



# FCC TEST REPORT

**REPORT NO.:** RF900807R02

**MODEL NO.:** St-AP2120

**RECEIVED:** August 7, 2001

**TESTED:** August 25 ~ August 30, 2001

**APPLICANT:** Sumtel Communications, Inc.

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Taiwan, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

**LAB LOCATION:** 47 14th Lin, Chiapau Tsun, Linko, Taipei,  
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0528

NVLAP®

Lab Code: 200102-0



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## 1 CERTIFICATION

**PRODUCT :** Wireless Access Point  
**BRAND NAME :** Sumtel  
**MODEL NO. :** St-AP2120  
**APPLICANT :** Sumtel Communications, Inc.  
**STANDARDS :** 47 CFR Part 15, Subpart C (Section 15.247),  
ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility from August 25, 2001 to August 30, 2001. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

TESTED BY :	<u>Steven Lu</u> Steven Lu	DATE:	<u>Sep. 4, 2001</u>
CHECKED BY :	<u>Emily Lu</u> Emily Lu	DATE:	<u>Sep. 4, 2001</u>
APPROVED BY :	<u>Harris W. Lai</u> Harris W. Lai Senior V.P.	DATE:	<u>Sep. 4, 2001</u>



## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.107	AC Power Conducted Emission Limit: 48dBuV	PASS	Meet the requirement of limit Minimum passing margin is -5.04dBuV at 0.459MHz
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(c)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -4.1dBuV at 4874.2 MHz
15.247(d)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit
15.247(c)	Band Edge Measurement Limit: 20 dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Wireless Access Point
<b>MODEL NO.</b>	St-AP2120
<b>POWER SUPPLY</b>	7.5VDC from AC adapter
<b>MODULATION TYPE</b>	BPSK, QPSK, CCK
<b>RADIO TECHNOLOGY</b>	DSSS
<b>TRANSFER RATE</b>	1/2/5.5/11Mbps
<b>FREQUENCY RANGE</b>	2412MHz ~ 2462MHz
<b>NUMBER OF CHANNEL</b>	11
<b>OUTPUT POWER</b>	18.09dBm
<b>ANTENNA TYPE</b>	Dipole antenna
<b>POWER CABLE</b>	Nonshielded 1.2m
<b>I/O PORTS</b>	RJ45 Port, Serial port
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:** 1. The EUT is operated with the following power adapter.

<b>Model No. :</b>	SCP48-751500
<b>Input Power :</b>	120Vac, 60Hz
<b>Output Power :</b>	7.5VDC, 1500mA

2. The Wireless Access Point are connected to a wired network via RJ45(UTP) connector to communicate with each other and with server and wirelessly connected to wireless node via the IEEE802.11b standard wireless protocol.
3. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



### 3.2 DESCRIPTION OF TEST MODES

Eleven channels are provided in 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		

**NOTE:** 1. Below 1 GHz, the channel 1, 6, and 11 were pre-tested in chamber. The channel 11, worst case one, was chosen for final test.  
 2. Above 1 GHz, the channel 1, 6, and 11 were tested individually.

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Wireless Access Point. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC CFR 47 Part 15, Subpart C. (15.247)**

**ANSI C63.4 : 1992**

All tests 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	DELL	INSPIRON5000e	NA	FCC DoC APPROVED
2	PRINTER	HP	2225C+	3123S97230	DSI6XU2225
3	MODEM	ACEEX	1414	980020503	IFAXDM1414
4	Personal Computer	IBM	2187-12W	1S218714ABNA 000V	FCC DoC APPROVED
5	19" COLOR MONITOR	HP	D2842A	KR93473168	BEJCB910
6	PS/2 KEYBOARD	FORWARD	FDA-104GA	FDKB8110111	F4ZDA-104G
7	PS/2 MOUSE	DEXIN	A2P800A	80102095	NIYA2P800A
8	10/100 LAN PC CARD	3COM	3CCFE575CT-D	6ZE1316B4E	FCC DoC APPROVED

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core.
3	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
4	NA
5	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w/o core.
6	1.5 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.
7	1.5 m foil shielded wire, terminated with PS2 connector via drain wire, w/o core.
8	NA

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



## 4 TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class B (dBuV)	
	Quasi-peak	Average
0.45 – 30	48	-

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class 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
*ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	July 4, 2002
*ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	839135/006	July 3, 2002
ROHDE & SCHWARZ 4-wire ISN	ENY41	837032/016	Nov. 28, 2001
ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/016	Dec. 3, 2001
*EMCO-L.I.S.N. (for peripheral)	3825/2	9204-1964	July 3, 2002
Software	Cond-V2J	NA	NA
*RF cable (JYEBAO)	RG-58A/U	Cable-C02.01	July 9, 2001
HP Terminator (For EMCO LISN)	11593A	E1-01-298	Feb. 20, 2002
HP Terminator (For EMCO LISN)	11593A	E1-01-299	Feb. 20, 2002
Shielded Room	Site 2	ADT-C02	NA
VCCI Site Registration No.	Site 2	C-240	NA

