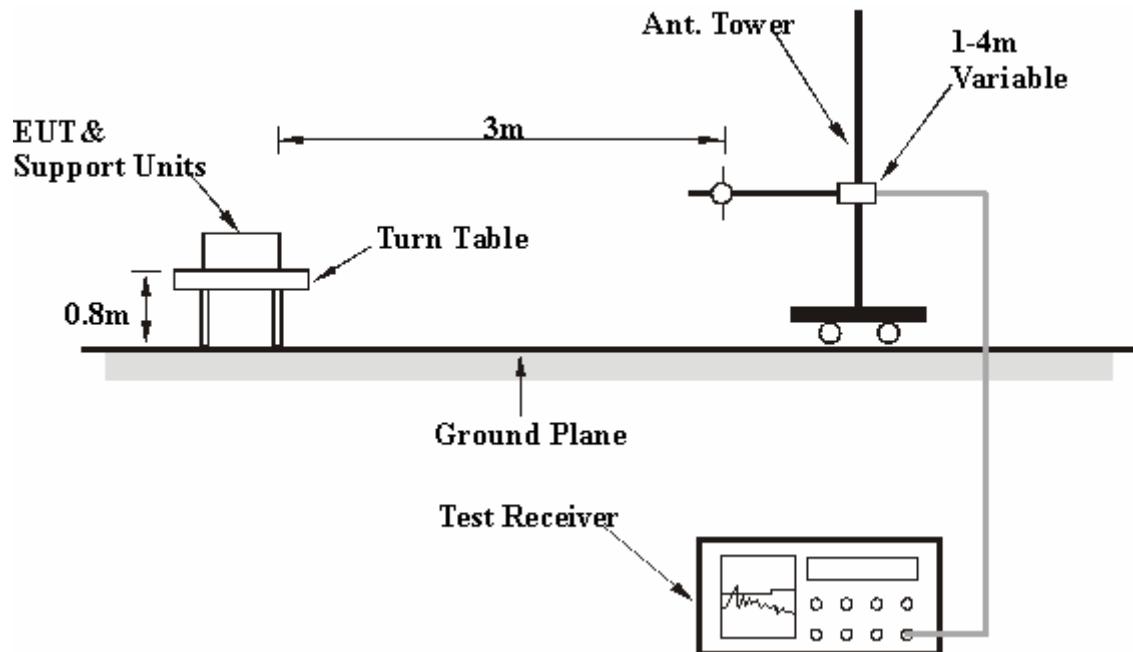
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10Hz 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 attached file (Test Setup Photo).

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6



#### 4.2.7 TEST RESULTS

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Quasi-Peak
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Match Tsui

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	96.01	35.96 QP	43.50	-7.54	2.00 H	23	26.15	9.81
2	193.22	30.50 QP	43.50	-13.00	1.50 H	11	19.13	11.37
3	202.94	33.72 QP	43.50	-9.78	2.00 H	11	22.64	11.08
4	288.49	32.20 QP	46.00	-13.80	1.00 H	347	17.63	14.57
5	325.43	32.71 QP	46.00	-13.29	1.50 H	11	17.01	15.70
6	358.48	39.81 QP	46.00	-6.19	1.00 H	17	23.16	16.65
7	428.48	41.59 QP	46.00	-4.41	1.50 H	161	23.09	18.50
8	663.74	33.13 QP	46.00	-12.87	2.00 H	47	9.16	23.98
9	902.89	37.06 QP	46.00	-8.94	1.50 H	11	8.85	28.21

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	57.12	28.93 QP	40.00	-11.07	1.00 V	11	15.85	13.08
2	97.95	28.71 QP	43.50	-14.79	1.00 V	188	18.75	9.96
3	354.60	33.96 QP	46.00	-12.04	1.50 V	56	17.42	16.54
4	362.37	32.65 QP	46.00	-13.35	1.50 V	50	15.89	16.76
5	879.55	36.61 QP	46.00	-9.39	1.00 V	92	8.78	27.82
6	908.72	31.60 QP	46.00	-14.40	1.00 V	164	3.33	28.28
7	947.60	34.90 QP	46.00	-11.10	2.50 V	11	6.21	28.69

**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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	DBPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	1Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Match Tsui

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	60.91 PK	74.00	-13.09	1.26 H	50	29.41	31.50
2	2390.00	51.27 AV	54.00	-2.73	1.26 H	50	19.77	31.50
3	*2412.00	111.15 PK			1.26 H	48	79.58	31.57
4	*2412.00	106.70 AV			1.26 H	48	75.13	31.57
5	4824.00	51.22 PK	74.00	-22.78	1.04 H	356	14.08	37.14
6	4824.00	46.43 AV	54.00	-7.57	1.04 H	356	9.29	37.14
7	7236.00	54.82 PK	91.15	-36.33	1.01 H	1	10.49	44.32
8	7236.00	45.12 AV	86.70	-41.58	1.01 H	1	0.79	44.32
9	9648.00	59.92 PK	91.15	-31.23	1.48 H	6	12.03	47.89
10	9648.00	52.21 AV	86.70	-34.49	1.48 H	6	4.32	47.89

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	2390.00	59.93 PK	74.00	-14.07	1.00 V	327	28.43	31.50
2	2390.00	49.01 AV	54.00	-4.99	1.00 V	327	17.51	31.50
3	*2412.00	106.62 PK			1.00 V	327	75.05	31.57
4	*2412.00	102.36 AV			1.00 V	327	70.79	31.57
5	4824.00	47.92 PK	74.00	-26.08	1.00 V	13	10.78	37.14
6	4824.00	38.87 AV	54.00	-15.13	1.00 V	20	1.73	37.14
7	9648.00	58.07 PK	86.62	-28.55	1.37 V	360	10.18	47.89
8	9648.00	48.63 AV	82.36	-33.73	1.37 V	360	0.74	47.89

**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.
5. “\*”: Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 6	FREQUENCY RANGE		1 ~ 25GHz
MODULATION TYPE	DBPSK	DETECTOR FUNCTION		Peak(PK) Average (AV)
TRANSFER RATE	1Mbps	ENVIRONMENTAL CONDITIONS		22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY		Match Tsui

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	58.46 PK	74.00	-15.54	1.24 H	50	26.96	31.50
2	2390.00	47.36 AV	54.00	-6.64	1.24 H	50	15.86	31.50
3	*2437.00	112.32 PK			1.24 H	50	80.66	31.66
4	*2437.00	108.04 AV			1.24 H	50	76.38	31.66
5	4874.00	56.97 PK	74.00	-17.03	1.07 H	14	19.67	37.30
6	4874.00	51.90 AV	54.00	-2.10	1.07 H	14	14.60	37.30
7	7311.00	55.96 PK	74.00	-18.04	1.04 H	10	11.53	44.43
8	7311.00	47.26 AV	54.00	-6.74	1.04 H	10	2.83	44.43
9	9748.00	60.66 PK	92.32	-31.66	1.11 H	356	12.57	48.09
10	9748.00	53.40 AV	88.04	-34.64	1.11 H	356	5.31	48.09

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	107.39 PK			1.04 V	356	75.73	31.66
2	*2437.00	102.89 AV			1.04 V	356	71.23	31.66
3	4874.00	48.54 PK	74.00	-25.46	1.00 V	10	11.24	37.30
4	4874.00	39.60 AV	54.00	-14.40	1.00 V	10	2.30	37.30
5	9748.00	59.60 PK	87.39	-27.79	1.07 V	0	11.51	48.09
6	9748.00	49.08 AV	82.89	-33.81	1.07 V	0	0.99	48.09

**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. “\*” : Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	DBPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	1Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Match Tsui

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	110.98 PK			1.22 H	52	79.24	31.74
2	*2462.00	106.94 AV			1.22 H	52	75.20	31.74
3	2483.50	59.33 PK	74.00	-14.67	1.19 H	51	27.52	31.81
4	2483.50	50.40 AV	54.00	-3.60	1.19 H	51	18.59	31.81
5	2499.00	60.18 PK	74.00	-13.82	1.19 H	51	28.31	31.87
6	2499.00	50.18 AV	54.00	-3.82	1.19 H	51	18.31	31.87
7	4924.00	55.83 PK	74.00	-18.17	1.01 H	346	18.36	37.46
8	<b>4924.00</b>	<b>52.50 AV</b>	<b>54.00</b>	<b>-1.50</b>	<b>1.01 H</b>	<b>346</b>	<b>15.03</b>	<b>37.46</b>
9	7386.00	54.92 PK	74.00	-19.08	1.00 H	54	10.31	44.61
10	7386.00	44.39 AV	54.00	-9.61	1.00 H	54	-0.22	44.61
11	9848.00	60.68 PK	90.98	-30.30	1.38 H	9	12.42	48.25
12	9848.00	53.05 AV	86.94	-33.89	1.38 H	9	4.79	48.25

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	106.80 PK			1.00 V	360	75.06	31.74
2	*2462.00	102.52 AV			1.00 V	360	70.78	31.74
3	2483.50	60.04 PK	74.00	-13.96	1.00 V	360	28.23	31.81
4	2483.50	49.20 AV	54.00	-4.80	1.00 V	360	17.39	31.81
5	4924.00	48.27 PK	74.00	-25.73	1.10 V	10	10.81	37.46
6	4924.00	40.50 AV	54.00	-13.50	1.10 V	10	3.04	37.46
7	9848.00	59.60 PK	86.80	-27.20	1.07 V	355	11.35	48.25
8	9848.00	49.50 AV	82.52	-33.02	1.07 V	355	1.25	48.25

**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. “\*”: Fundamental frequency.



### 802.11g OFDM modulation

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Match Tsui

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	68.67 PK	74.00	-5.33	1.04 H	47	37.17	31.50
2	2390.00	52.17 AV	54.00	-1.83	1.04 H	47	20.67	31.50
3	*2412.00	107.44 PK			1.04 H	46	75.87	31.57
4	*2412.00	97.20 AV			1.04 H	46	65.63	31.57
5	4824.00	45.71 PK	74.00	-28.29	1.04 H	0	8.57	37.14
6	4824.00	33.81 AV	54.00	-20.19	1.04 H	0	-3.33	37.14

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	62.78 PK	74.00	-11.22	1.00 V	53	31.28	31.50
2	2390.00	49.36 AV	54.00	-4.64	1.00 V	53	17.86	31.50
3	*2412.00	103.61 PK			1.00 V	53	72.04	31.57
4	*2412.00	93.43 AV			1.00 V	53	61.86	31.57
5	4824.00	45.72 PK	74.00	-28.28	1.00 V	350	8.58	37.14
6	4824.00	33.87 AV	54.00	-20.13	1.00 V	350	-3.27	37.14

#### 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. “\*”: Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Peak(PK) Average (AV)
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Match Tsui

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	109.01 PK			1.23 H	51	77.35	31.66
2	*2437.00	98.75 AV			1.23 H	51	67.09	31.66
3	4874.00	46.89 PK	74.00	-27.11	1.00 H	10	9.58	37.30
4	4874.00	34.52 AV	54.00	-19.48	1.00 H	10	-2.79	37.30

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	105.13 PK			1.45 V	50	73.47	31.66
2	*2437.00	95.08 AV			1.45 V	50	63.42	31.66
3	4874.00	45.87 PK	74.00	-28.13	1.10 V	360	8.56	37.30
4	4874.00	33.70 AV	54.00	-20.30	1.10 V	360	-3.61	37.30

**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. “\*”: Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Channel 11		FREQUENCY RANGE
MODULATION TYPE		BPSK		DETECTOR FUNCTION
TRANSFER RATE		6Mbps		ENVIRONMENTAL CONDITIONS
INPUT POWER (SYSTEM)		120Vac, 60 Hz		TESTED BY
				Match Tsui

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	107.76 PK			1.00 H	50	76.02	31.74
2	*2462.00	97.29 AV			1.00 H	50	65.55	31.74
3	2483.50	67.01 PK	74.00	-6.99	1.00 H	50	35.20	31.81
4	2483.50	51.56 AV	54.00	-2.44	1.00 H	50	19.75	31.81
5	4924.00	46.89 PK	74.00	-27.11	1.00 H	10	9.43	37.46
6	4924.00	34.56 AV	54.00	-19.44	1.00 H	10	-2.90	37.46

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	103.77 PK			1.00 V	74	72.03	31.74
2	*2462.00	94.56 AV			1.00 V	74	62.82	31.74
3	2483.50	63.10 PK	74.00	-10.90	1.00 V	74	31.29	31.81
4	2483.50	49.86 AV	54.00	-4.14	1.00 V	74	18.05	31.81
5	4924.00	45.86 PK	74.00	-28.14	1.00 V	0	8.40	37.46
6	4924.00	33.82 AV	54.00	-20.18	1.00 V	0	-3.64	37.46

**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. “\*”: Fundamental frequency.



## 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
SPECTRUM ANALYZER	FSP40	100040	Jun. 07, 2007

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

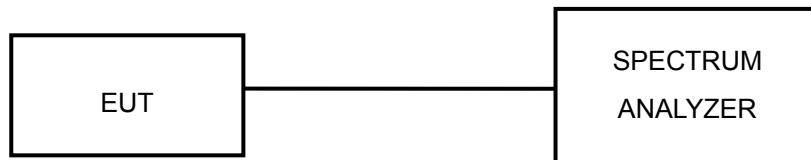
#### 4.3.3 TEST PROCEDURE

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.