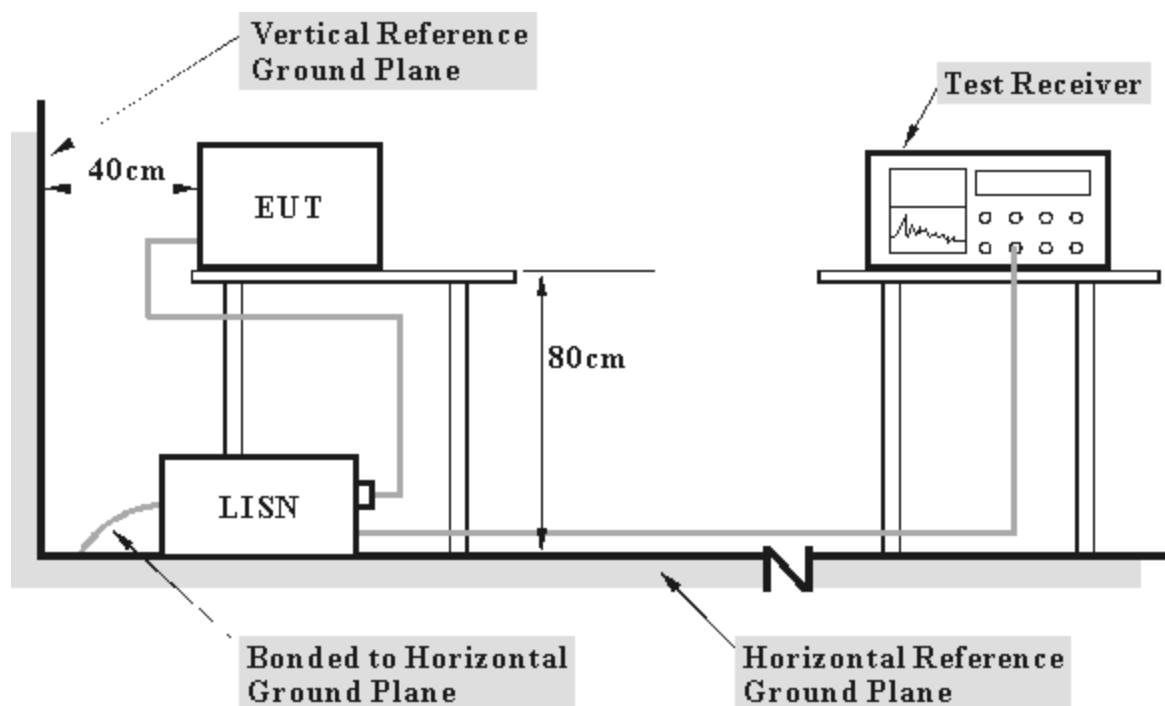
**NOTE:**

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.
3. “\*” = These equipments are used for the final measurement.

#### 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 450 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

#### 4.1.4 TEST SETUP



**Note:** 1. Support units were connected to second LISN.  
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

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



#### 4.1.5 EUT OPERATING CONDITIONS

- a. Placed the EUT (with a computer system) on the testing table.
- b. The computer system sent data to EUT by command "PIN" via an RJ 45 cable.
- c. The computer system sent "H" messages to Color Monitor and Monitor displayed "H" patterns on its screen.
- d. The computer system sent "H" messages to modem.
- e. The computer system sent "H" messages to printer, and the printer prints them on paper.
- f. Prepared another computer system to act as a communication partner and placed it outside of testing area.
- g. The communication partner run a test program to enable EUT under transmission/receiving condition continuously at specific channel frequency via an RJ 45 cable.
- h. The communication partner sent data to EUT by command "PIN".

## 4.1.6 TEST RESULTS

<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	26 deg. C, 63%RH, 1005 hPa		<b>TESTED BY:</b> Steven Lu

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.458	0.10	39.14	-	39.24	-	48.00	-	-8.76	-
2	0.591	0.10	37.63	-	37.73	-	48.00	-	-10.27	-
3	0.977	0.10	25.12	-	25.22	-	48.00	-	-22.78	-
4	1.131	0.10	26.41	-	26.51	-	48.00	-	-21.49	-
5	1.989	0.10	24.64	-	24.74	-	48.00	-	-23.26	-
6	2.872	0.19	20.32	-	20.51	-	48.00	-	-27.49	-

Remarks: 1. \*\*: Undetectable

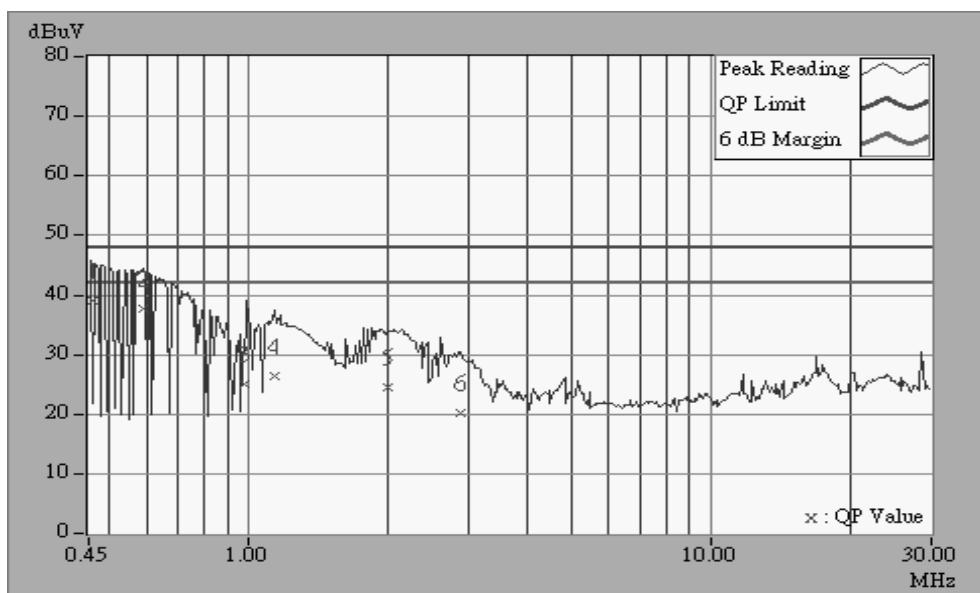
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. -: NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.



<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>MODE</b>	Channel 1	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	26 deg. C, 63%RH, 1005 hPa		<b>TESTED BY:</b> Steven Lu

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.459	0.10	42.86	-	42.96	-	48.00	-	-5.04	-
2	1.206	0.10	33.31	-	33.41	-	48.00	-	-14.59	-
3	2.049	0.10	23.49	-	23.59	-	48.00	-	-24.41	-
4	2.985	0.20	24.85	-	25.05	-	48.00	-	-22.95	-
5	4.942	0.32	18.06	-	18.38	-	48.00	-	-29.62	-
6	13.679	0.55	12.57	-	13.12	-	48.00	-	-34.88	-

Remarks: 1. \*\*: Undetectable

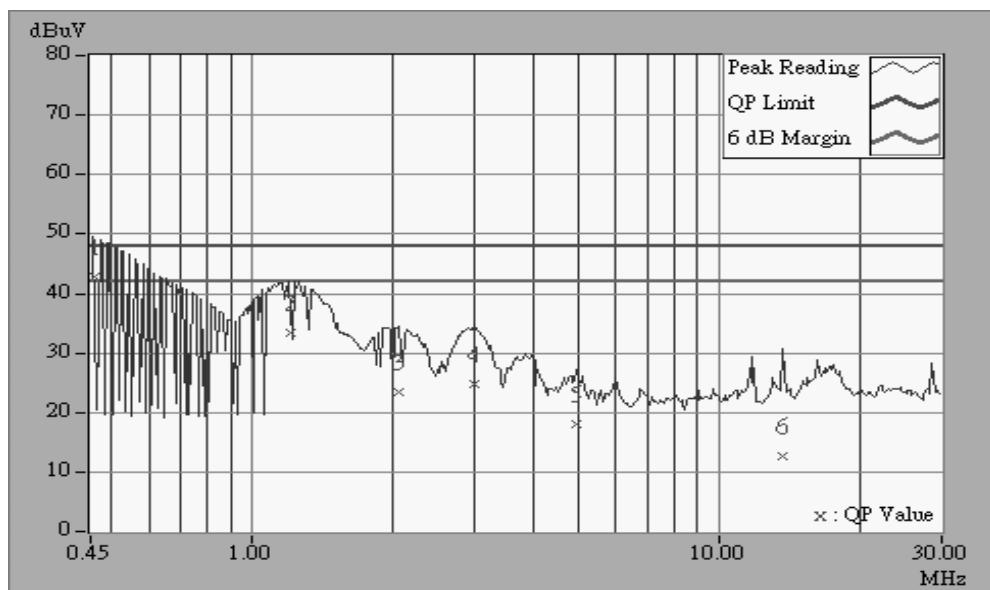
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. -: NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.





<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	26 deg. C, 63%RH, 1005 hPa		<b>TESTED BY:</b> Steven Lu

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.459	0.10	39.10	-	39.20	-	48.00	-	-8.80	-
2	0.575	0.10	37.21	-	37.31	-	48.00	-	-10.69	-
3	1.147	0.10	27.94	-	28.04	-	48.00	-	-19.96	-
4	1.950	0.10	25.04	-	25.14	-	48.00	-	-22.86	-
5	2.699	0.17	22.98	-	23.15	-	48.00	-	-24.85	-
6	16.436	0.86	14.95	-	15.81	-	48.00	-	-32.19	-

Remarks: 1. \*\*: Undetectable

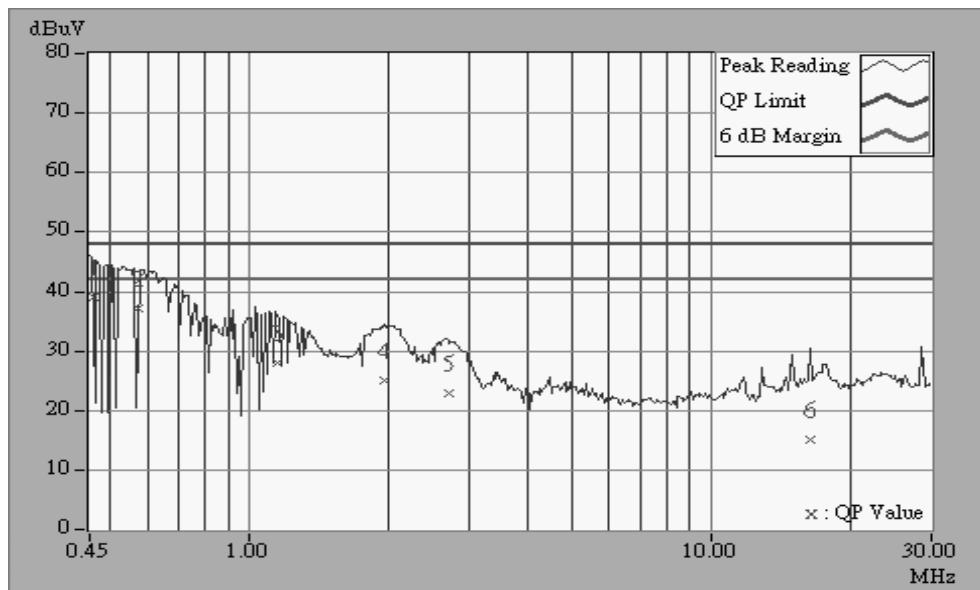
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. -: NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.