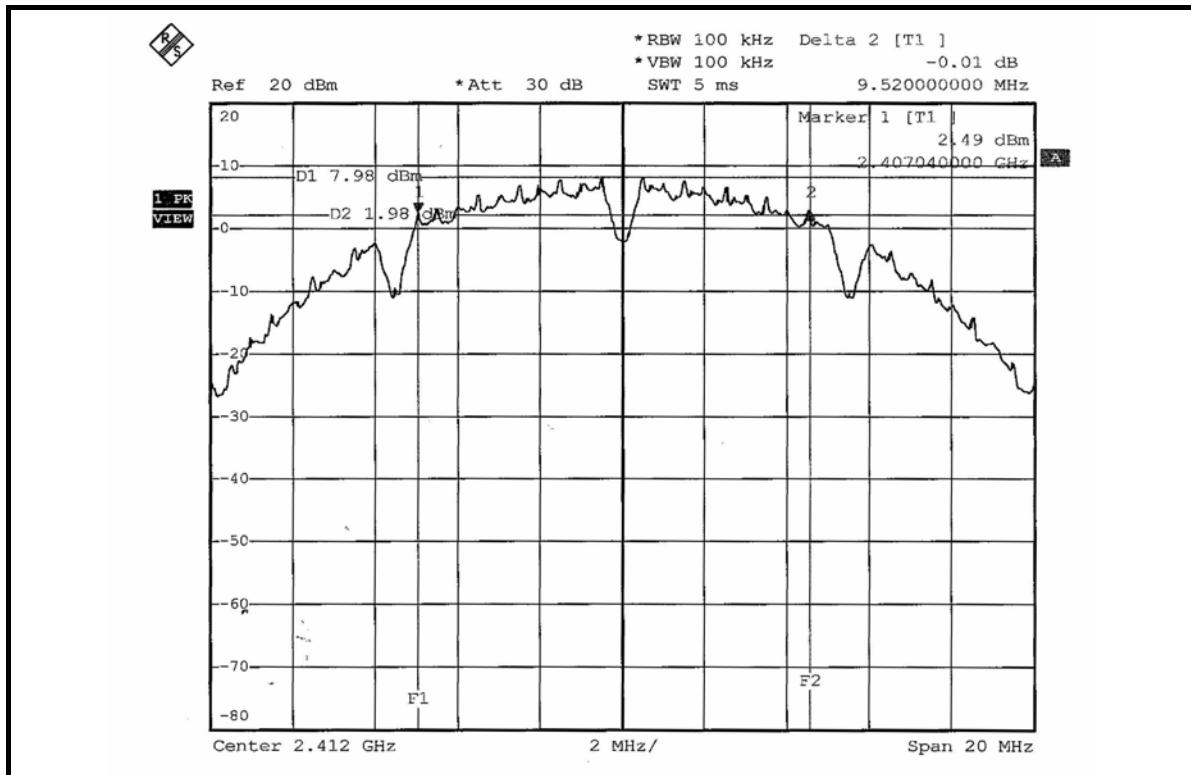
#### 4.3.7 TEST RESULTS

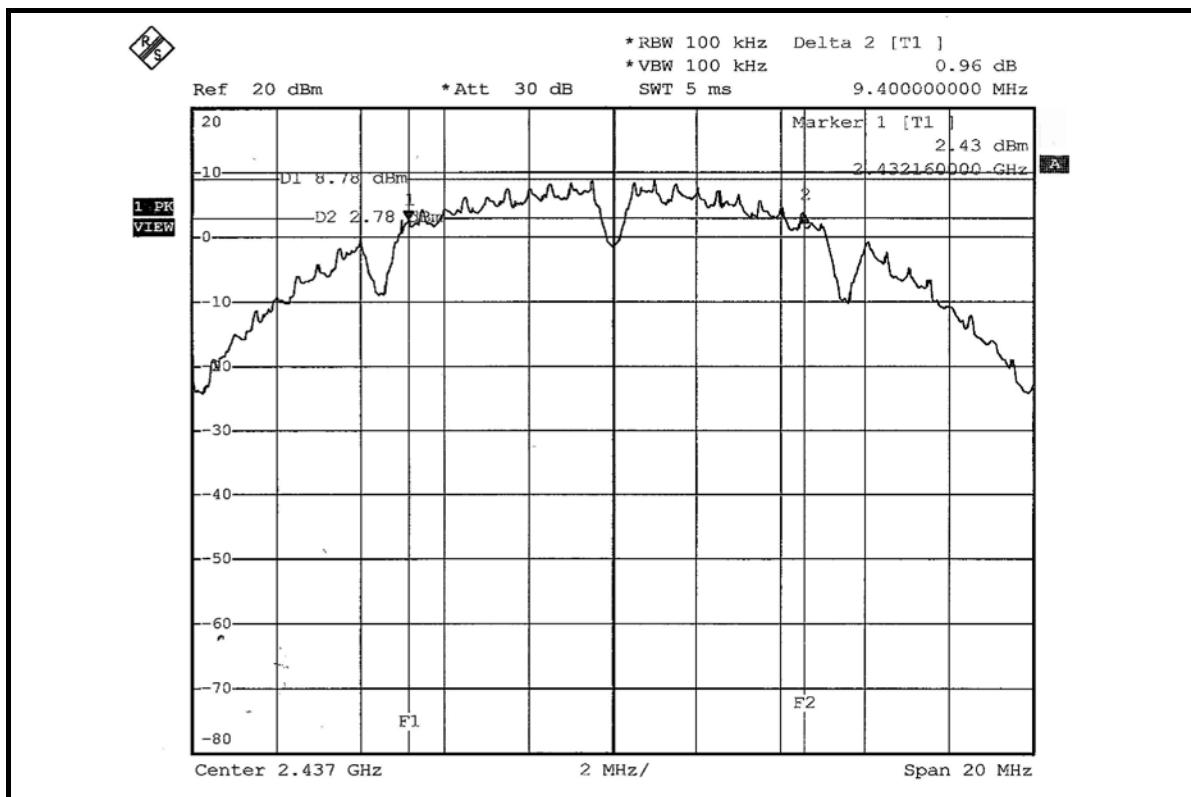
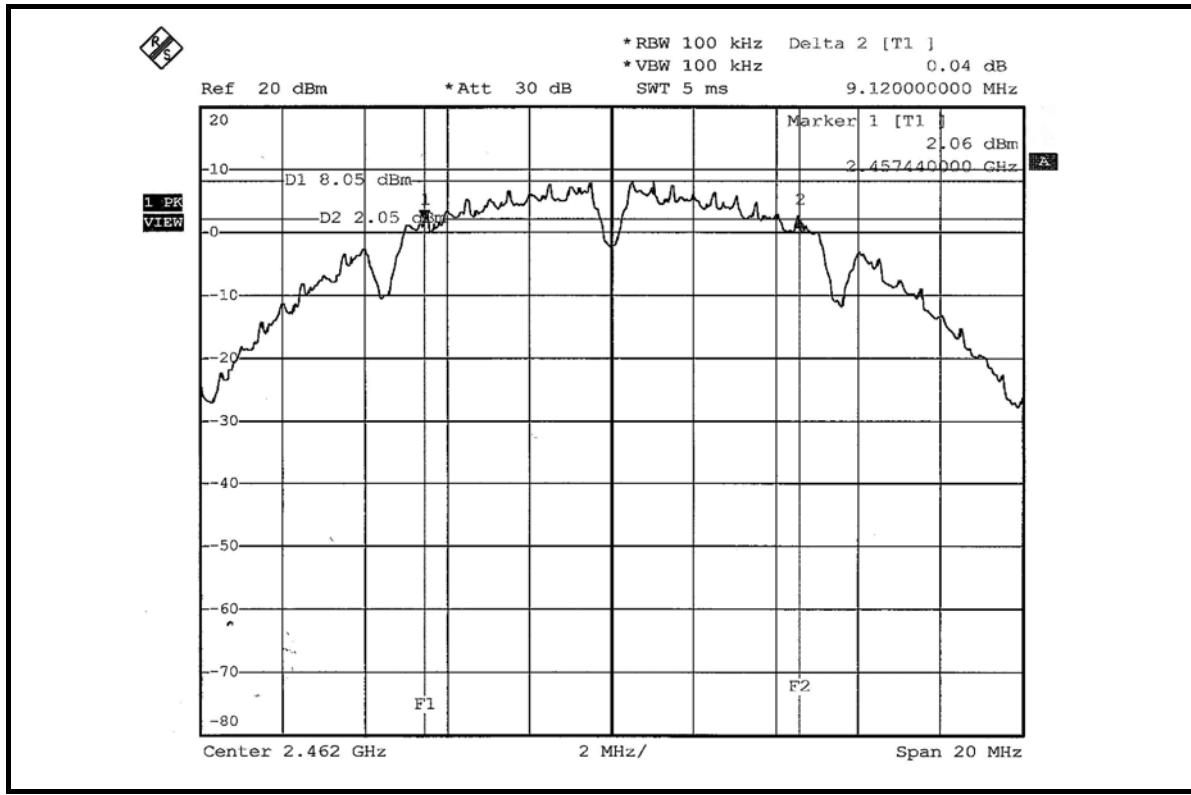
##### 802.11b DSSS modulation

MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	9.52	0.5	PASS
6	2437	9.40	0.5	PASS
11	2462	9.12	0.5	PASS

##### CH 1



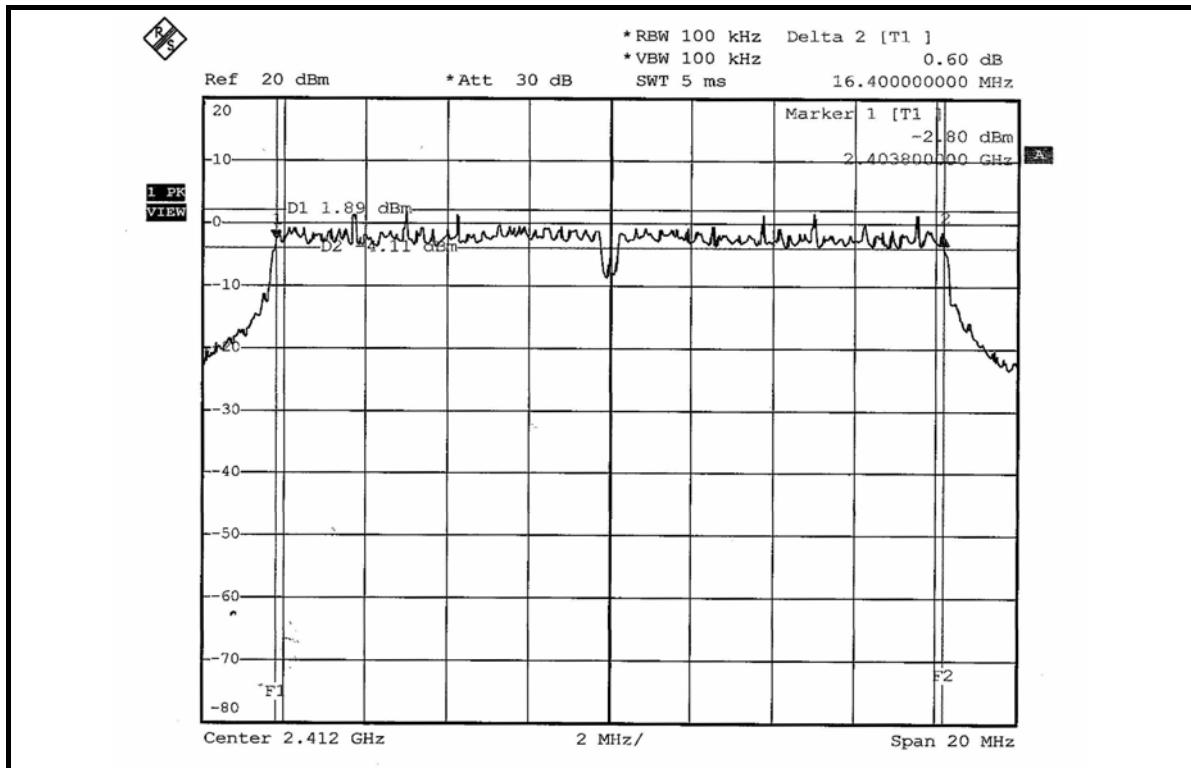
**CH 6**

**CH 11**


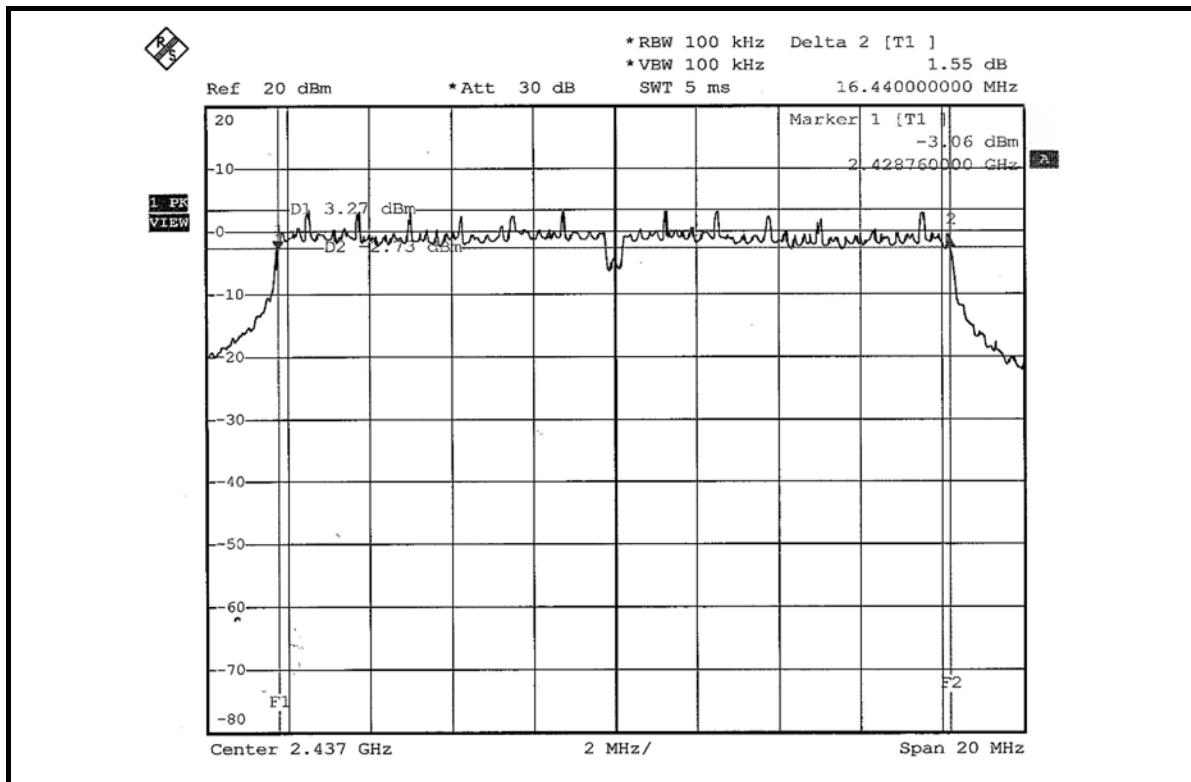
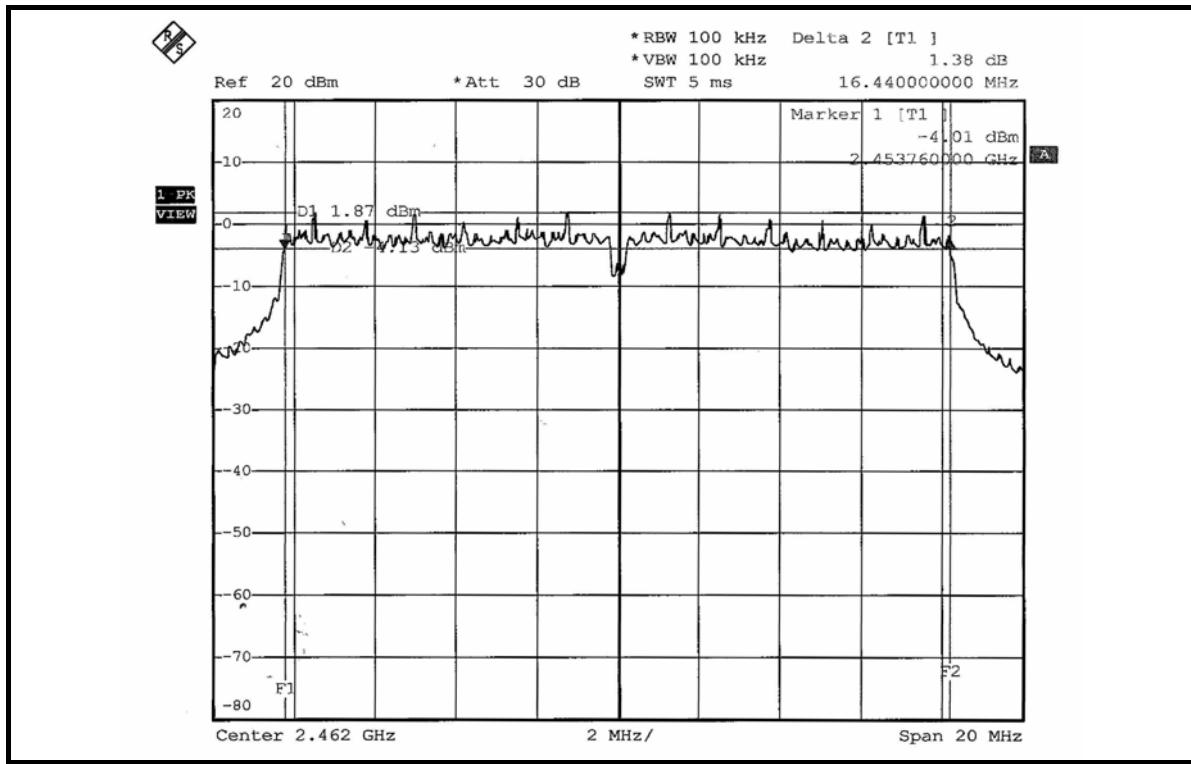
### 802.11g OFDM modulation

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.40	0.5	PASS
6	2437	16.44	0.5	PASS
11	2462	16.44	0.5	PASS

### CH 1



**CH 6**

**CH 11**




## 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	100040	Jun. 07, 2007
ANRITSU SYNTHESIZED SIGNAL GENERATOR	68247B	984703	May 08, 2007
DIGITAL RT OSCILLOSCOPE	TDS1012	C037299	Nov. 27, 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.

#### 4.4.1 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.

#### 4.4.2 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.3 TEST SETUP



#### 4.4.4 EUT OPERATING CONDITIONS

Same as Item 4.3.6



#### 4.4.3 TEST RESULTS

##### 802.11b DSSS modulation

MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	80.168	19.04	30	PASS
6	2437	100.231	20.01	30	PASS
11	2462	79.983	19.03	30	PASS

##### 802.11g OFDM modulation

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	50.582	17.04	30	PASS
6	2437	63.826	18.05	30	PASS
11	2462	51.168	17.09	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	100040	Jun. 07, 2007

**NOTE:**

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

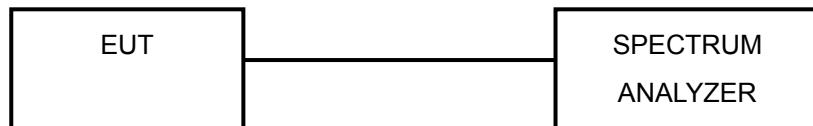
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded.

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

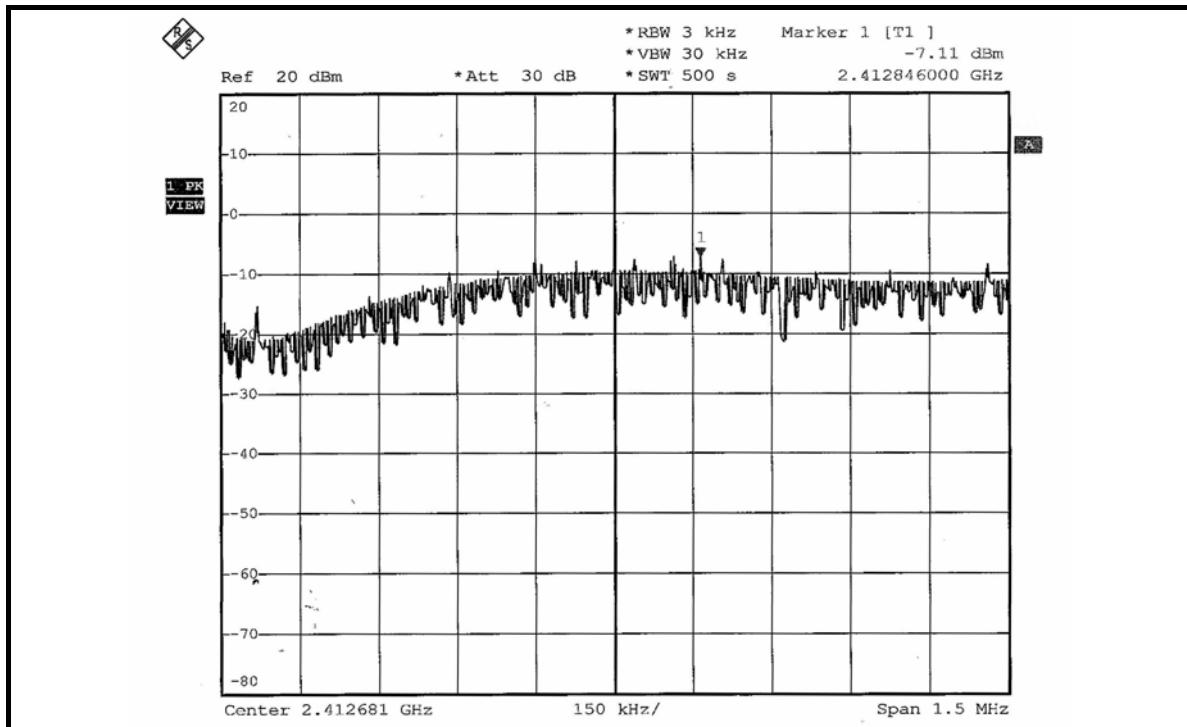
#### 4.5.7 TEST RESULTS

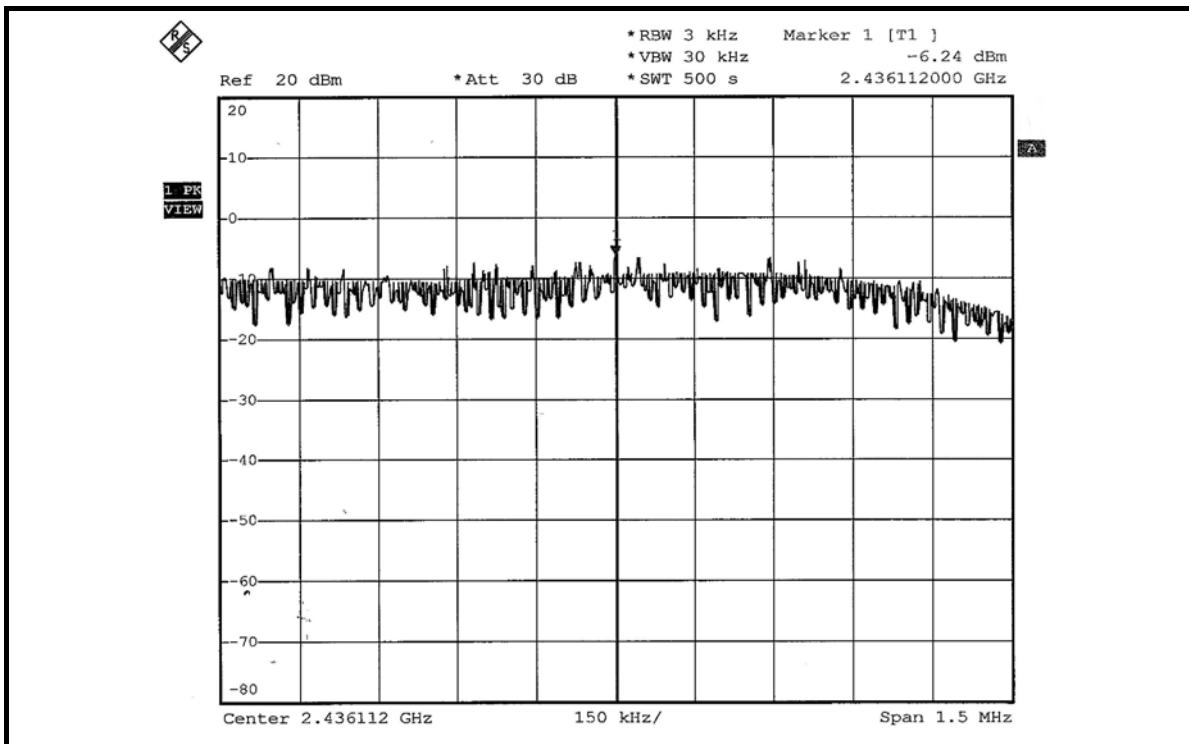
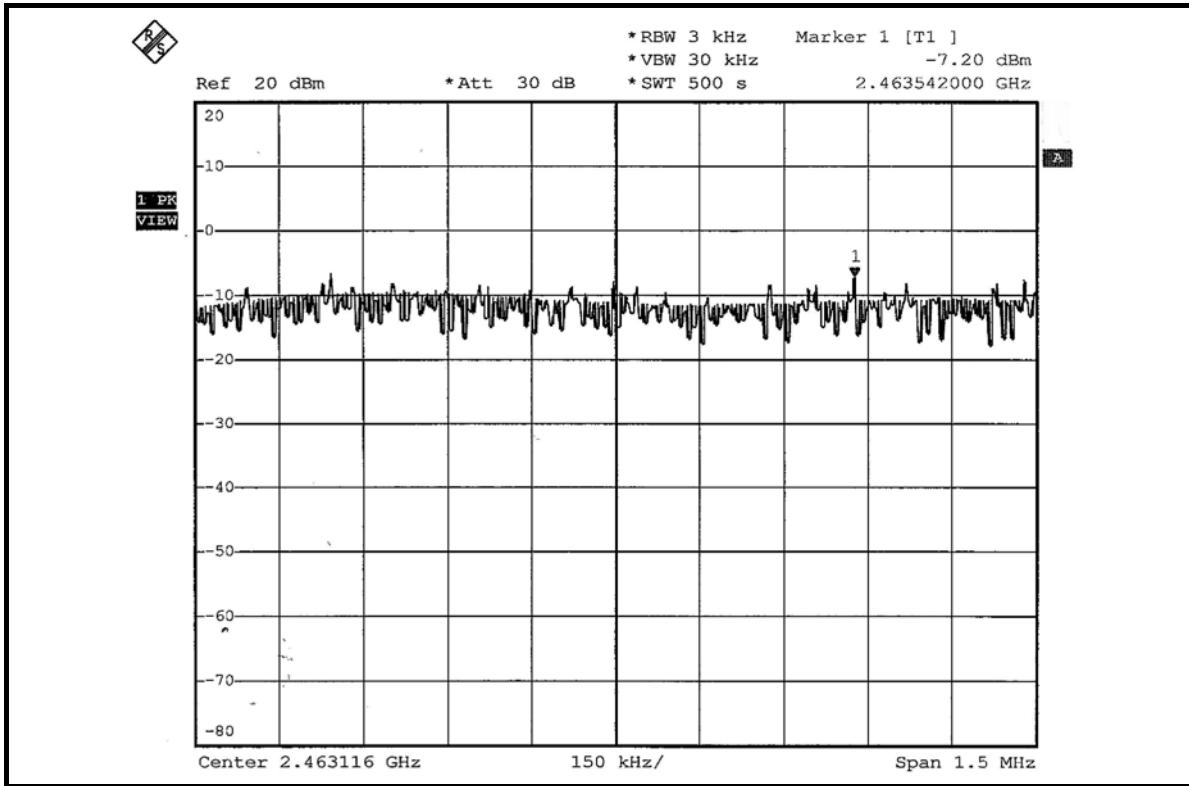
##### 802.11b DSSS modulation

MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-7.11	8	PASS
6	2437	-6.24	8	PASS
11	2462	-7.20	8	PASS

##### CH 1



**CH 6**

**CH 11**


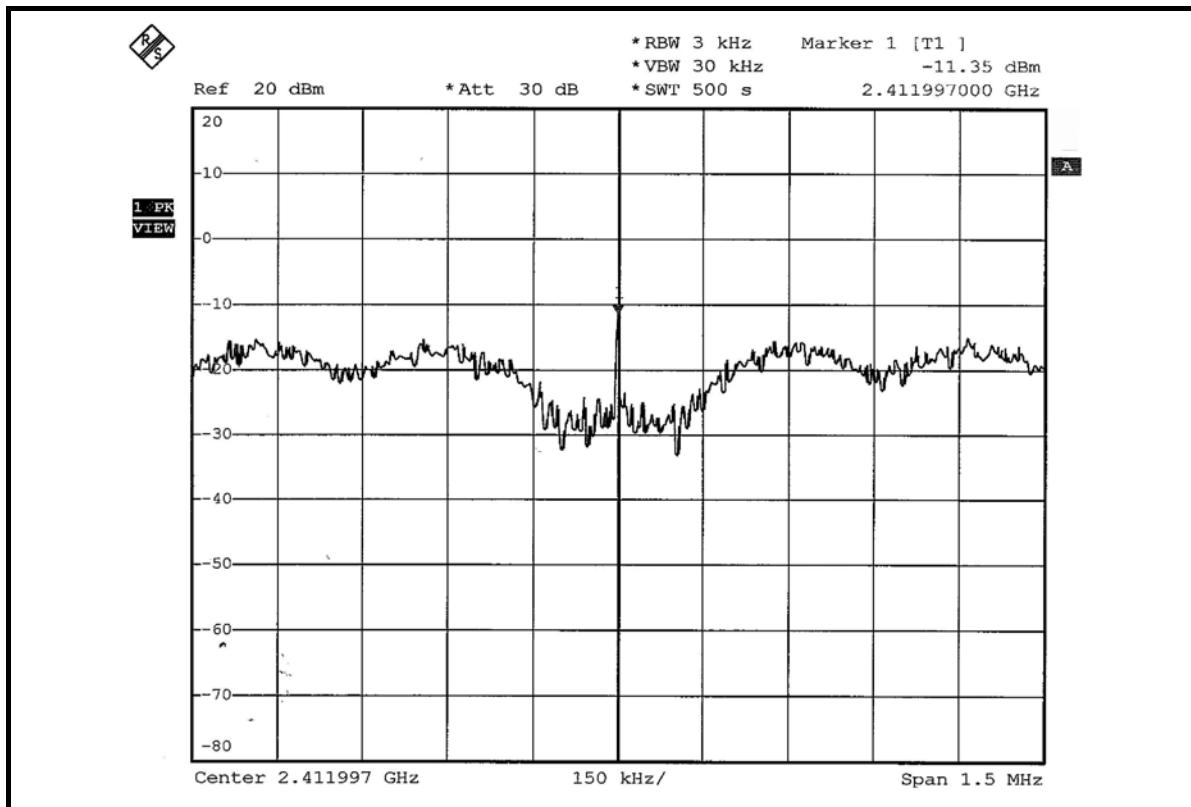


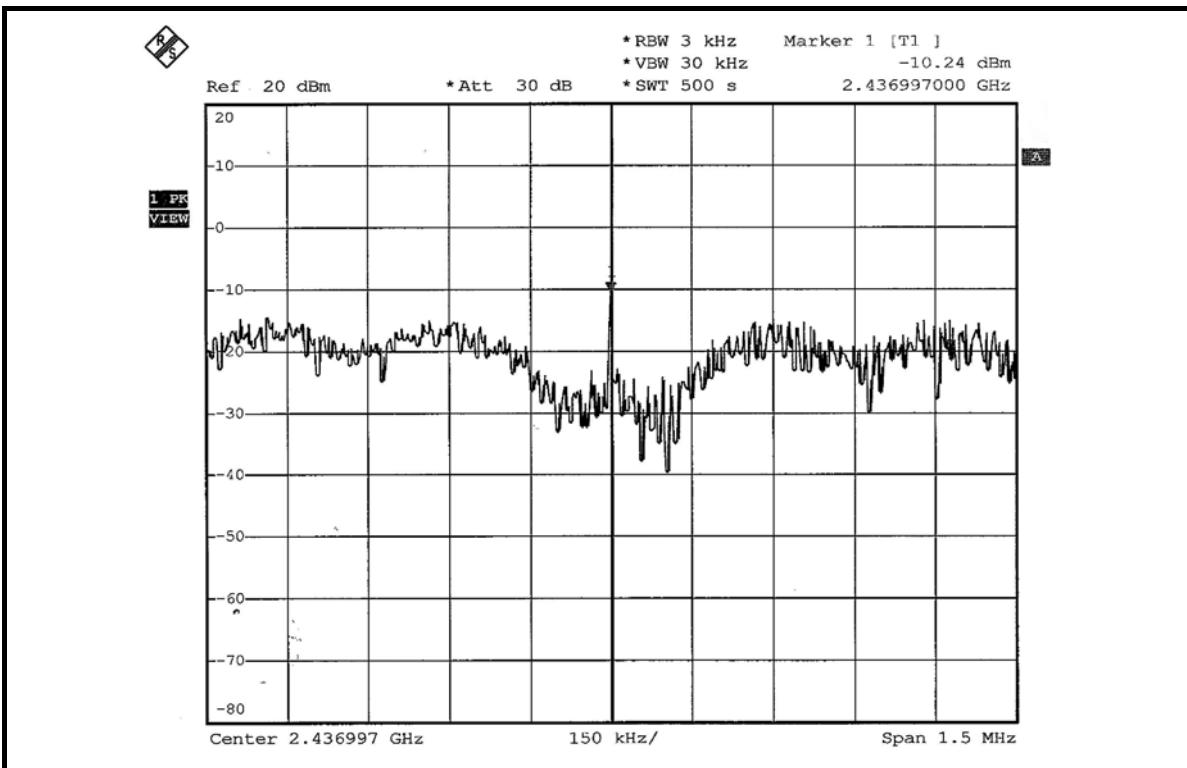
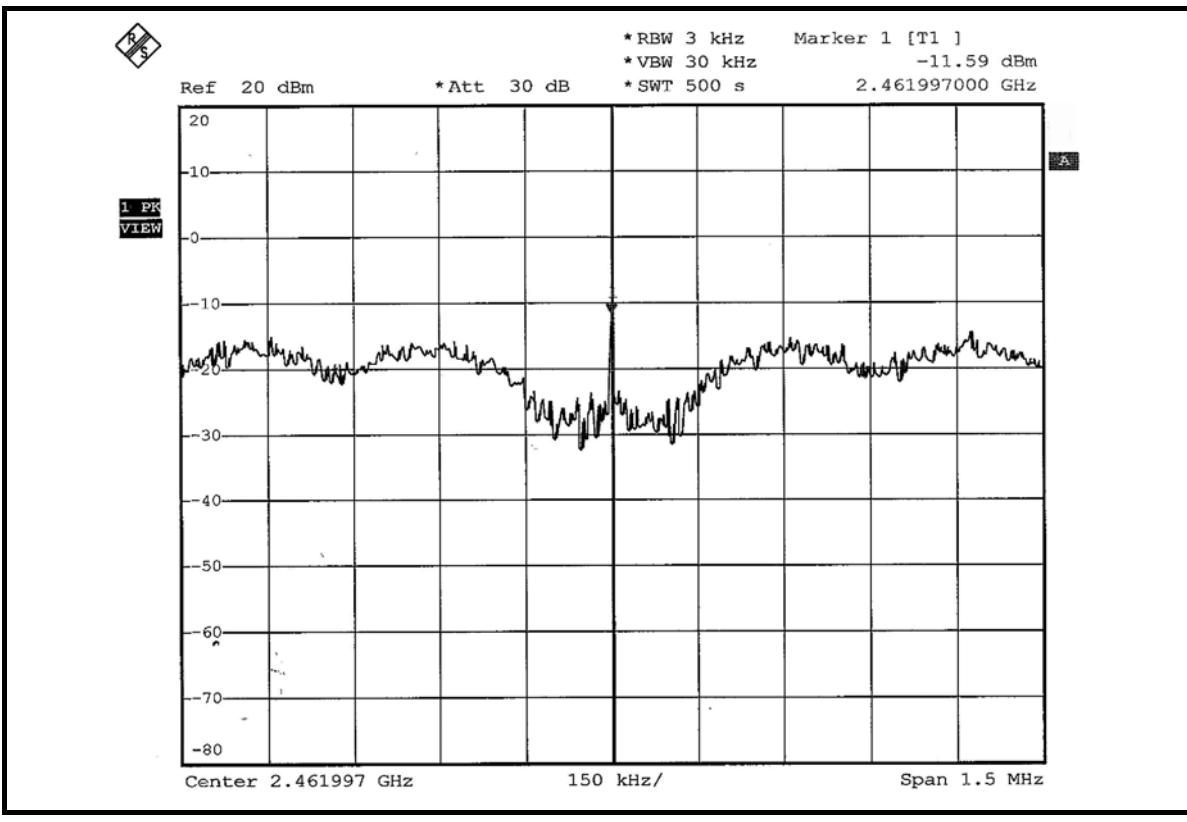
### 802.11g OFDM modulation

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-11.35	8	PASS
6	2437	-10.24	8	PASS
11	2462	-11.59	8	PASS

### CH 1



**CH 6**

**CH 11**




## 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	100040	Jun. 07, 2007

**NOTE:** 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 100MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots (Peak RBW=VBW=100kHz; Average RBW=1MHz, VBW= 10Hz are attached on the following pages.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6



#### 4.6.6 TEST RESULTS

The spectrum plots are attached on the following 12 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).

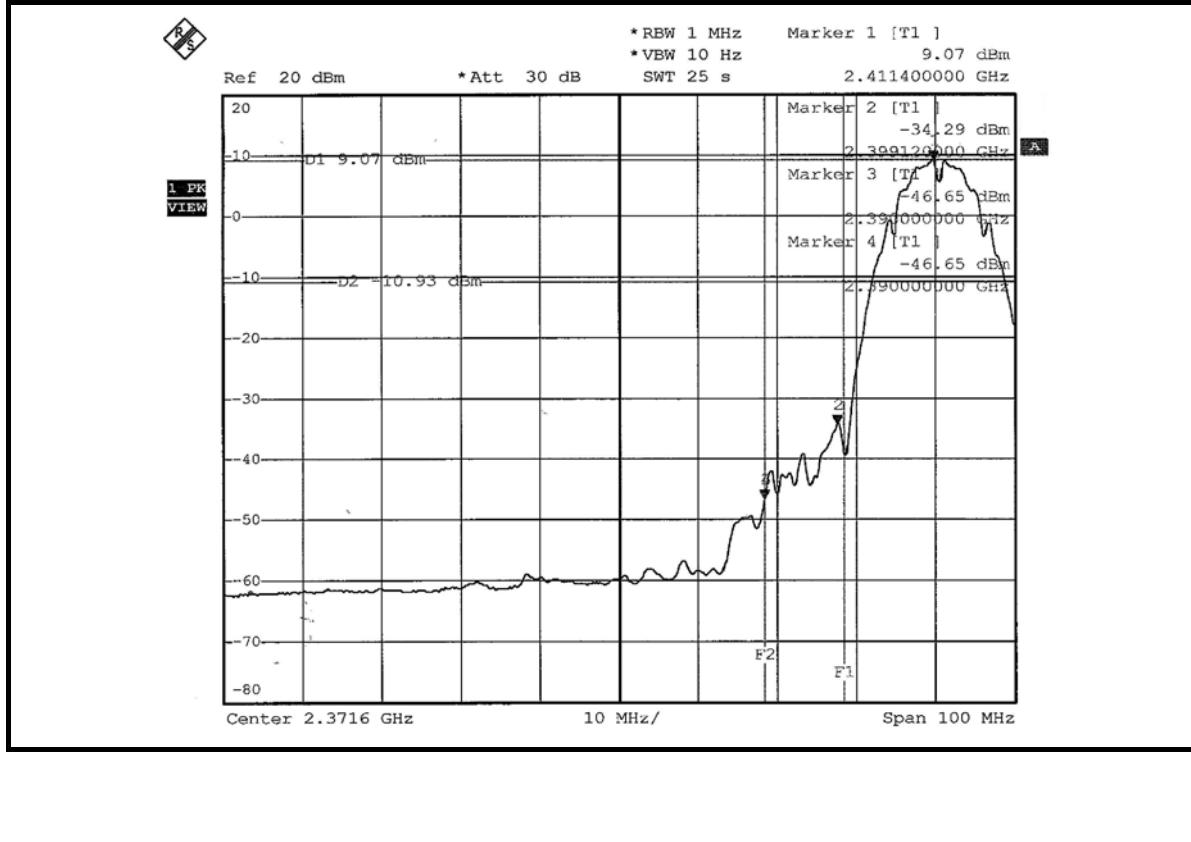
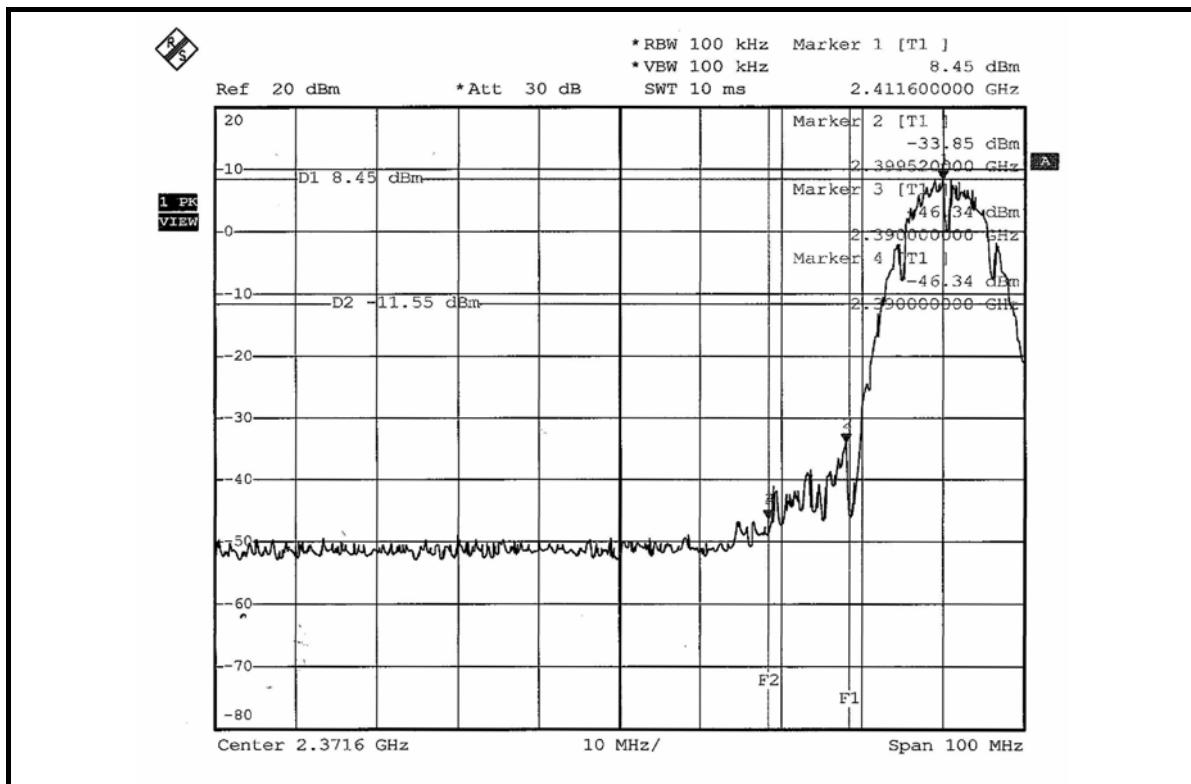
#### 802.11b DSSS modulation