<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>MODE</b>	Channel 6	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	26 deg. C, 63%RH, 1005 hPa		<b>TESTED BY:</b> Steven Lu

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.459	0.10	42.82	-	42.92	-	48.00	-	-5.08	-
2	0.922	0.10	28.57	-	28.67	-	48.00	-	-19.33	-
3	1.122	0.10	32.86	-	32.96	-	48.00	-	-15.04	-
4	1.761	0.10	23.50	-	23.60	-	48.00	-	-24.40	-
5	2.703	0.17	22.74	-	22.91	-	48.00	-	-25.09	-
6	3.570	0.26	19.40	-	19.66	-	48.00	-	-28.34	-

Remarks: 1. \*\*: Undetectable

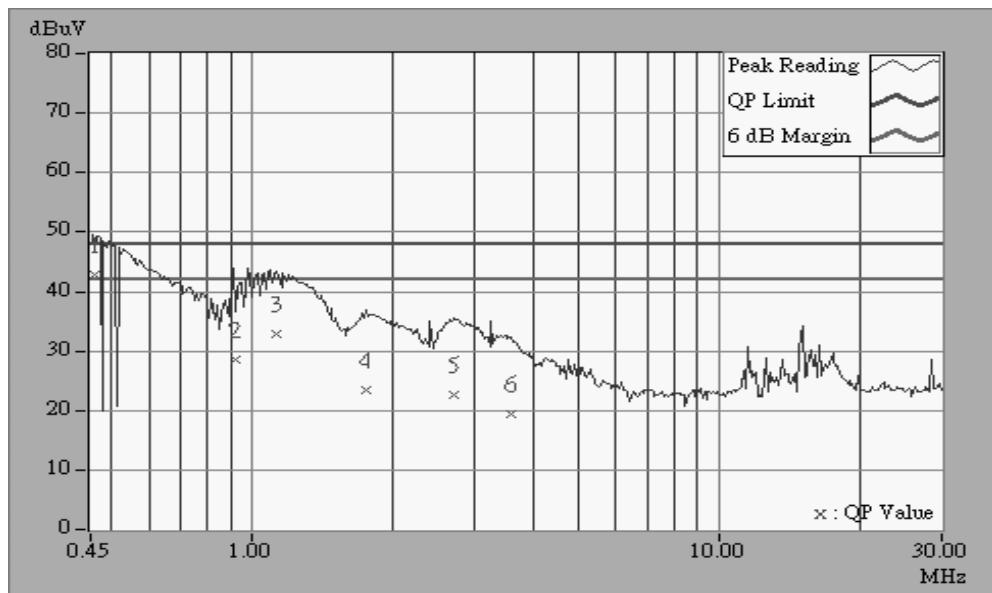
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. -: NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.





<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	26 deg. C, 63%RH, 1005 hPa		<b>TESTED BY:</b> Steven Lu

No	Freq. (MHz)	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.462	0.10	38.89	-	38.99	-	48.00	-	-9.01	-
2	0.605	0.10	34.91	-	35.01	-	48.00	-	-12.99	-
3	0.828	0.10	29.42	-	29.52	-	48.00	-	-18.48	-
4	1.860	0.10	23.77	-	23.87	-	48.00	-	-24.13	-
5	2.471	0.15	24.74	-	24.89	-	48.00	-	-23.11	-
6	2.471	0.15	24.68	-	24.83	-	48.00	-	-23.17	-

Remarks: 1. \*\*: Undetectable

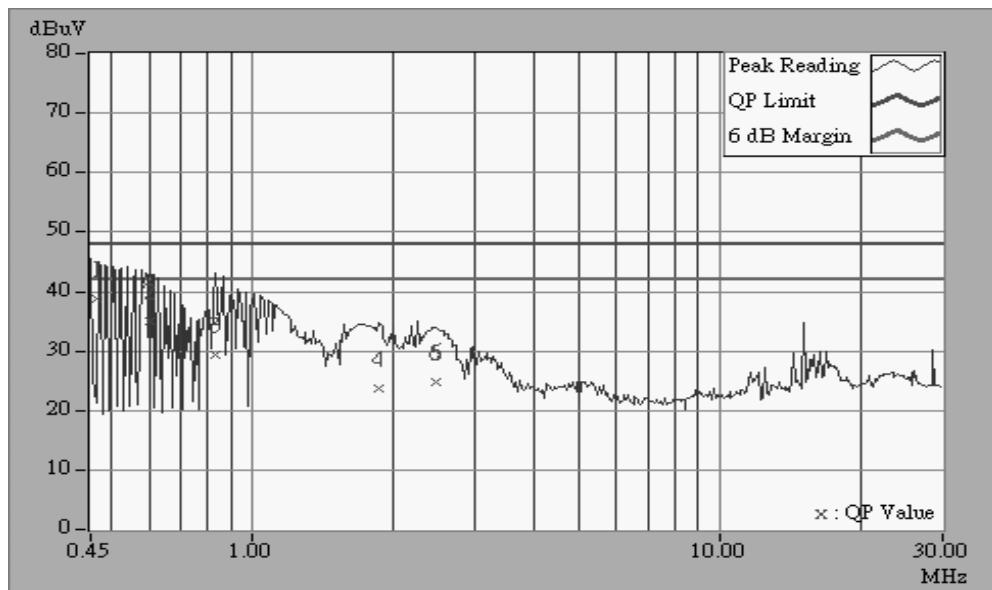
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. -: NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.





<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>MODE</b>	Channel 11	<b>6dB BANDWIDTH</b>	10 kHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	26 deg. C, 63%RH, 1005 hPa		<b>TESTED BY:</b> Steven Lu

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	QP.	AV.	QP.	AV.	QP.	AV.	QP.	AV.
1	0.460	0.10	42.82	-	42.92	-	48.00	-	-5.08	-
2	0.575	0.10	36.86	-	36.96	-	48.00	-	-11.04	-
3	1.091	0.10	36.02	-	36.12	-	48.00	-	-11.88	-
4	1.785	0.10	27.35	-	27.45	-	48.00	-	-20.55	-
5	2.876	0.19	19.87	-	20.06	-	48.00	-	-27.94	-
6	15.149	0.61	28.36	-	28.97	-	48.00	-	-19.03	-