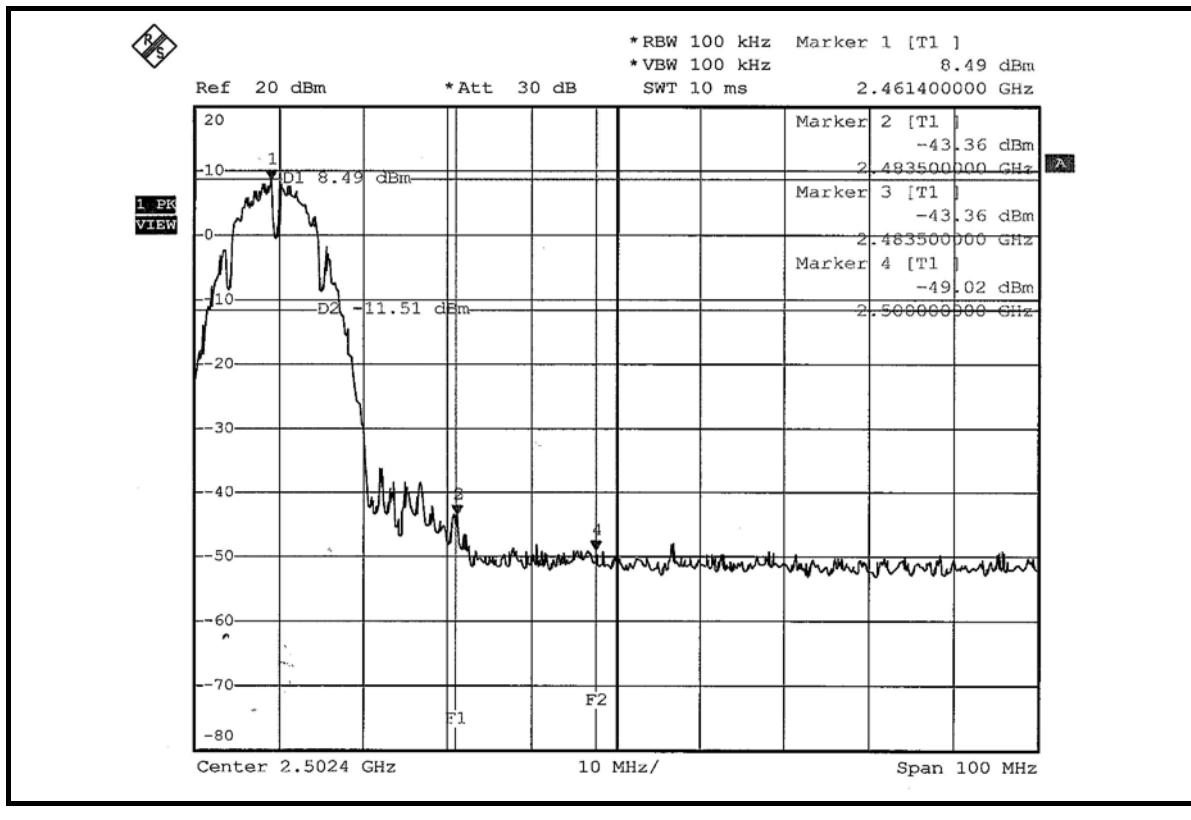
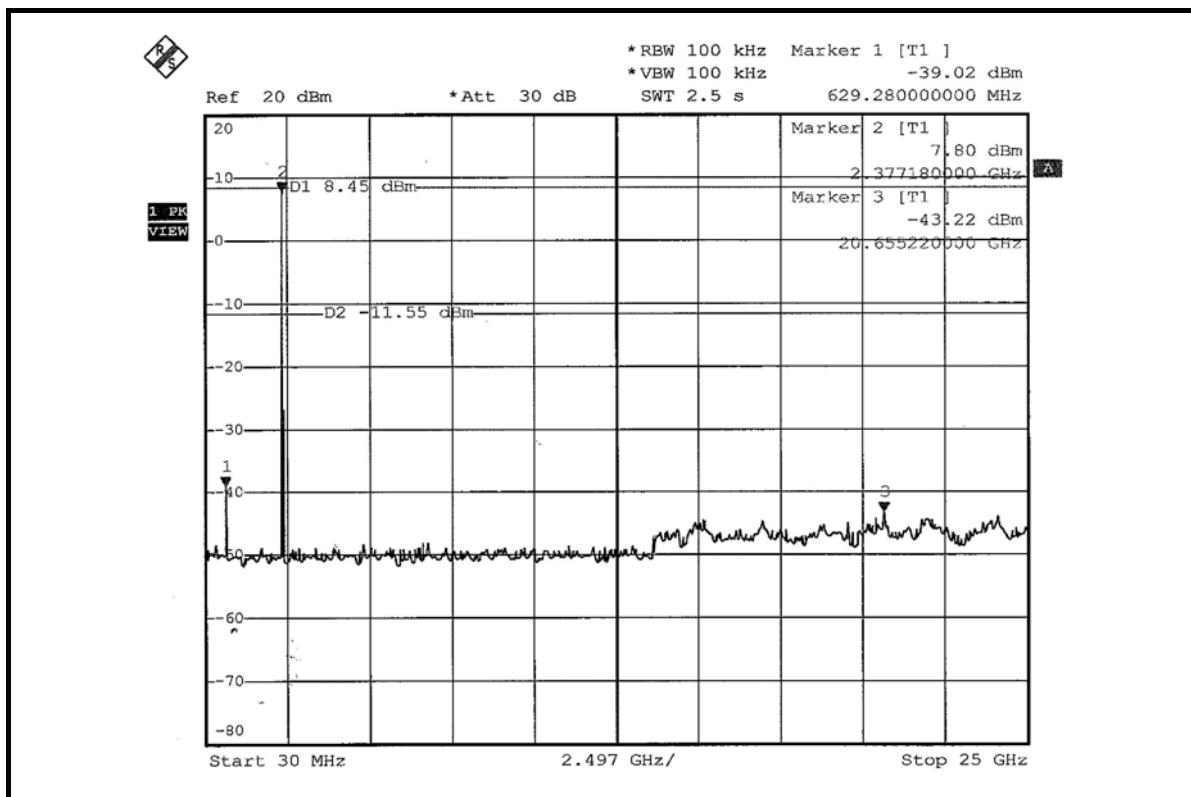
**NOTE 1:** The band edge emission plot on the next page shows 54.79dBc between carrier maximum power and local maximum emission in restrict band (2.39000GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 111.15dBuV/m (Peak), so the maximum field strength in restrict band is  $111.15 - 54.79 = 56.36$ dBuV/m which is under 74dBuV/m limit.

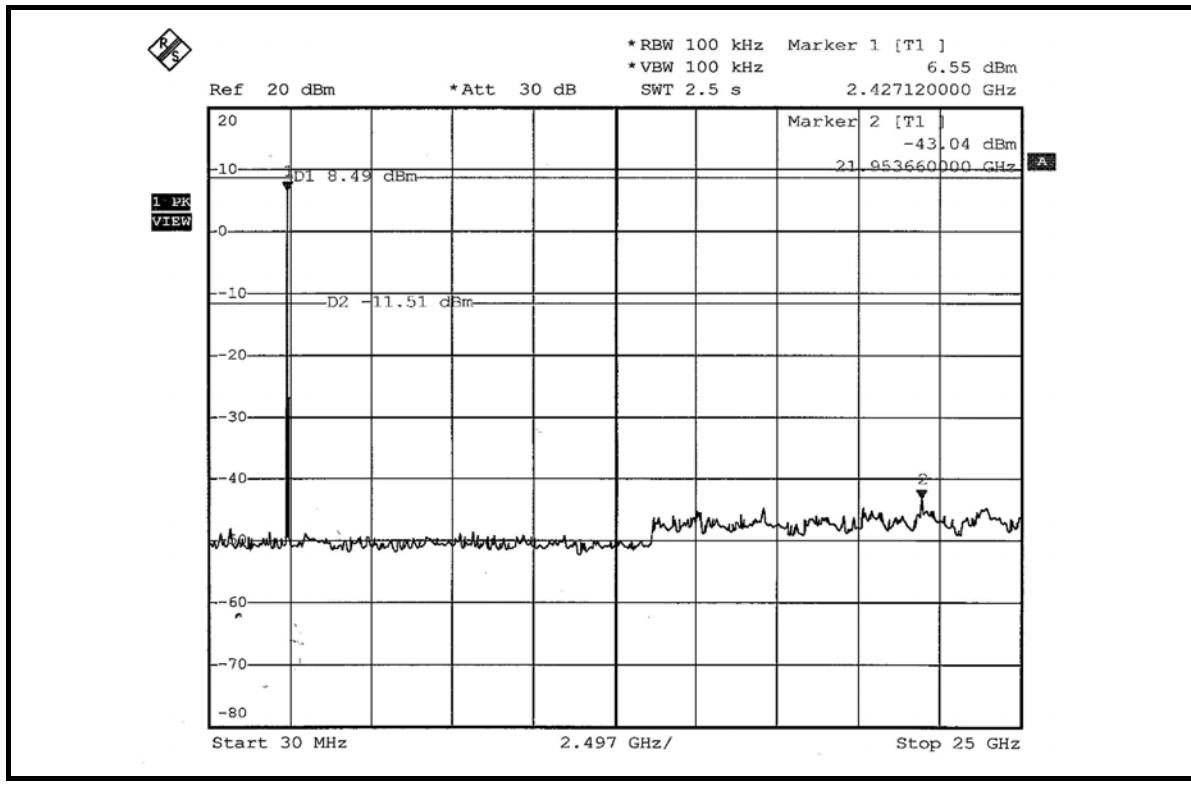
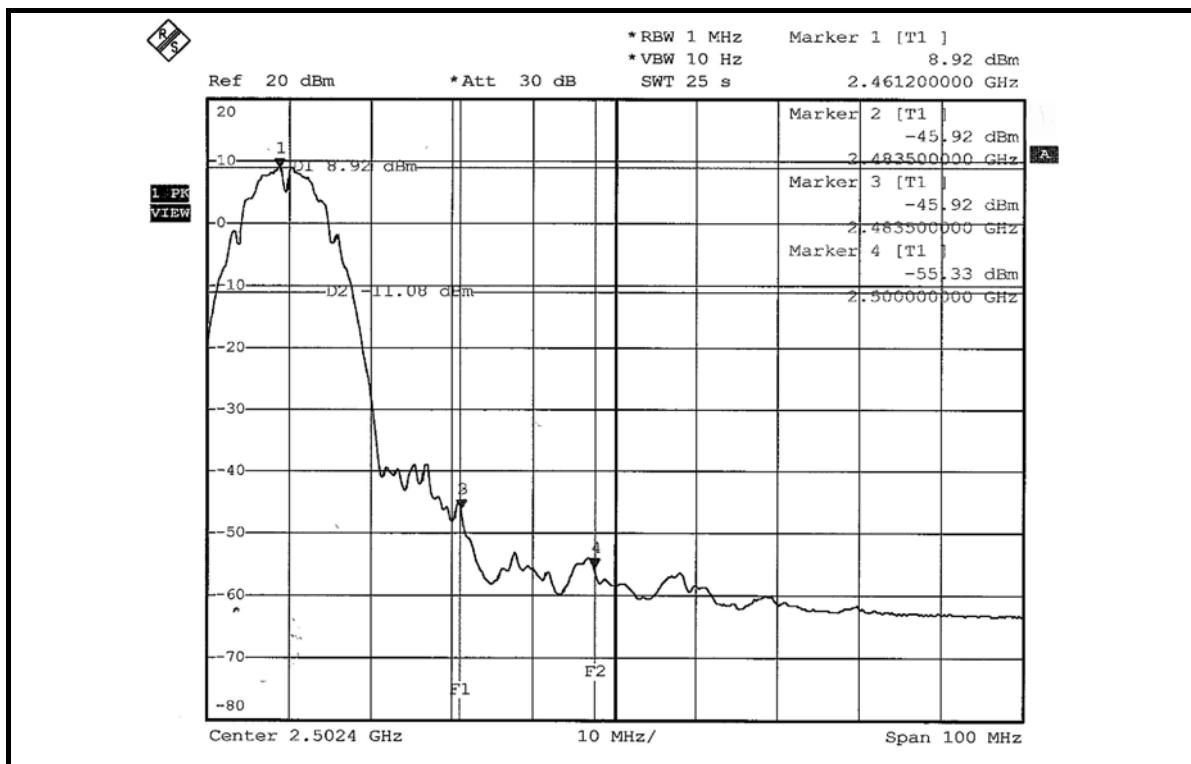
The band edge emission plot of on the next page shows 55.72dBc between carrier maximum power and local maximum emission in restrict band (2.39000GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 106.70dBuV/m (Average), so the maximum field strength in restrict band is  $106.70 - 55.72 = 50.98$ dBuV/m which is under 54dBuV/m limit.

**NOTE 2:** The band edge emission plot on the next second page shows 51.85dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 110.98dBuV/m (Peak), so the maximum field strength in restrict band is  $110.98 - 51.85 = 59.13$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 54.84dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 106.94dBuV/m (Average), so the maximum field strength in restrict band is  $106.94 - 54.84 = 52.10$ dBuV/m which is under 54dBuV/m limit.









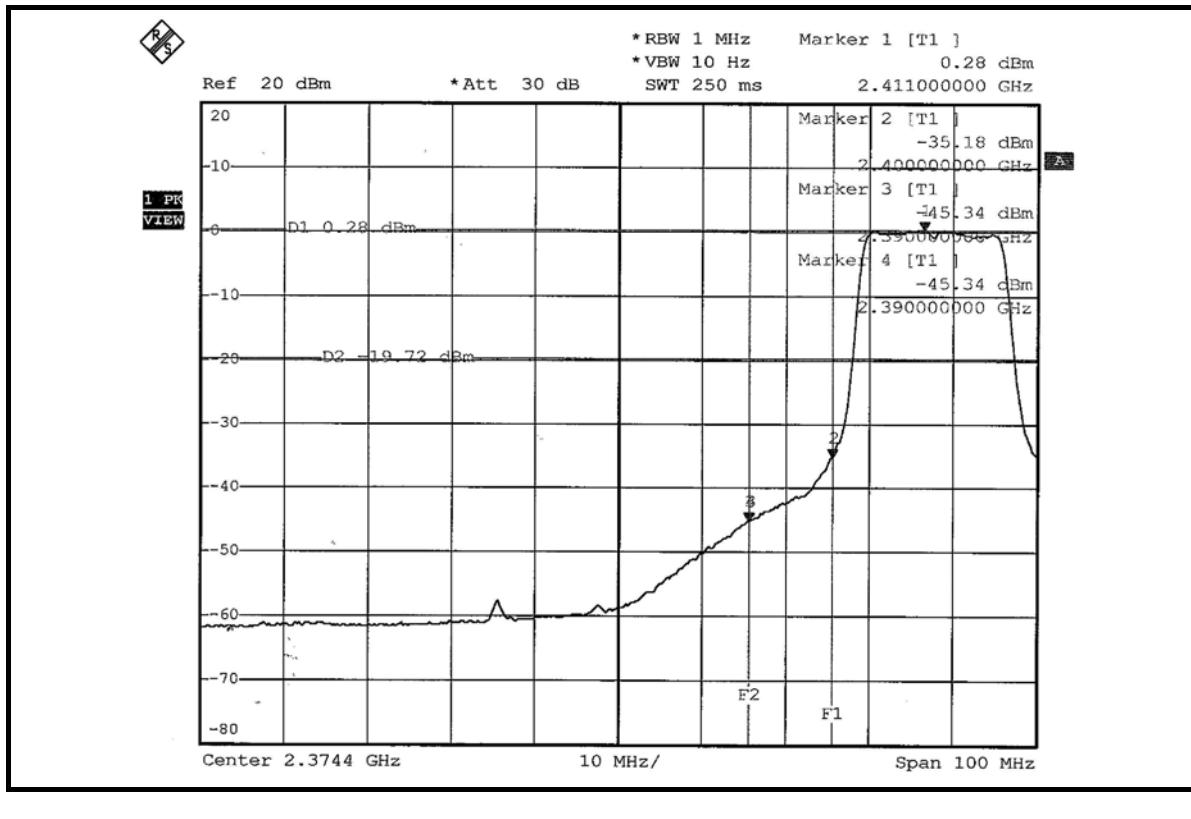
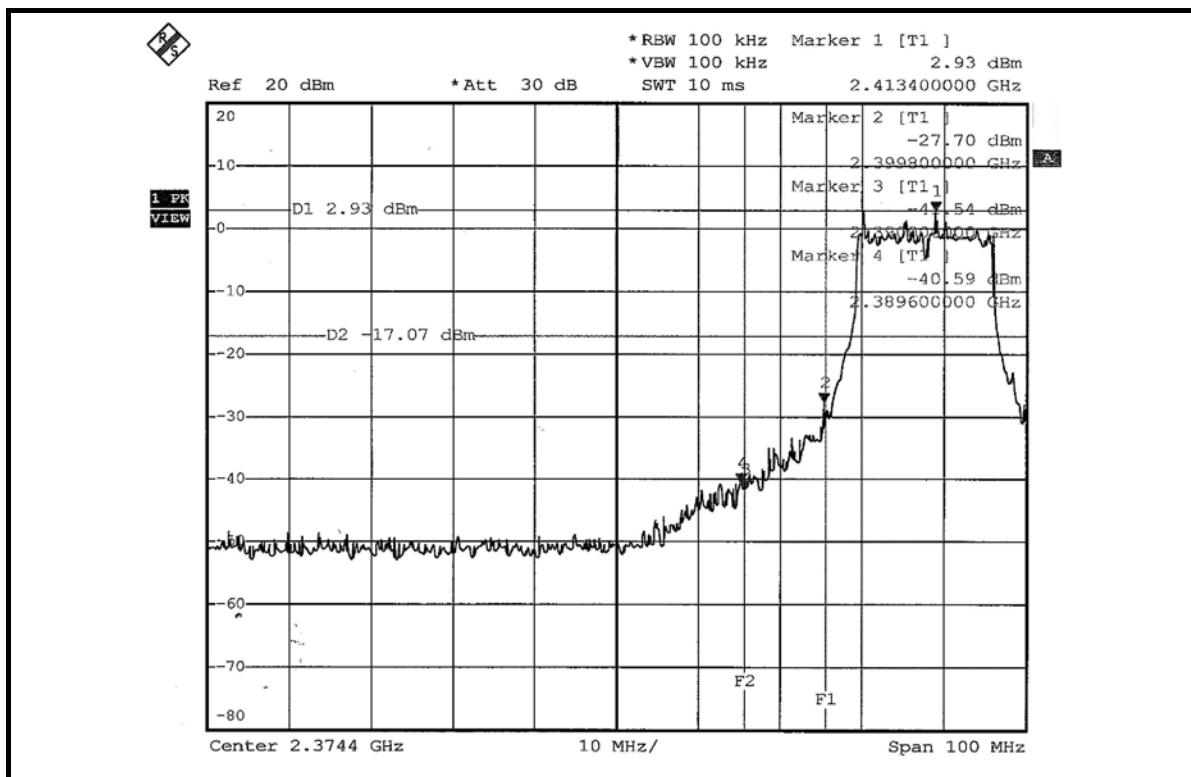
### 802.11g OFDM modulation

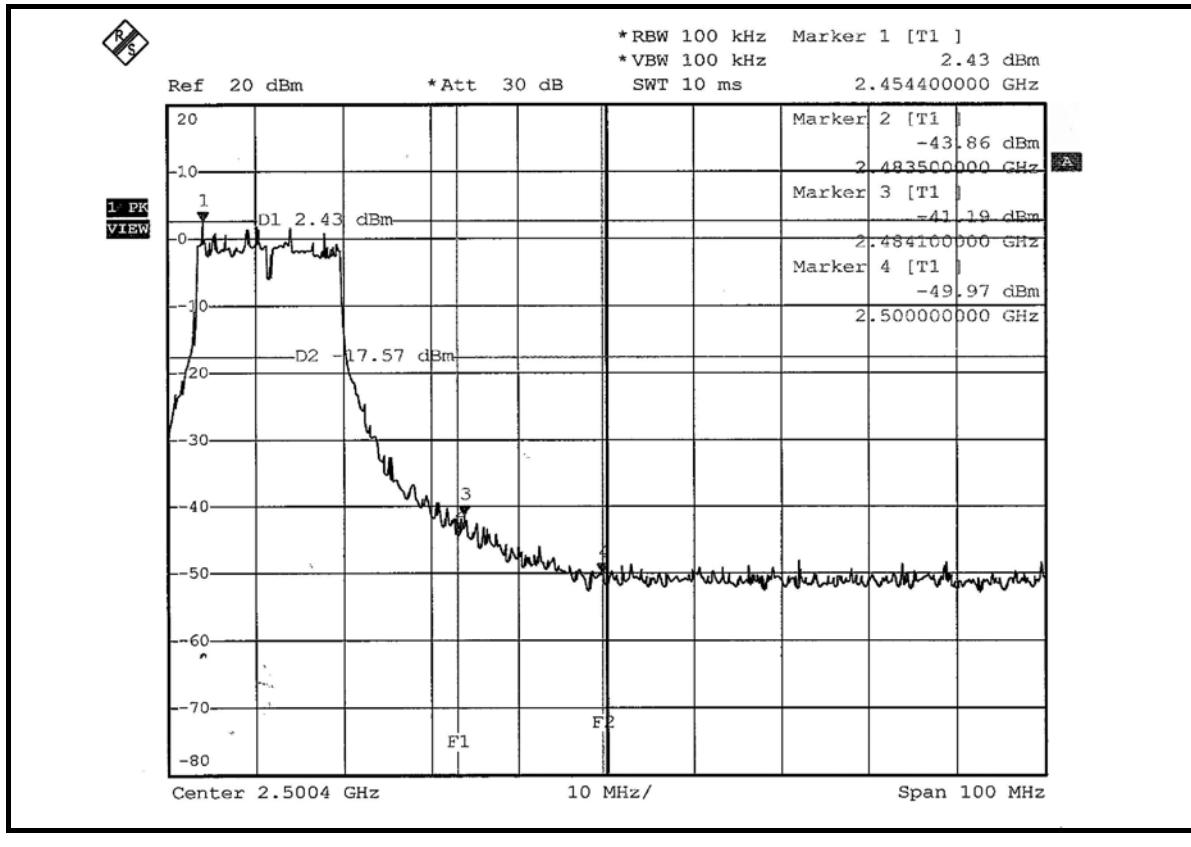
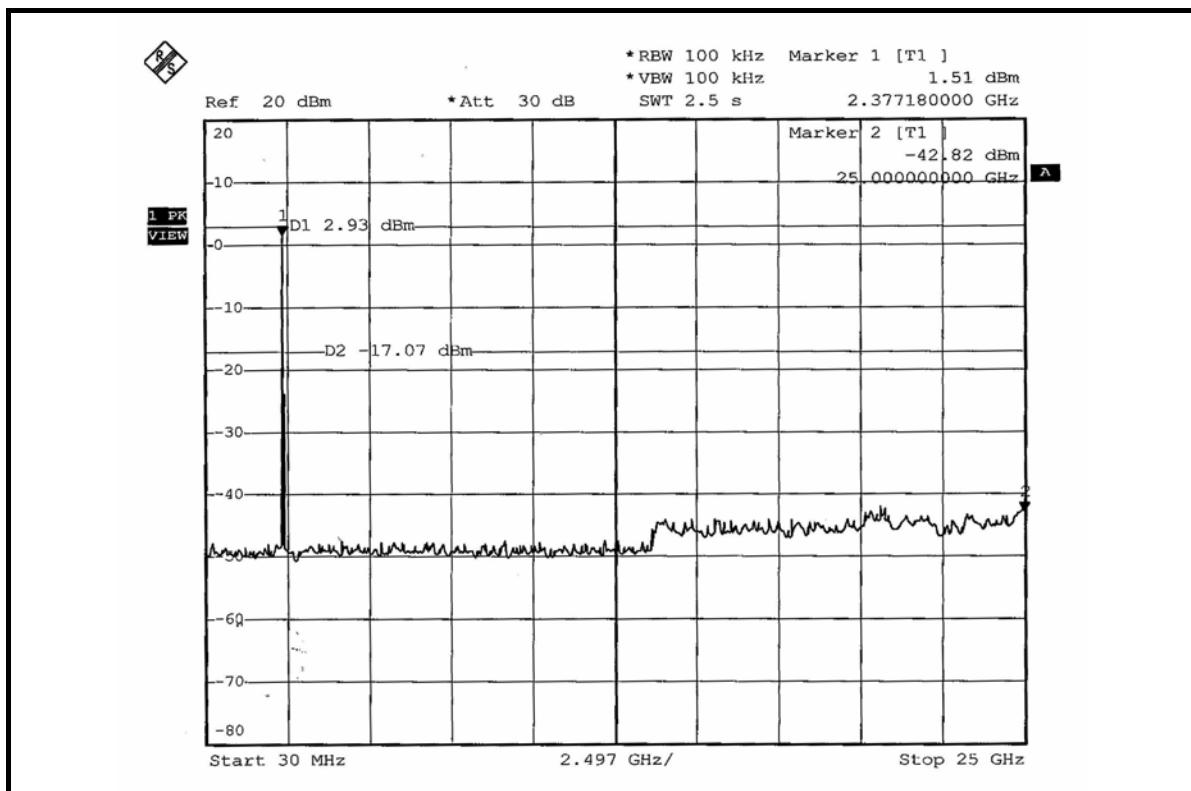
**NOTE 1:** The band edge emission plot on the next page shows 43.52dBc between carrier maximum power and local maximum emission in restrict band (2.38960GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 107.44dBuV/m (Peak), so the maximum field strength in restrict band is  $107.44 - 43.52 = 63.92$ dBuV/m which is under 74dBuV/m limit.

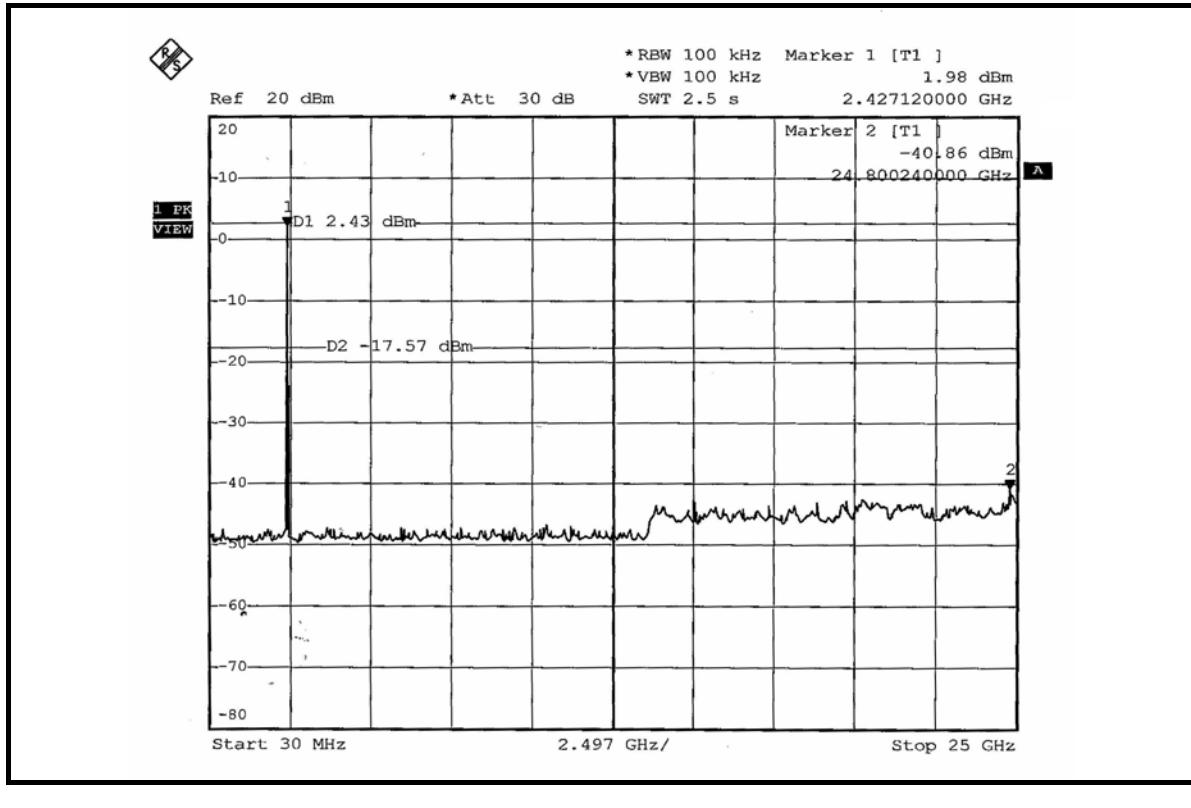
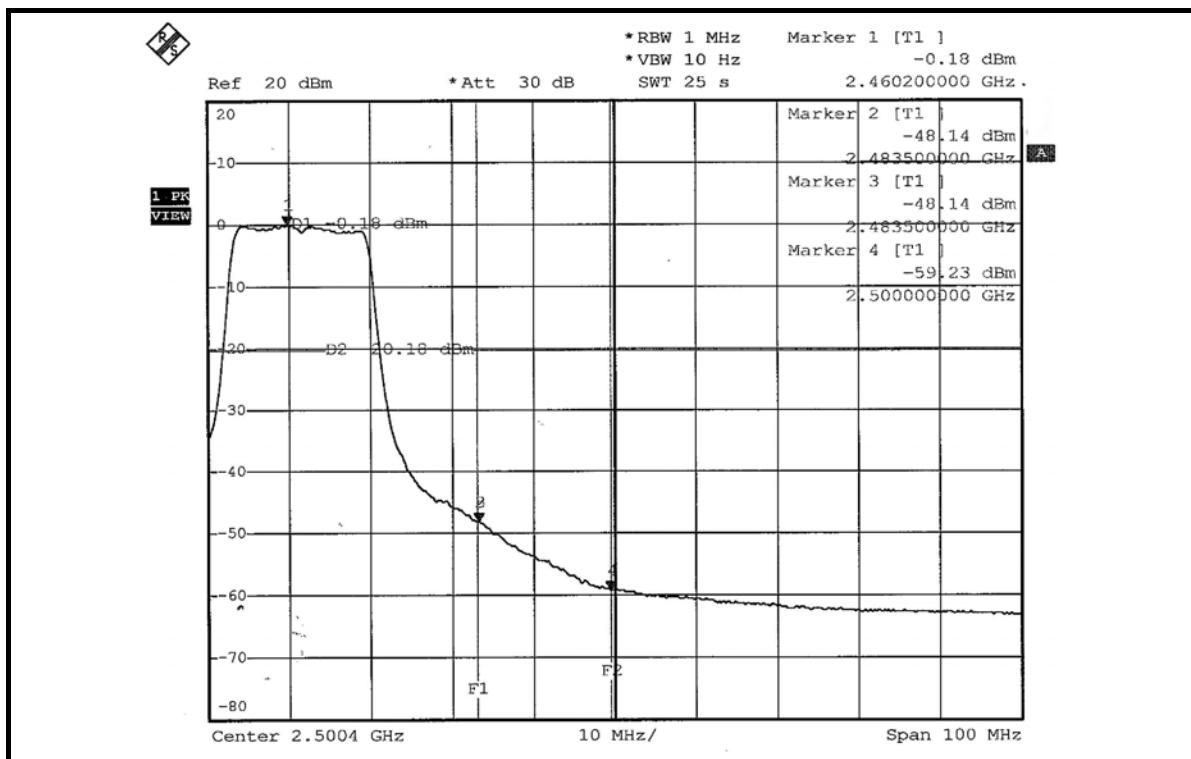
The band edge emission plot on the next page shows 45.62dBc between carrier maximum power and local maximum emission in restrict band (2.39000GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 97.20dBuV/m (Average), so the maximum field strength in restrict band is  $97.20 - 45.62 = 51.58$ dBuV/m which is under 54dBuV/m limit.

**NOTE 2:** The band edge emission plot on the next second page shows 43.62dBc between carrier maximum power and local maximum emission in restrict band (2.48410Hz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 107.76dBuV/m (Peak), so the maximum field strength in restrict band is  $107.76 - 43.62 = 64.14$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot on the next third page shows 47.96dBc between carrier maximum power and local maximum emission in restrict band (2.48350GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 97.29dBuV/m (Average), so the maximum field strength in restrict band is  $97.29 - 47.96 = 49.33$ dBuV/m which is under 54dBuV/m limit.









## 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 PIFA antenna with UFL connector. The maximum Gain of the antenna is 0.62dBi.



## 5. TEST TYPES AND RESULTS (FOR 802.11a 5745~5825MHz Band)

### 5.1 CONDUCTED EMISSION MEASUREMENT

#### 5.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	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 ROHDE & SCHWARZ	ESCS30	100288	Sep. 25, 2007
RF signal cable Woken	5D-FB	Cable-HYCO3-01	Jan. 06, 2008
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Jan. 08, 2008
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Jan. 16, 2008
Software ADT	ADT_Cond_V3	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 HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.