Remarks: 1. \*\*: Undetectable

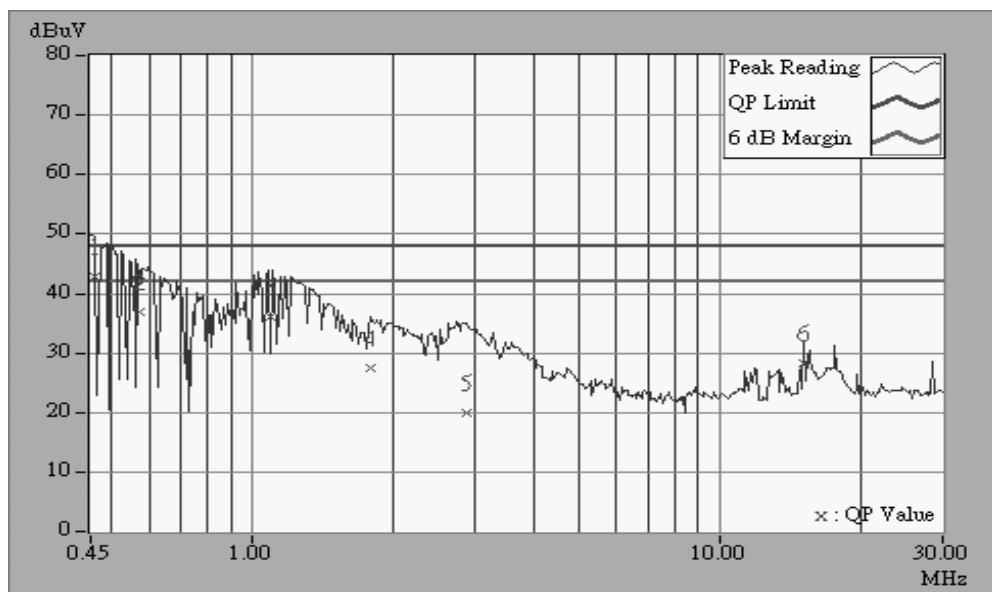
2. QP. and AV. are abbreviations of quasi-peak and average individually.

3. -: NA

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

<b>Frequencies (MHz)</b>	<b>Field Strength of Fundamental</b>	
	<b>uV/m</b>	<b>dBuV/m</b>
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

**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
*HP Spectrum Analyzer	8590L	3544A01176	May 7, 2002
*HP Preamplifier	8447D	2944A08485	Nov. 4, 2001
* HP Preamplifier	8449B	3008A01201	Dec. 13, 2001
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Jan. 25, 2002
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2001
* CHASE BILOG Antenna	CBL6112A	2221	Aug. 4, 2001
* EMCO Turn Table	1060	1115	NA
* SHOSHIN Tower	AP-4701	A6Y005	NA
* Software	AS61D	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Aug. 4, 2001
* TIMES RF cable	LMR-600	CABLE-ST5-01	Aug. 4, 2001
* Antenna (Horn)	BBHA9120-D	D130	July 10, 2002
Open Field Test Site	Site 5	ADT-R05	July 28, 2001
Site Registration No.	FCC: 90422 VCCI : R-1039 Canada IC: IC 3789-5		

**NOTE:**

- 1.The measurement uncertainty is less than +/- 3.0dB, 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.
- 3.“\*” = These equipments are used for the final measurement.



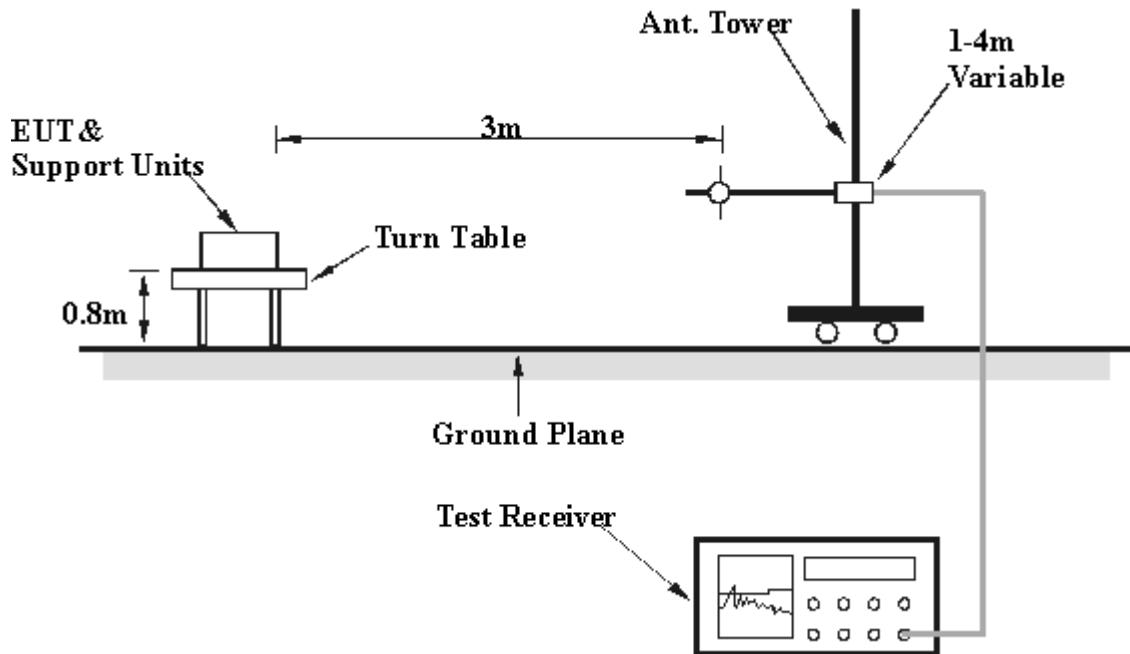
#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. 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 Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 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 300 Hz for Average detection (AV) at frequency above 1GHz.

#### 4.2.4 TEST SETUP



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

#### 4.2.5 EUT OPERATING CONDITIONS

Same as 4.1.5.



## 4.2.6 TEST RESULTS

<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 63RH, 1005 hPa	<b>TESTED BY:</b> Steven Lu	

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)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	324.70	40.8QP	46.00	-5.2	1.00H	281	25.15	13.72	1.96	0.00	-15.68
2	331.91	39.0QP	46.00	-7.0	1.07H	279	23.21	13.82	1.98	0.00	-15.80
3	393.23	33.4QP	46.00	-12.6	1.00H	210	15.30	15.86	2.21	0.00	-18.08
4	499.70	40.1QP	46.00	-5.9	1.07H	204	20.30	17.26	2.50	0.00	-19.76
5	528.08	35.6QP	46.00	-10.4	1.09H	100	15.37	17.62	2.60	0.00	-20.22
6	597.00	39.1QP	46.00	-6.9	1.70H	216	17.69	18.58	2.82	0.00	-21.40
7	625.06	38.8QP	46.00	-7.2	1.59H	235	16.98	18.91	2.92	0.00	-21.83
8	730.18	39.9QP	46.00	-6.1	1.33H	185	16.87	19.85	3.22	0.00	-23.06
9	862.17	29.4QP	46.00	-6.6	1.00H	150	15.36	20.56	3.52	0.00	-24.07

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)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	324.68	30.0QP	46.0	-16.0	1.99H	366	14.30	13.72	1.96	0.00	-15.68
2	331.91	33.0QP	46.0	-13.0	1.10H	245	17.20	13.82	1.98	0.00	-15.80
3	393.23	32.4QP	46.0	-13.6	1.79H	-2	14.30	15.86	2.21	0.00	-18.08
4	499.73	33.4QP	46.0	-12.6	1.26H	251	13.65	17.26	2.50	0.00	-19.76
5	528.11	29.6QP	46.0	-16.4	2.02H	196	9.36	17.62	2.60	0.00	-20.22
6	596.96	35.6QP	46.0	-10.4	1.00H	185	14.25	18.58	2.82	0.00	-21.40
7	625.04	37.2QP	46.0	-8.8	1.81H	92	15.36	18.91	2.92	0.00	-21.83
8	730.16	34.3QP	46.0	-11.7	1.00H	221	11.20	19.85	3.22	0.00	-23.06
9	862.37	33.4QP	46.0	-12.6	1.00H	0	9.36	9.36	3.52	0.00	-24.07

**NOTE:**

- 1 Emission level = Raw Value - Correction Factor
- 2 Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss  
(External Preamp. Gain = 0, when the test receiver is used for the test.)
- 3 The other emission levels were very low against the limit.
- 4 Margin value = Emission level - Limit value



<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>MODE</b>	Channel 1	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	26g. C, 63RH, 1005 hPa	<b>TESTED BY:</b> Steven Lu	

<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)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2038.2	49.2 PK	74.00	-24.8	1.04H	163	20.63	25.27	3.29	0.00	-28.57
2	2038.2	47.2 AV	54.00	-6.8	1.04H	163	18.65	25.27	3.29	0.00	-28.57
3	*2412.0	98.4 PK	-	-	1.23H	255	67.58	27.19	3.62	0.00	-30.81
4	*2412.0	93.4 AV	-	-	1.23H	255	62.58	27.19	3.62	0.00	-30.81
5	4076.2	48.5 PK	74.00	-25.5	1.04H	163	13.54	30.18	4.77	0.00	-34.95
6	4824.2	50.2 PK	74.00	-23.8	1.09H	228	13.54	31.43	5.21	0.00	-36.64

<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)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2037.8	48.9PK	74.00	-25.1	1.03V	155	20.30	25.27	3.29	0.00	-28.57
2	2037.8	46.1AV	54.00	-7.9	1.03V	155	17.50	25.27	3.29	0.00	-28.57
3	*2412.0	99.4PK	-	-	1.08V	342	68.60	27.19	3.62	0.00	-30.81
4	*2412.0	93.1AV	-	-	1.08V	342	62.30	27.19	3062	0.00	-30.81
5	4075.5	45.2PK	74.00	-28.8	1.13V	86	10.24	30.18	4.77	0.00	-34.95
6	4824.2	49.0PK	74.00	-25.0	1.08V	176	12.36	31.43	5.21	0.00	-36.64

**NOTE:**

1. Emission level = Raw Value - Correction Factor
2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss  
(External Preamp. Gain = 0, when the test receiver is used for the test.)
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>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>MODE</b>	Channel 6	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 63RH, 1005 hPa		<b>TESTED BY:</b> Steven Lu

<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)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2062.7	48.3PK	74.00	-25.7	1.20H	93	19.63	25.39	3.31	0.00	-28.70
2	2062.7	45.9AV	54.00	-8.1	1.20H	93	17.20	25.39	3.31	0.00	-28.70
3	*2437.2	99.2PK	-	-	1.19H	142	68.23	27.30	3.64	0.00	-30.94
4	*2437.2	94.5AV	-	-	1.19H	142	63.54	27.30	3.64	0.00	-30.94
5	4125.4	47.4PK	74.00	-26.6	1.31H	156	12.36	30.28	4.79	0.00	-35.07
6	4874.2	49.9AV	54.00	-4.1	1.09H	-5	13.20	31.47	5.25	0.00	-36.72

<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)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2062.8	48.1PK	74.00	-25.9	1.08V	145	19.37	25.39	3.31	0.00	-28.70
2	2062.8	46.0AV	54.00	-8.0	1.08V	145	17.26	25.39	3.31	0.00	-28.70
3	*2437.0	100.5PK	-	-	1.03V	340	69.54	27.30	3.64	0.00	-30.94
4	*2437.0	94.0AV	-	-	1.03V	340	63.10	27.30	3.64	0.00	-30.94
5	4125.5	47.7PK	74.00	-26.3	1.35V	85	12.65	30.28	4.79	0.00	-35.07
6	4874.0	49.9PK	74.00	-24.1	1.08V	237	13.20	31.47	5.25	0.00	-36.72