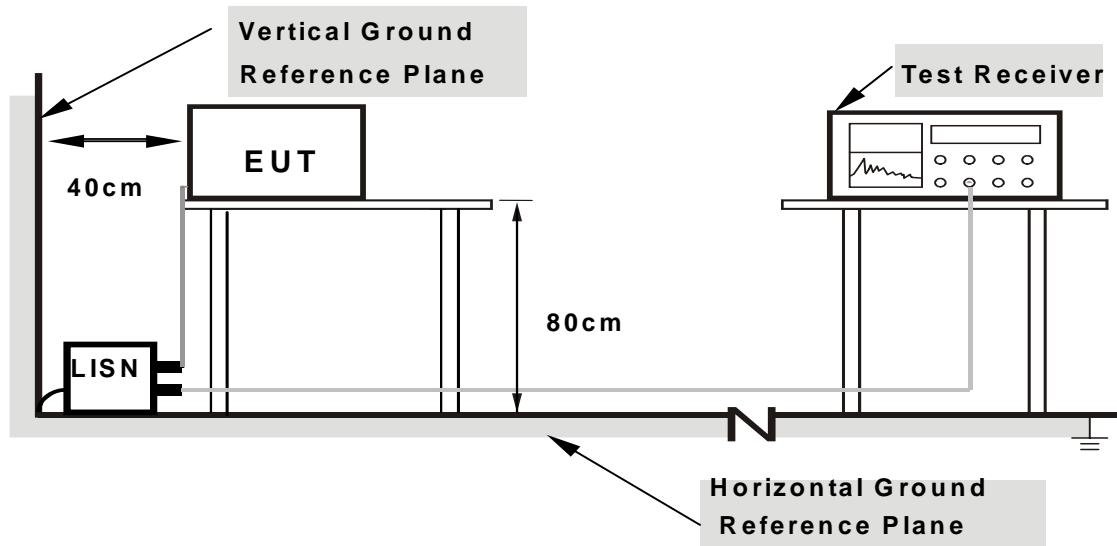
### 5.1.3 TEST PROCEDURES

- 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) was 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 cm from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 5.1.6 EUT OPERATING CONDITIONS

Same as 4.1.6

### 5.1.7 TEST RESULTS

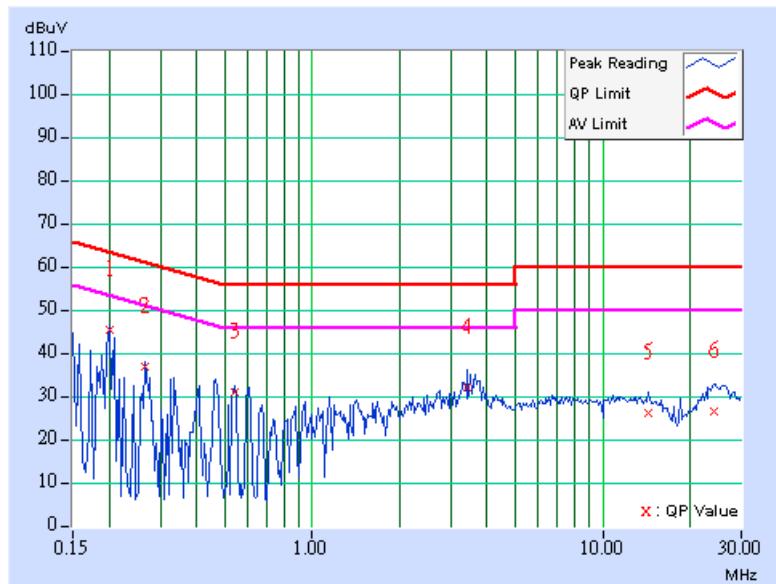
#### Conducted Worst-Case Data

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 5	PHASE	Line 1
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Dean Wang

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
			Factor [MHz]	Factor (dB)	[dB (uV)] Q.P.	[dB (uV)] AV.	[dB (uV)] Q.P.	[dB (uV)] AV.	(dB) Q.P.	(dB) AV.
1	0.201	0.10	44.85	-	44.95	-	63.58	53.58	-18.63	-
2	0.267	0.10	36.11	-	36.21	-	61.20	51.20	-24.99	-
3	0.541	0.10	30.28	-	30.38	-	56.00	46.00	-25.62	-
4	3.434	0.26	31.49	-	31.75	-	56.00	46.00	-24.25	-
5	14.332	0.46	25.46	-	25.92	-	60.00	50.00	-34.08	-
6	24.203	0.78	25.73	-	26.51	-	60.00	50.00	-33.49	-

**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.

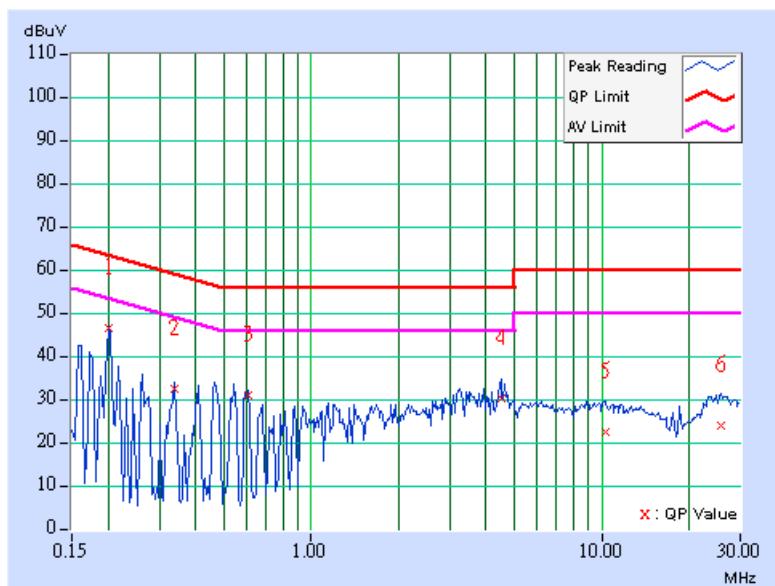


EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 5	PHASE	Line 2
MODULATION TYPE	BPSK	6dB BANDWIDTH	9 kHz
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Dean Wang

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
			Factor [MHz]	[dB (uV)]	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.10	45.83	-	45.93	-	63.58	53.58	-17.65	-
2	0.338	0.10	32.02	-	32.12	-	59.26	49.26	-27.14	-
3	0.603	0.14	30.44	-	30.58	-	56.00	46.00	-25.42	-
4	4.512	0.29	29.80	-	30.09	-	56.00	46.00	-25.91	-
5	10.316	0.43	22.00	-	22.43	-	60.00	50.00	-37.57	-
6	25.754	0.75	23.20	-	23.95	-	60.00	50.00	-36.05	-

**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 (dB<sub>u</sub>V/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
Test Receiver ROHDE & SCHWARZ	ESIB7	100188	Dec. 17, 2007
Spectrum Analyzer ROHDE & SCHWARZ	FSEK 30	100049	Aug. 21, 2007
BILOG Antenna SCHWARZBECK	VULB9168	9168-157	Jan. 04, 2008
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-408	Jan. 18, 2008
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170147	Jan. 16, 2008
Preamplifier Agilent	8449B	3008A01961	Oct. 15, 2007
Preamplifier Agilent	8447D	2944A10629	Oct. 16, 2007
RF signal cable HUBER+SUHNER	SUCOFLEX 106	25648/6	Dec. 19, 2007
RF signal cable HUBER+SUHNER	SUCOFLEX 104	251643/4	Dec. 11, 2007
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower ADT.	AT100	AT93021702	NA
Turn Table ADT.	TT100.	TT93021702	NA
Controller ADT.	SC100.	SC93021702	NA
Amplifier	8449B	3008A01961	Oct. 15, 2007

**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 HwaYa Chamber 2.  
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.  
4. The IC Site Registration No. is IC3789B-2.



### 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 meters 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 lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

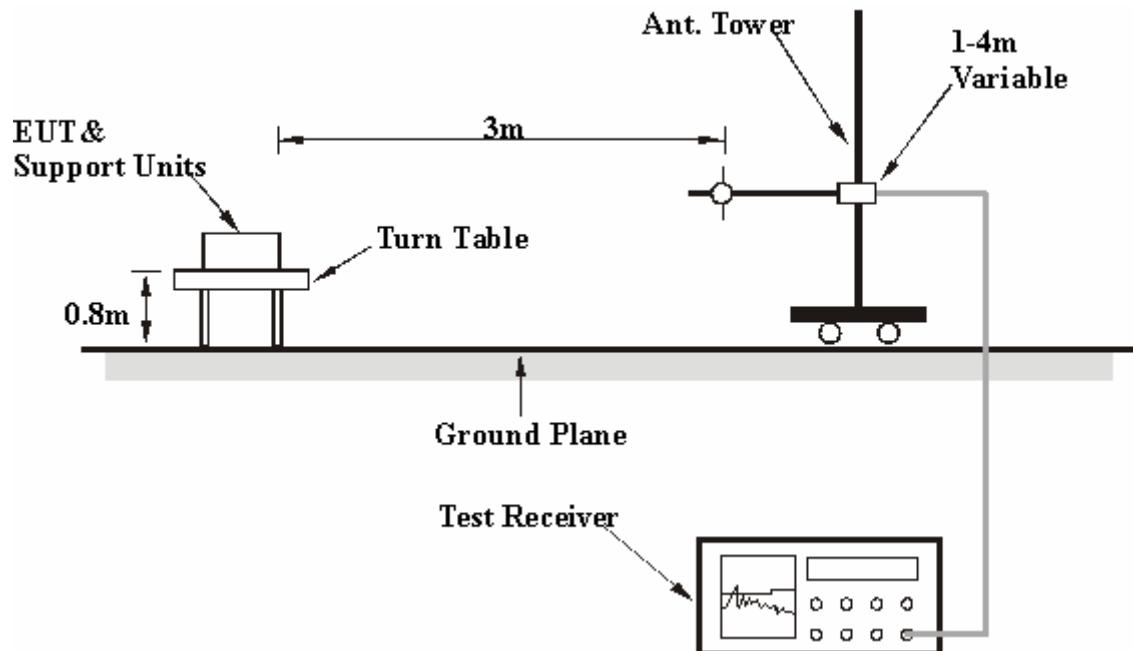
#### NOTE:

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 video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10kHz 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 attached file (Test Setup Photo).

### 5.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6



### 5.2.7 TEST RESULTS

#### Below 1GHz Worst-Case Data

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 5	FREQUENCY RANGE	Below 1000MHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION	Quasi-Peak
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS	22deg. C, 60%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY	Match Tsui

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	57.12	28.98 QP	40.00	-11.02	1.00 H	11	15.90	13.08
2	96.01	35.69 QP	43.50	-7.81	2.00 H	11	25.88	9.81
3	129.06	28.57 QP	43.50	-14.93	2.00 H	11	15.71	12.86
4	191.28	29.83 QP	43.50	-13.67	1.50 H	14	18.34	11.49
5	199.05	32.34 QP	43.50	-11.16	1.50 H	11	21.35	11.00
6	230.16	31.18 QP	46.00	-14.82	1.50 H	332	18.82	12.35
7	288.49	31.18 QP	46.00	-14.82	1.50 H	11	16.62	14.57
8	325.43	32.64 QP	46.00	-13.36	1.00 H	17	16.94	15.70
9	354.60	39.94 QP	46.00	-6.06	1.00 H	32	23.40	16.54
10	395.43	34.81 QP	46.00	-11.19	2.00 H	11	17.13	17.68
11	663.74	32.94 QP	46.00	-13.06	1.00 H	35	8.96	23.98
12	897.05	32.94 QP	46.00	-13.06	2.00 H	299	4.81	28.13
13	908.72	31.62 QP	46.00	-14.38	2.00 H	290	3.34	28.28

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	57.87	29.86 QP	40.00	-10.14	1.00 V	11	16.85	13.01
2	98.31	28.85 QP	43.50	-14.65	1.00 V	188	18.85	9.99
3	354.60	33.96 QP	46.00	-12.04	1.50 V	56	17.42	16.54
4	363.35	33.13 QP	46.00	-12.87	1.50 V	50	16.35	16.79
5	879.55	36.61 QP	46.00	-9.39	1.00 V	92	8.78	27.82
6	909.72	32.92 QP	46.00	-13.08	1.50 V	164	4.63	28.29
7	947.60	34.90 QP	46.00	-11.10	2.50 V	11	6.21	28.69

**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**

EUT TEST CONDITION		MEASUREMENT DETAIL		
<b>CHANNEL</b>		Channel 1		<b>FREQUENCY RANGE</b>
<b>MODULATION TYPE</b>		BPSK		<b>DETECTOR FUNCTION</b>
<b>TRANSFER RATE</b>		6Mbps		<b>ENVIRONMENTAL CONDITIONS</b>
<b>INPUT POWER (SYSTEM)</b>		120Vac, 60 Hz		<b>TESTED BY</b>
				Match Tsui

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	5725.00	66.79 PK	82.88	-16.09	1.37 H	343	27.73	39.06
2	5725.00	56.02 AV	72.55	-16.53	1.37 H	343	16.96	39.06
3	*5745.00	102.88 PK			1.37 H	343	63.76	39.12
4	*5745.00	92.55 AV			1.37 H	343	53.43	39.12
5	#11490.00	58.56 PK	74.00	-15.44	1.26 H	1	8.55	50.01
6	#11490.00	45.19 AV	54.00	-8.81	1.26 H	1	-4.82	50.01

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	5725.00	66.77 PK	79.71	-12.94	1.01 V	337	27.71	39.06
2	5725.00	55.99 AV	69.74	-13.75	1.01 V	337	16.93	39.06
3	*5745.00	99.71 PK			1.01 V	337	60.59	39.12
4	*5745.00	89.74 AV			1.01 V	337	50.62	39.12
5	#11490.00	58.41 PK	74.00	-15.59	1.17 V	360	8.40	50.01
6	#11490.00	45.13 AV	54.00	-8.87	1.17 V	360	-4.88	50.01

**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

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 3	FREQUENCY RANGE		1 ~ 40 GHz
MODULATION TYPE	BPSK	DETECTOR FUNCTION		Peak(PK) Average (AV)
TRANSFER RATE	6Mbps	ENVIRONMENTAL CONDITIONS		24deg. C, 61%RH, 991hPa
INPUT POWER (SYSTEM)	120Vac, 60 Hz	TESTED BY		Match Tsui

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	*5785.00	103.27 PK			1.29 H	360	64.03	39.24
2	*5785.00	92.85 AV			1.29 H	360	53.61	39.24
3	#11570.00	58.96 PK	74.00	-15.04	1.21 H	1	9.10	49.86
4	#11570.00	45.38 AV	54.00	-8.62	1.21 H	1	-4.48	49.86

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	*5785.00	100.08 PK			1.07 V	358	60.84	39.24
2	*5785.00	90.30 AV			1.07 V	358	51.06	39.24
3	11570.00	58.36 PK	74.00	-15.64	1.10 V	360	8.50	49.86
4	11570.00	45.29 AV	54.00	-8.71	1.10 V	360	-4.57	49.86

**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



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		Frequency Range		1 ~ 40 GHz
MODULATION TYPE		Detector Function		Peak(PK) Average (AV)
TRANSFER RATE		Environmental Conditions		24deg. C, 61%RH, 991hPa
INPUT POWER (SYSTEM)		Tested By		Match Tsui

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	*5825.00	103.36 PK			1.00 H	340	64.03	39.33
2	*5825.00	94.01 AV			1.00 H	340	54.68	39.33
3	5850.00	66.75 PK	83.36	-16.61	1.00 H	340	27.38	39.37
4	5850.00	55.78 AV	74.01	-18.23	1.00 H	340	16.41	39.37
5	#11650.00	58.60 PK	74.00	-15.40	1.30 H	360	8.78	49.82
6	#11650.00	45.29 AV	54.00	-8.71	1.30 H	360	-4.53	49.82

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	*5825.00	100.38 PK			1.04 V	10	61.05	39.33
2	*5825.00	90.47 AV			1.04 V	10	51.14	39.33
3	#11650.00	59.10 PK	74.00	-14.90	1.20 V	360	9.28	49.82
4	#11650.00	45.38 AV	54.00	-8.62	1.20 V	360	-4.44	49.82

**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	100040	Jun. 07, 2007

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

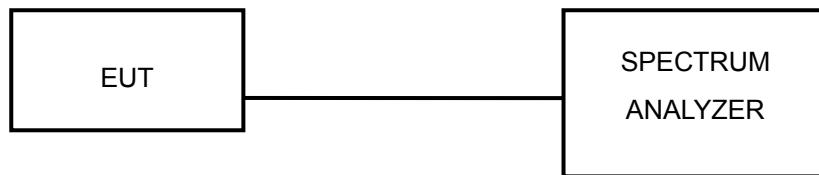
### 5.3.3 TEST PROCEDURE

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.