**NOTE:**

1. Emission level = Raw Value - Correction Factor
2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss  
(External Preamp. Gain = 0, when the test receiver is used for the test.)
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>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>MODE</b>	Channel 11	<b>FREQUENCY RANGE</b>	Above 1000 MHz
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION</b>	Peak(PK) Average (AV)
<b>ENVIRONMENTAL CONDITIONS</b>	26eg. C, 63RH, 1005 hPa		<b>TESTED BY:</b> Steven Lu

<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)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2087.8	50.2PK	74.00	-23.8	1.15H	91	21.40	25.50	3.33	0.00	-28.83
2	2087.8	47.7AV	54.00	-6.3	1.15H	91	18.90	25.50	3.33	0.00	-28.83
3	*2461.6	99.0PK	-	-	1.10H	247	67.96	27.41	3.66	0.00	-31.07
4	*2461.6	92.4AV	-	-	1.10H	247	61.35	27.41	3.66	0.00	-31.07
5	2486.0	43.6PK	74.00	-30.4	1.07H	170	12.35	27.52	3.68	0.00	-31.20
6	4175.5	46.7PK	74.00	-27.3	1.13H	145	11.52	30.38	4.81	0.00	-35.19
7	4924.2	49.1PK	74.00	-24.9	1.09H	220	12.35	35.51	5.28	0.00	-36.80

<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)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	2087.8	49.2PK	74.00	-24.8	1.09V	122	20.36	25.50	3.33	0.00	-28.83
2	2087.8	46.3AV	54.00	-7.7	1.09V	123	17.43	25.50	3.33	0.00	-28.83
3	*2461.6	100.3PK	-	-	1.00V	258	69.23	27.41	3.66	0.00	-31.07
4	*2461.6	94.6AV	-	-	1.00V	258	63.50	27.41	3.66	0.00	-31.07
5	2483.6	43.6PK	74.00	-30.4	1.19V	173	12.39	27.52	3.68	0.00	-31.20
6	4175.6	47.8PK	74.00	-26.2	1.08V	114	12.62	30.38	4.81	0.00	-35.19
7	4175.6	40.8AV	54.00	-13.2	1.08V	114	5.06	30.38	4.81	0.00	-35.19
8	4924.2	50.1PK	74.00	-23.9	1.16V	66	13.26	31.51	5.28	0.00	-36.80

**NOTE:**

1. Emission level= Raw Value - Correction Factor
2. Correction Factor = External Preamp. Gain - Ant. Factor - Cable loss  
(External Preamp. Gain = 0, when the test receiver is used for the test.)
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



### 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
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839379/002	Dec. 28, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

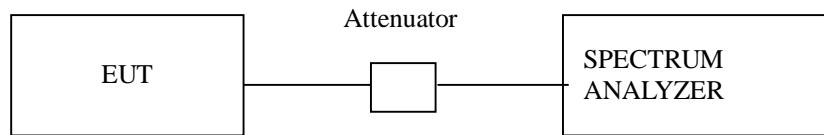
Notes:

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.

#### 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 100 kHz RBW and 100 kHz VBW. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