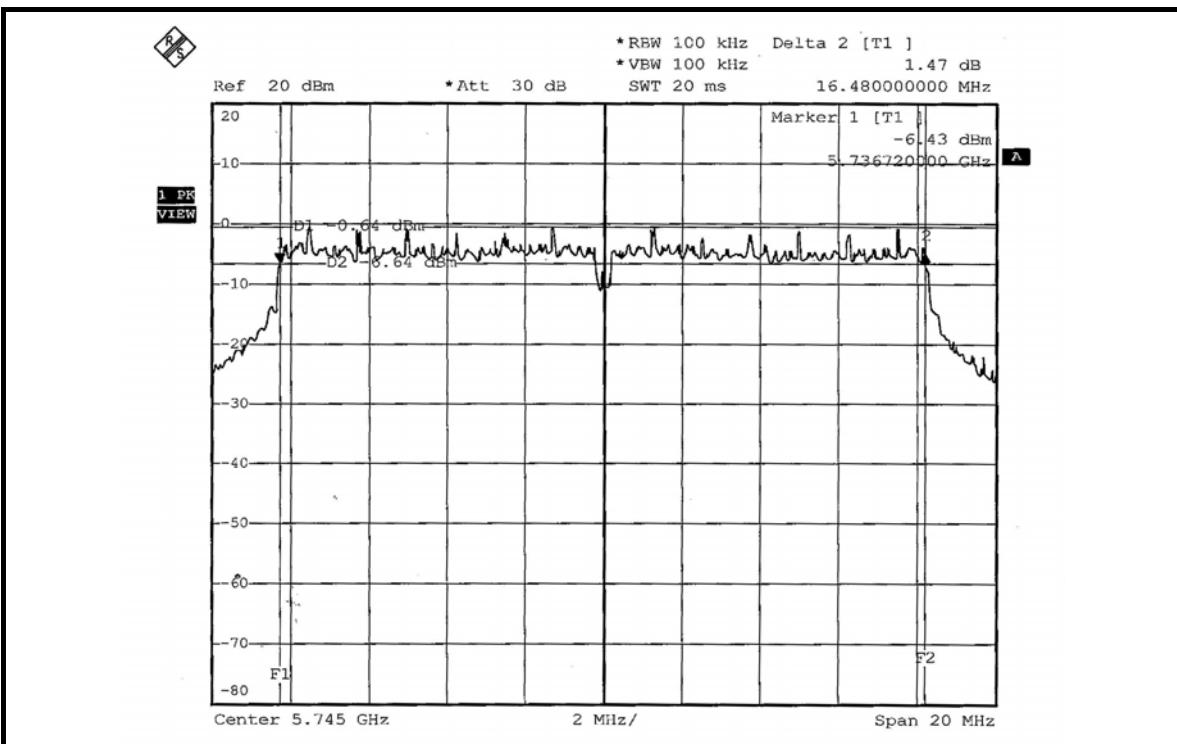
### 5.3.7 TEST RESULTS

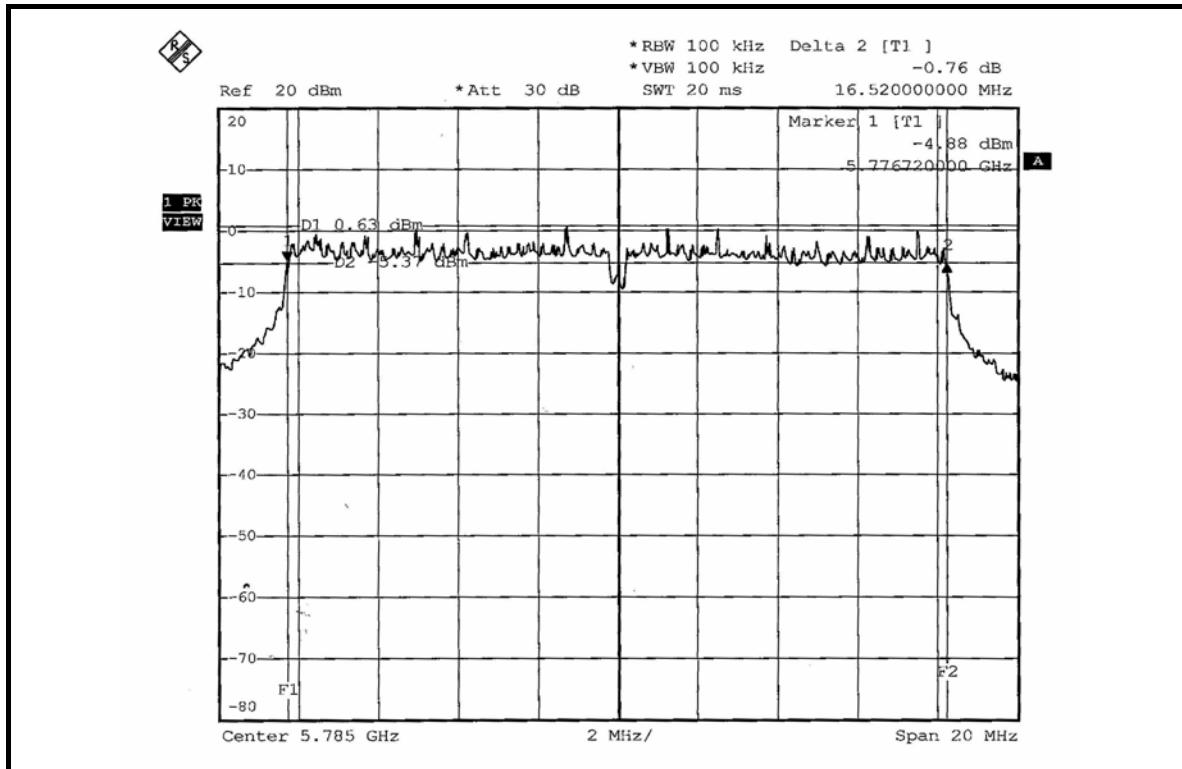
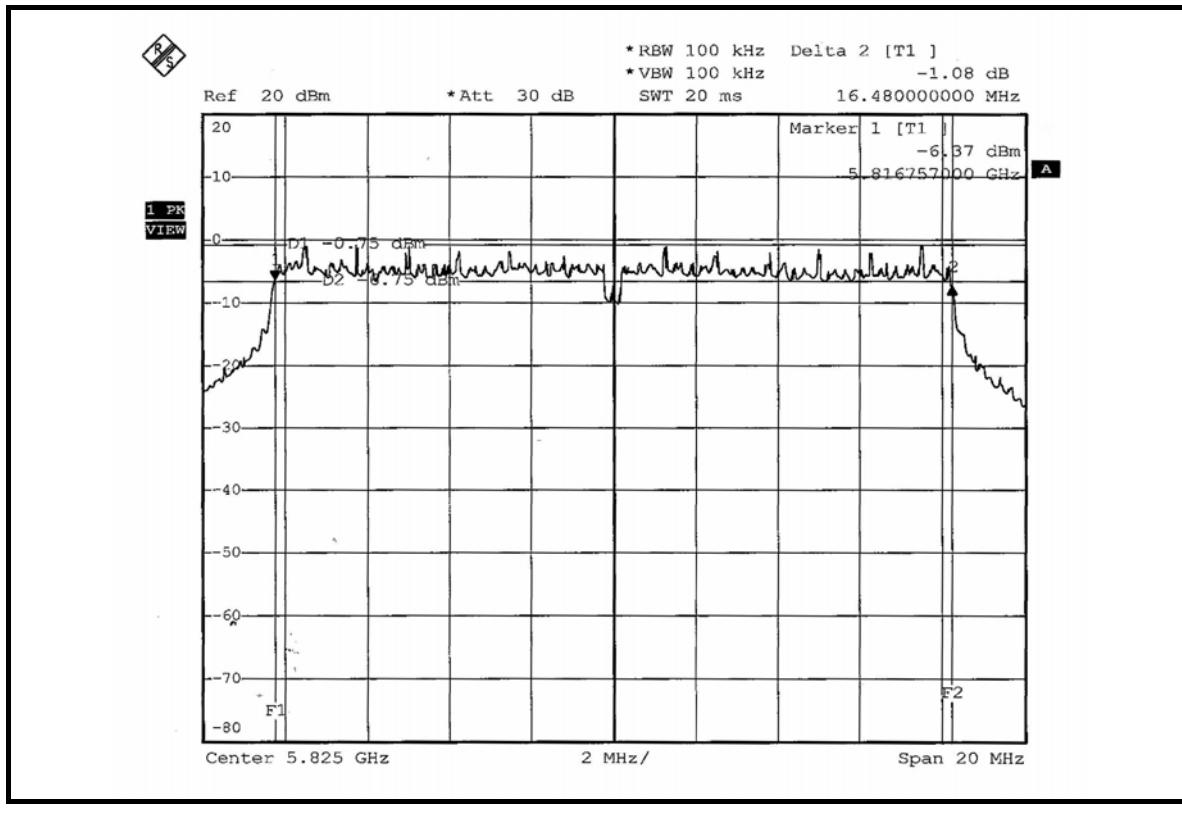
#### 802.11a OFDM modulation

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	5745	16.48	0.5	PASS
3	5785	16.52	0.5	PASS
5	5825	16.48	0.5	PASS

#### CH 1



**CH 3**

**CH 5**




## 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	100040	Jun. 07, 2007
ANRITSU SYNTHESIZED SIGNAL GENERATOR	68247B	984703	May 08, 2007
DIGITAL RT OSCILLOSCOPE	TDS1012	C037299	Nov. 27, 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 5.3.6



## 5.4.7 TEST RESULTS

### 802.11a OFDM modulation

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	5745	50.234	17.01	30	PASS
3	5785	50.816	17.06	30	PASS
5	5825	50.699	17.05	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	100040	Jun. 07, 2007

**NOTES:**

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

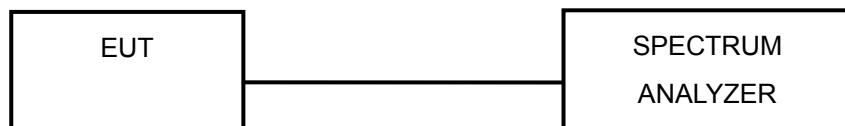
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time = span/3 kHz. The power spectral density was measured and recorded.

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 5.3.6

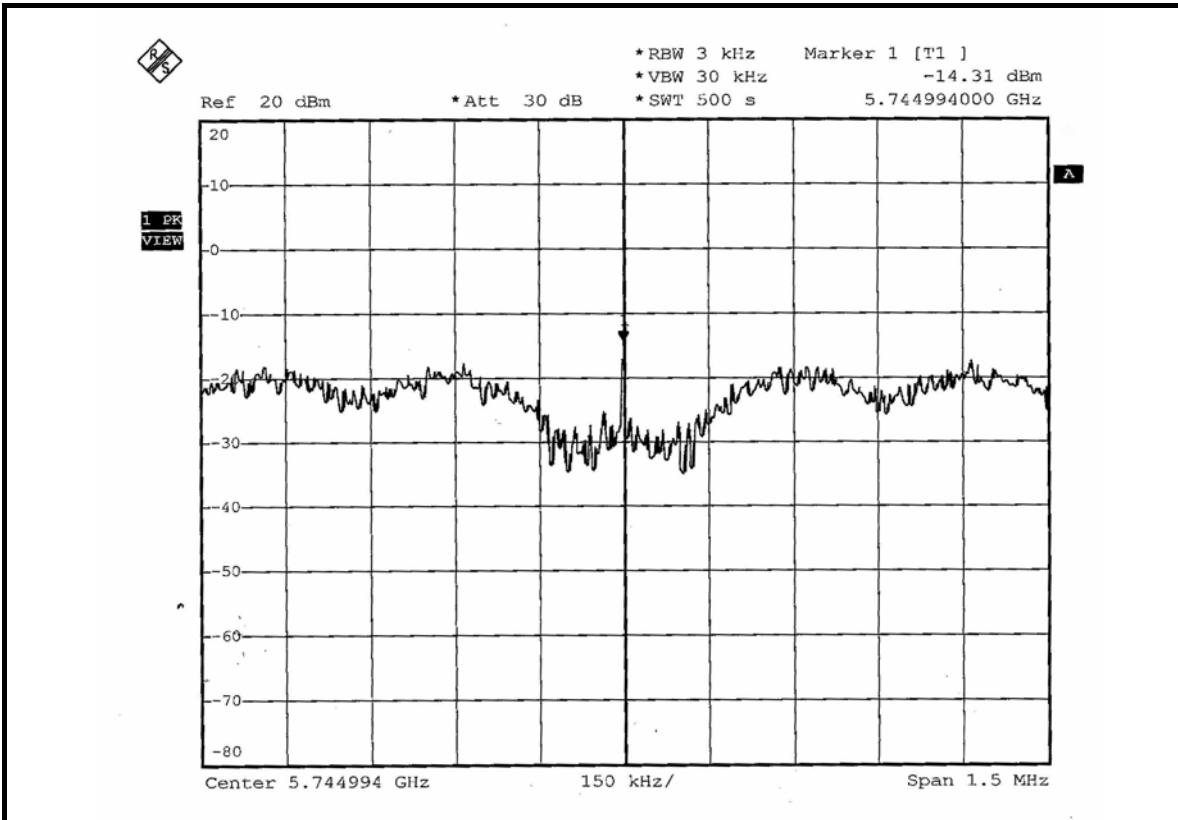
## 5.5.7 TEST RESULTS

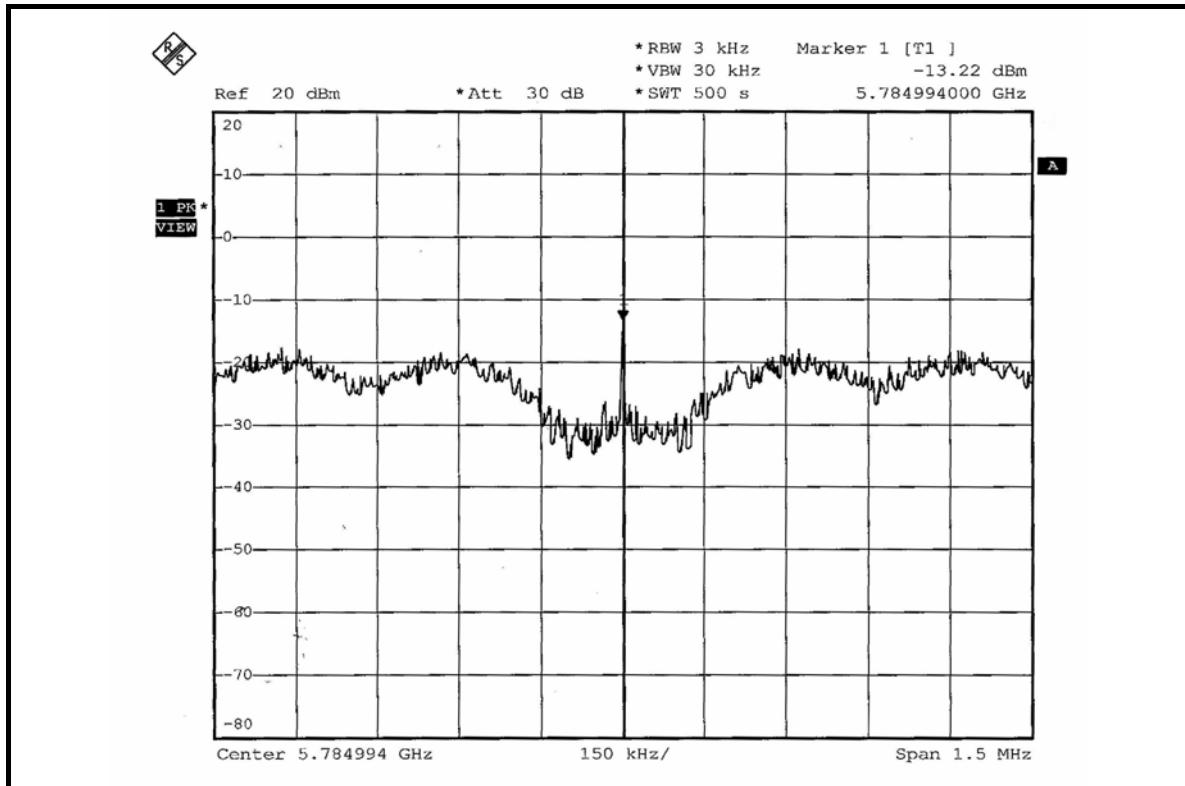
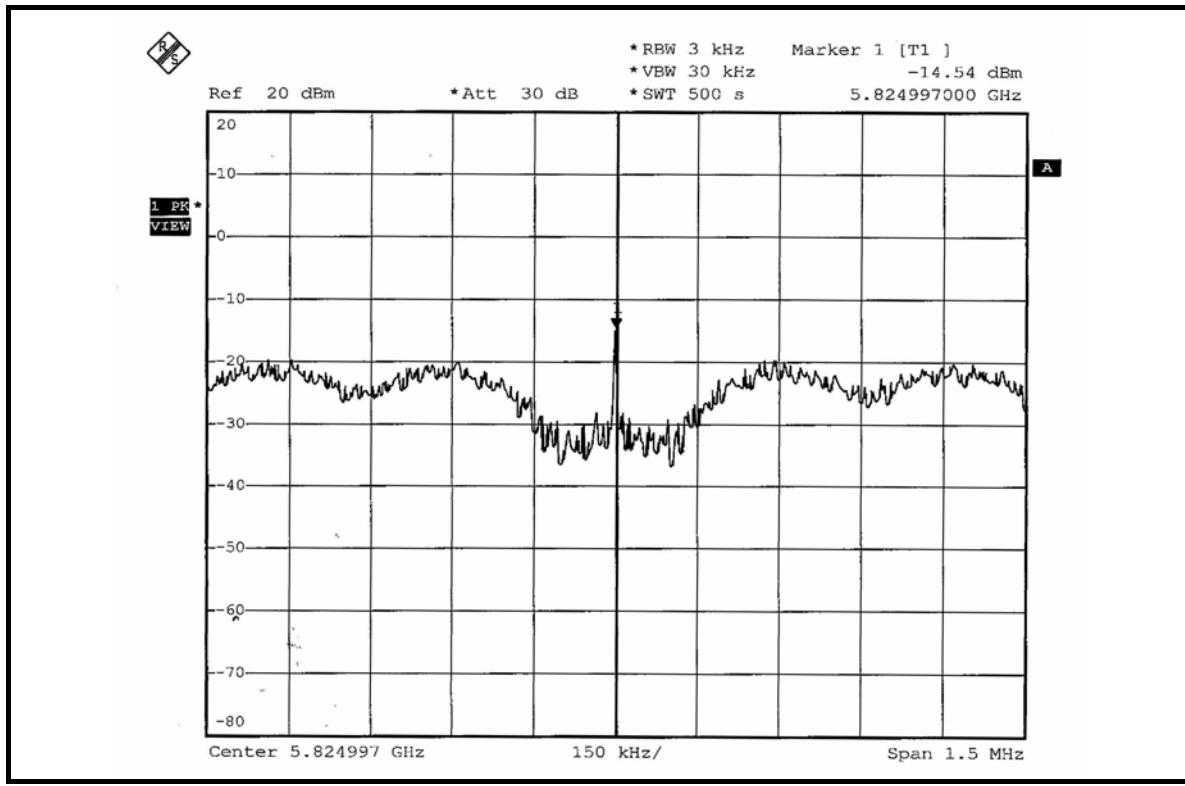
### 802.11a OFDM modulation

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg.C, 65%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	5745	-14.31	8	PASS
3	5785	-13.22	8	PASS
5	5825	-14.54	8	PASS

### CH 1



**CH 3**

**CH 5**




## 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	100040	Jun. 07, 2007

#### NOTES:

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

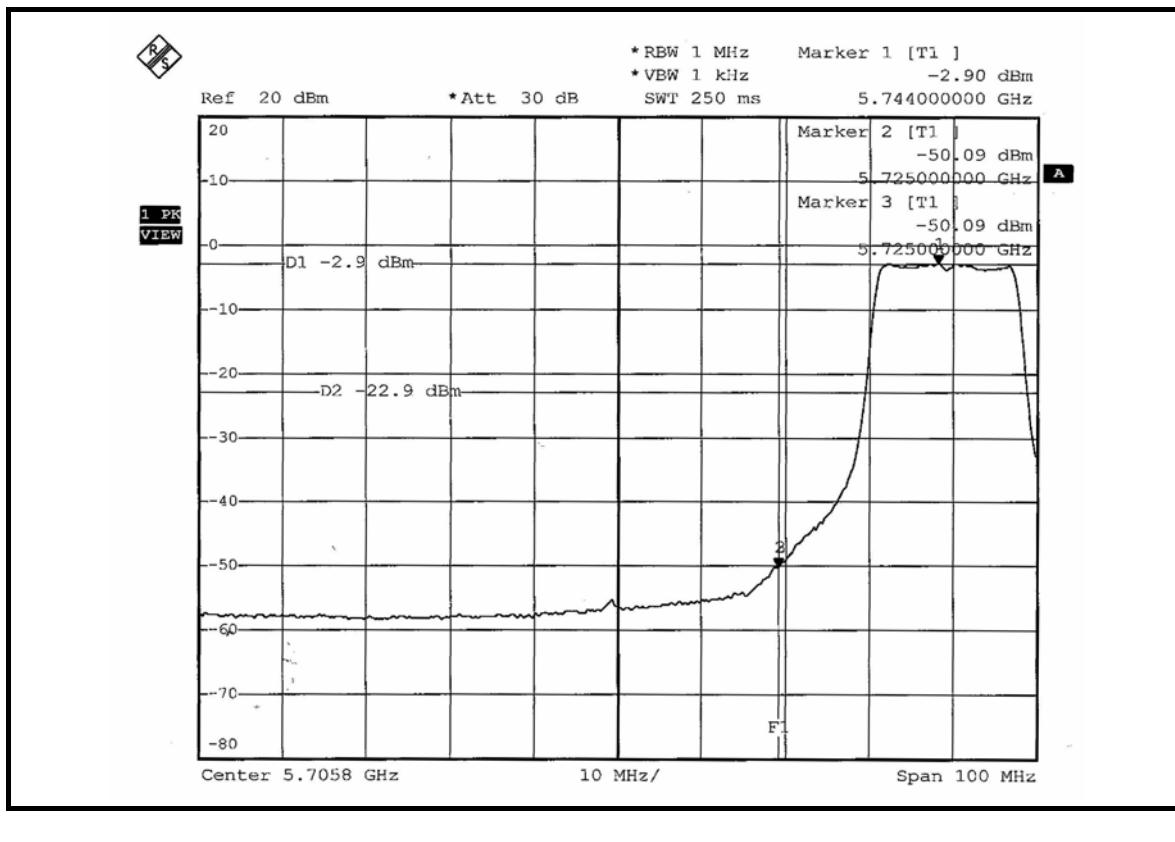
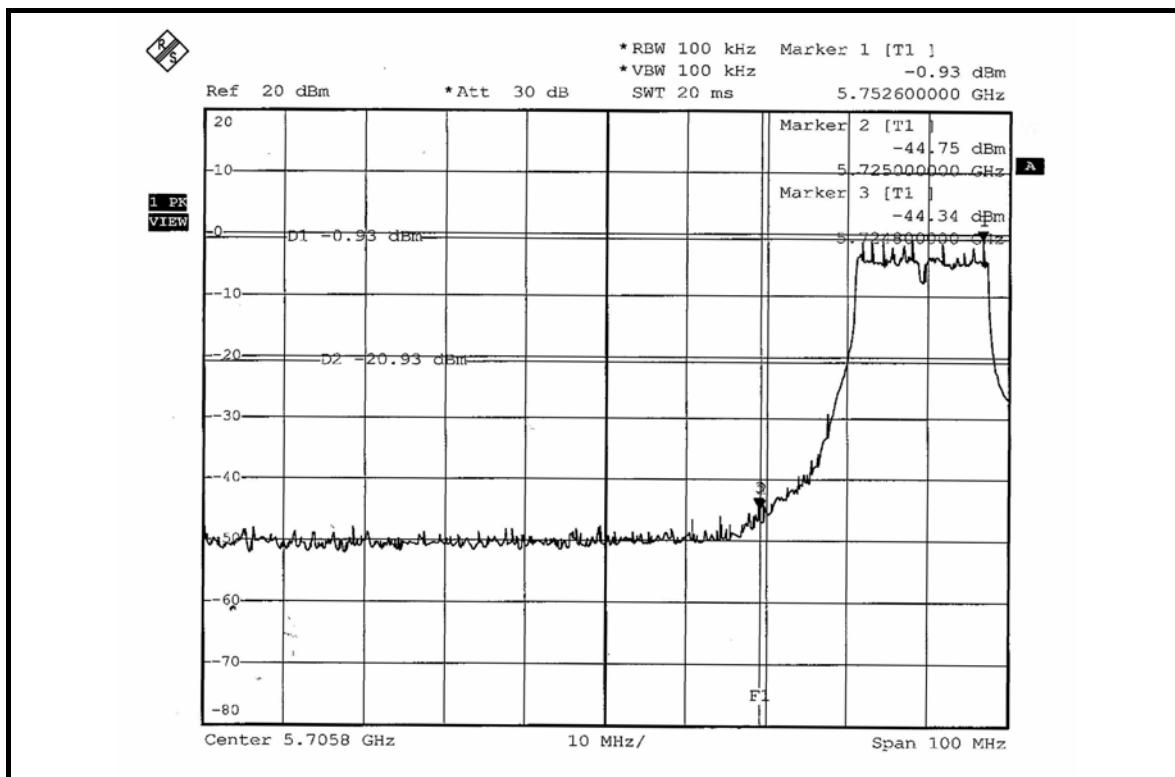


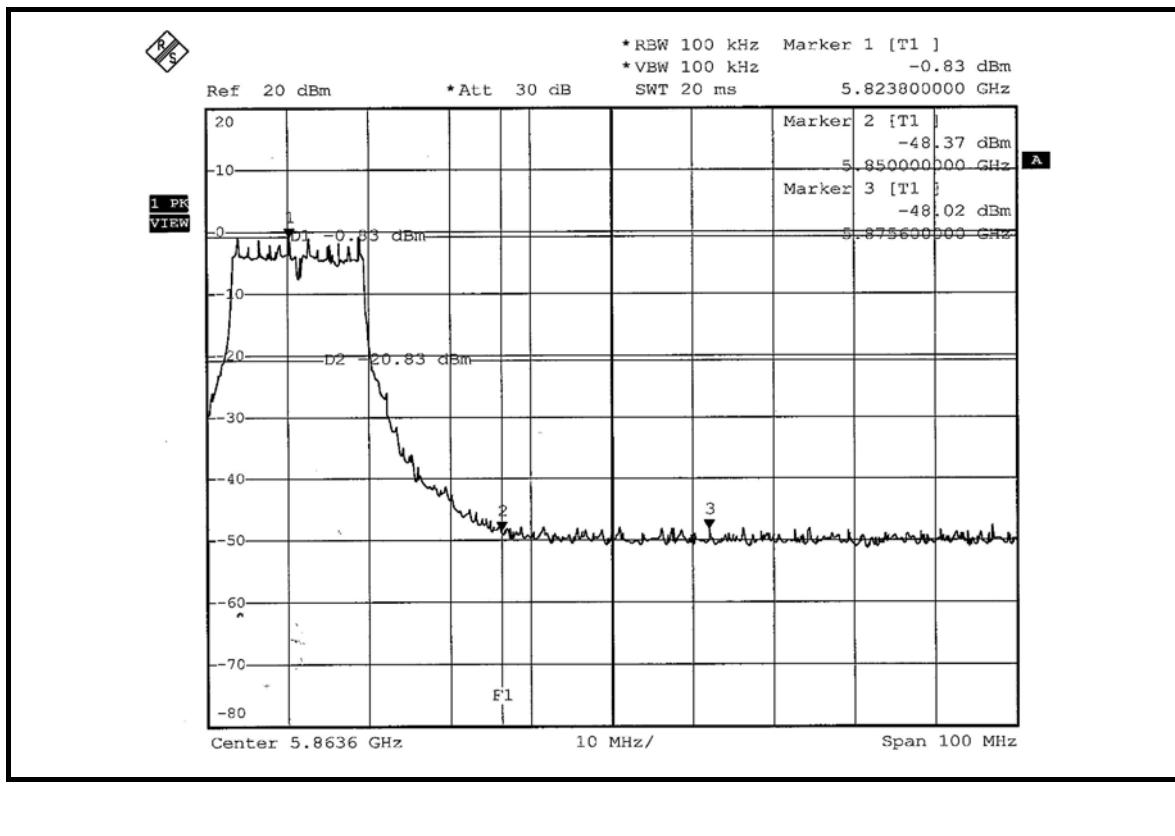
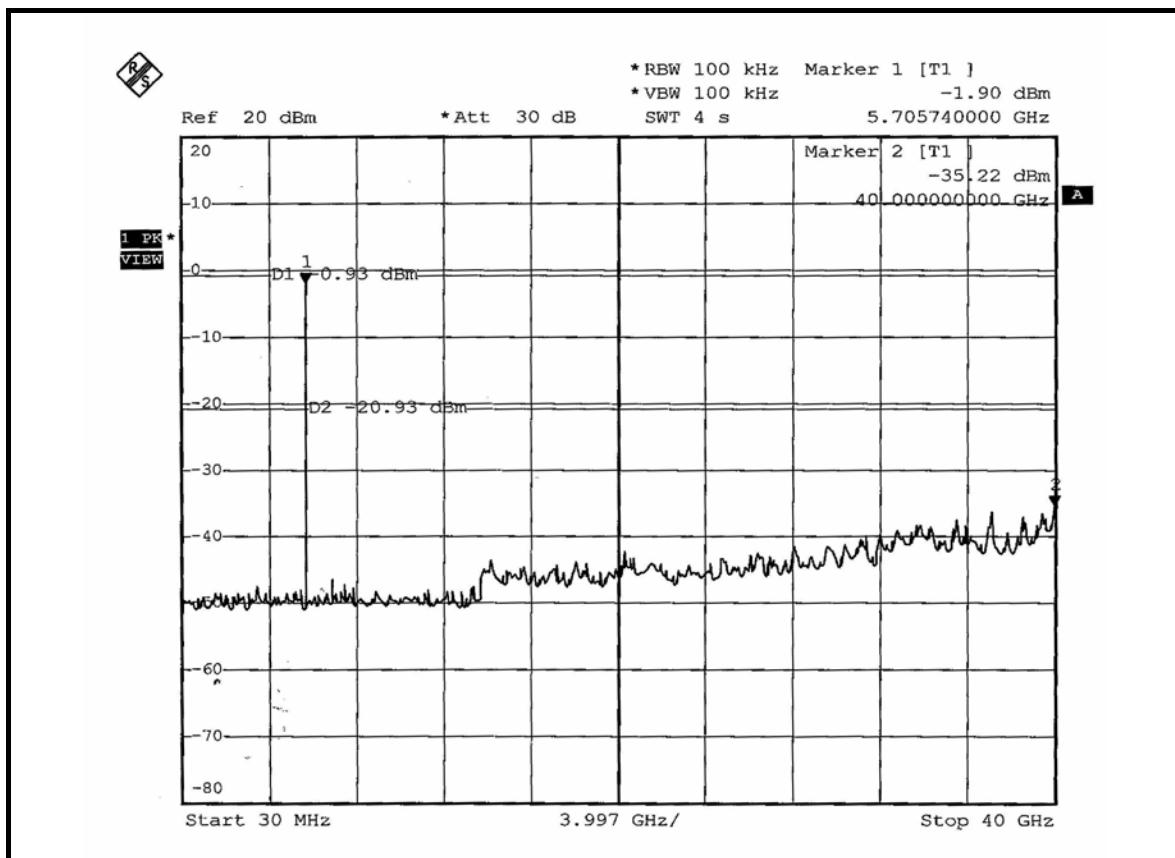
### 5.6.5 EUT OPERATING CONDITION

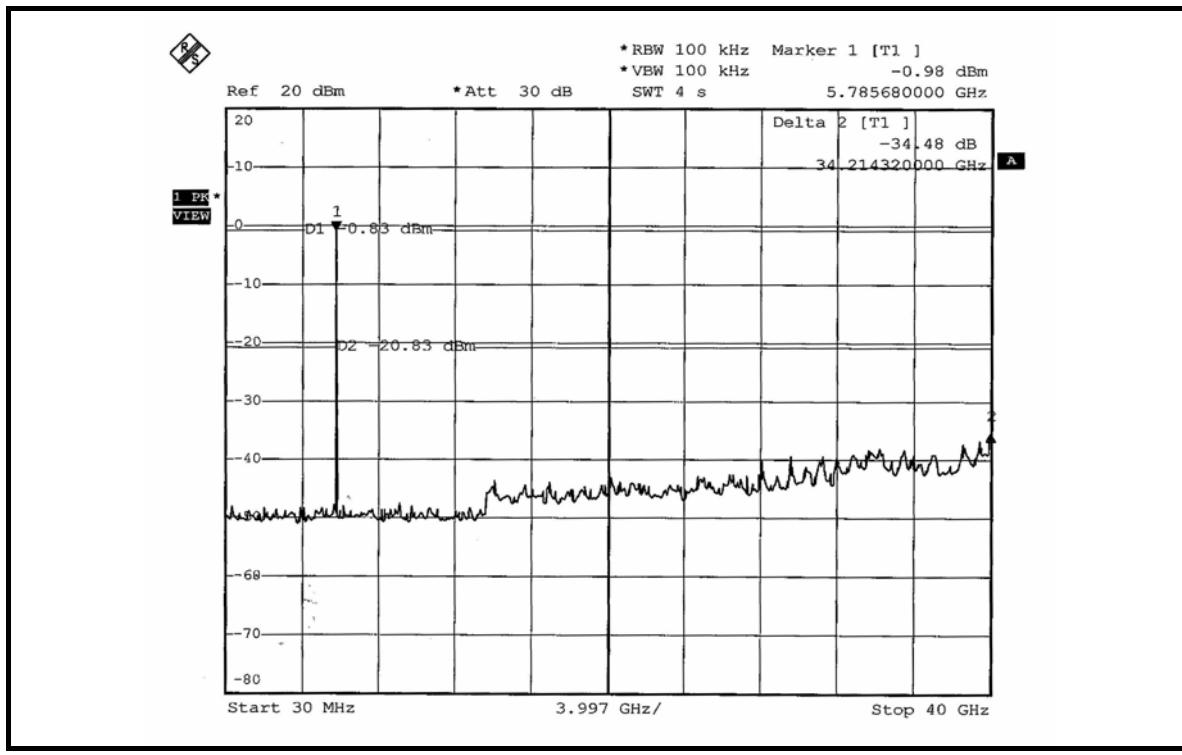
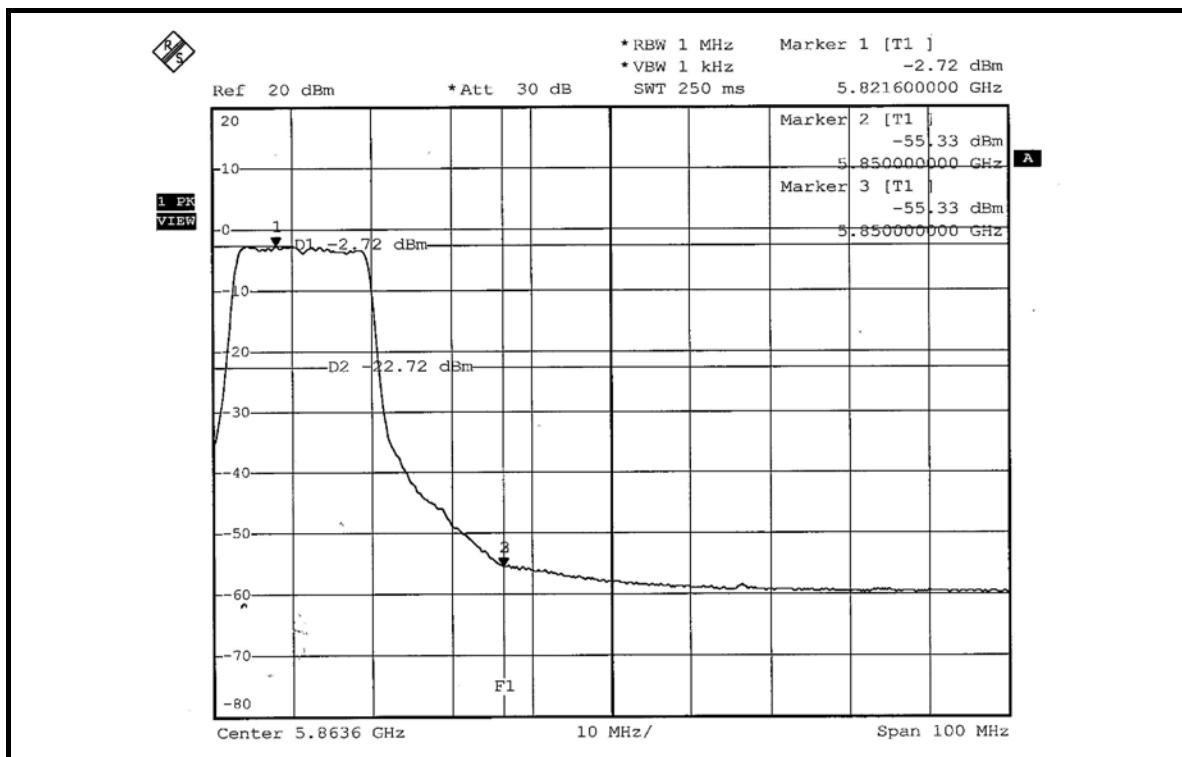
Same as Item 5.9.6

### 5.6.6 TEST RESULTS

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









## 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 PIFA antenna with UFL connector. The maximum Gain of the antenna is 2.63dBi.



## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



## 7. 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: 886-2-26051924

**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.