#### 4.3.4 TEST SETUP



#### 4.3.5 EUT OPERATING CONDITIONS

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

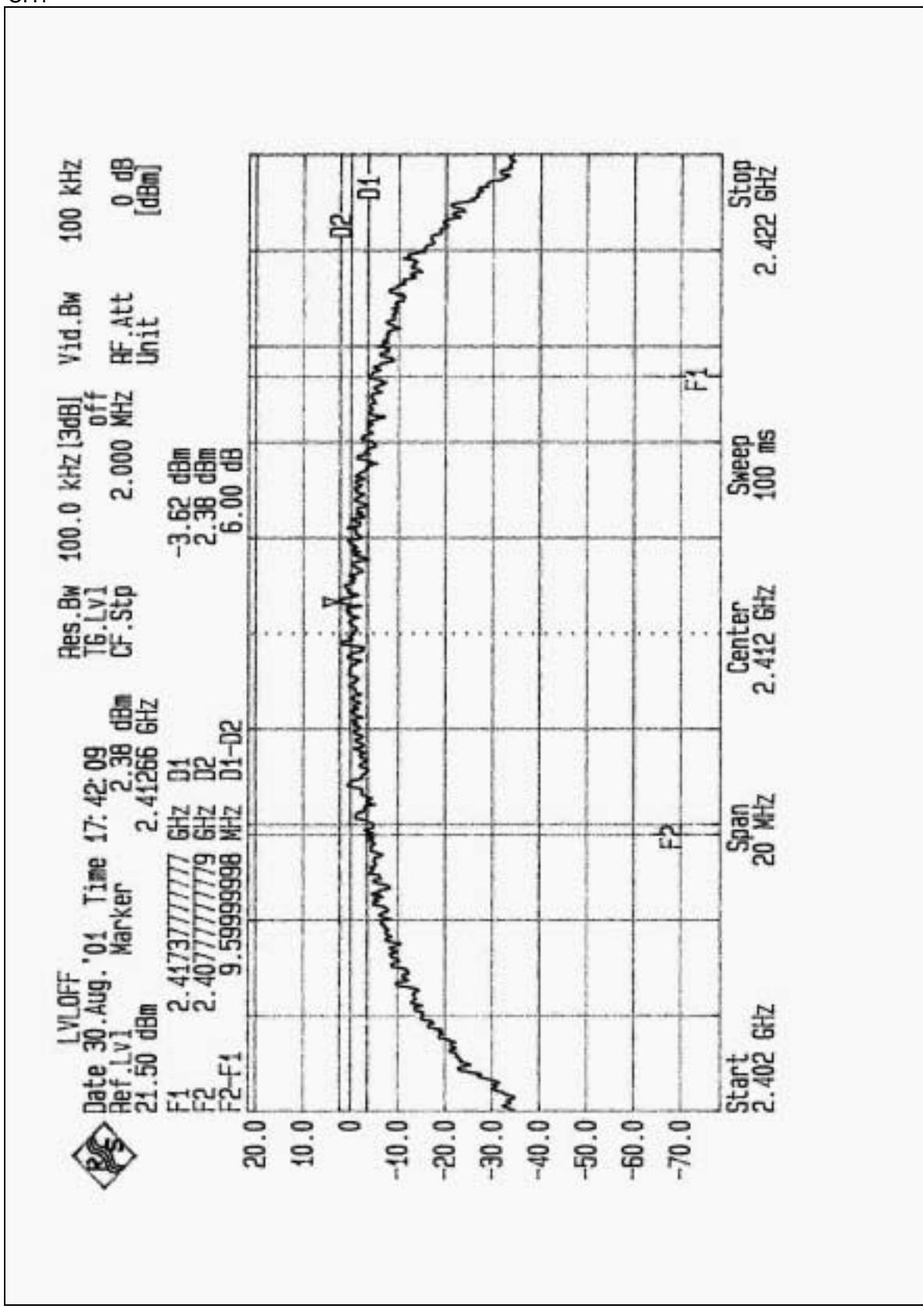


## 4.3.6 TEST RESULTS

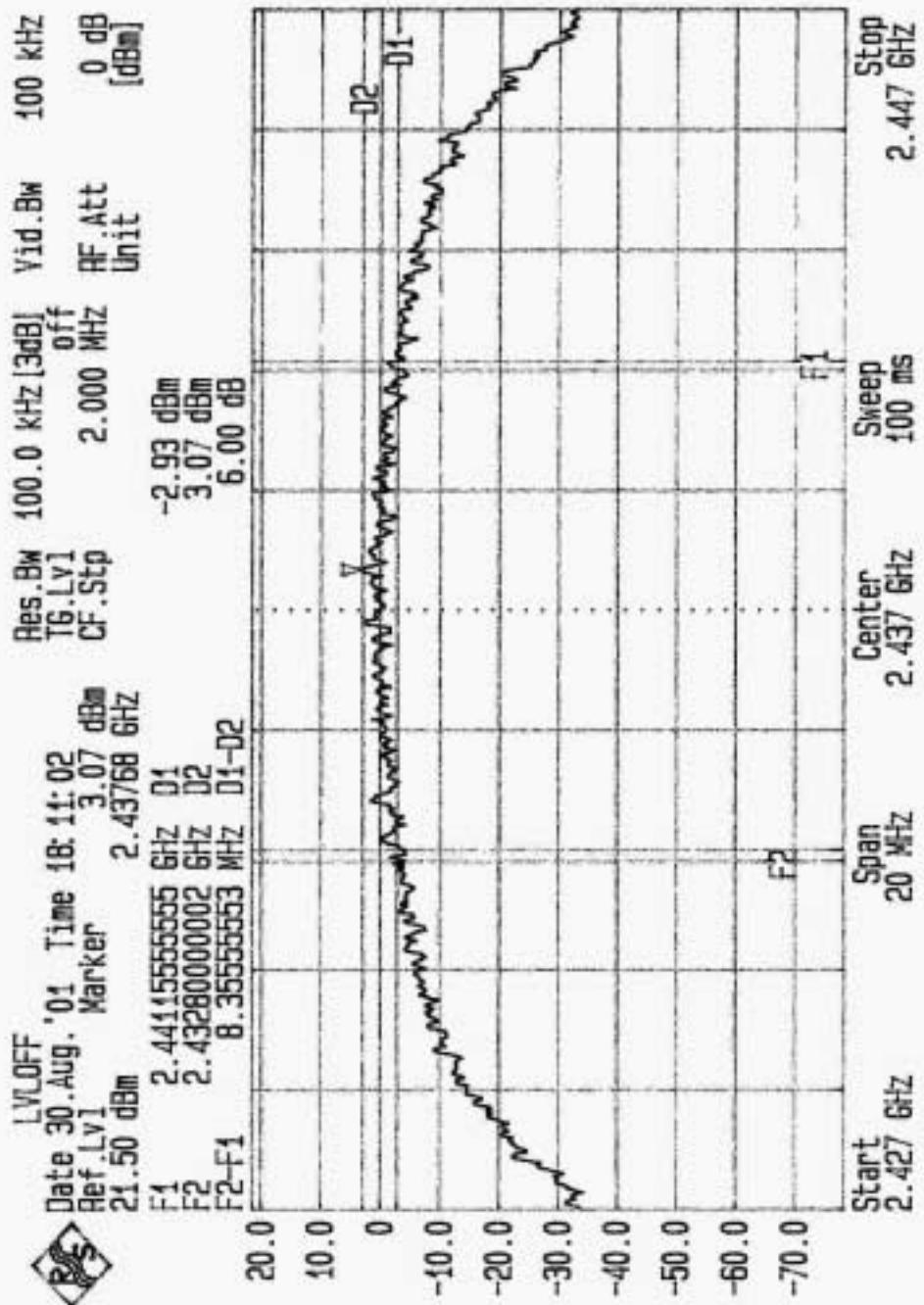
<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 75%RH, 1005 hPa
<b>TESTED BY:</b> James Lee			

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	9.60	0.5	PASS
6	2437	8.36	0.5	PASS
11	2462	8.44	0.5	PASS

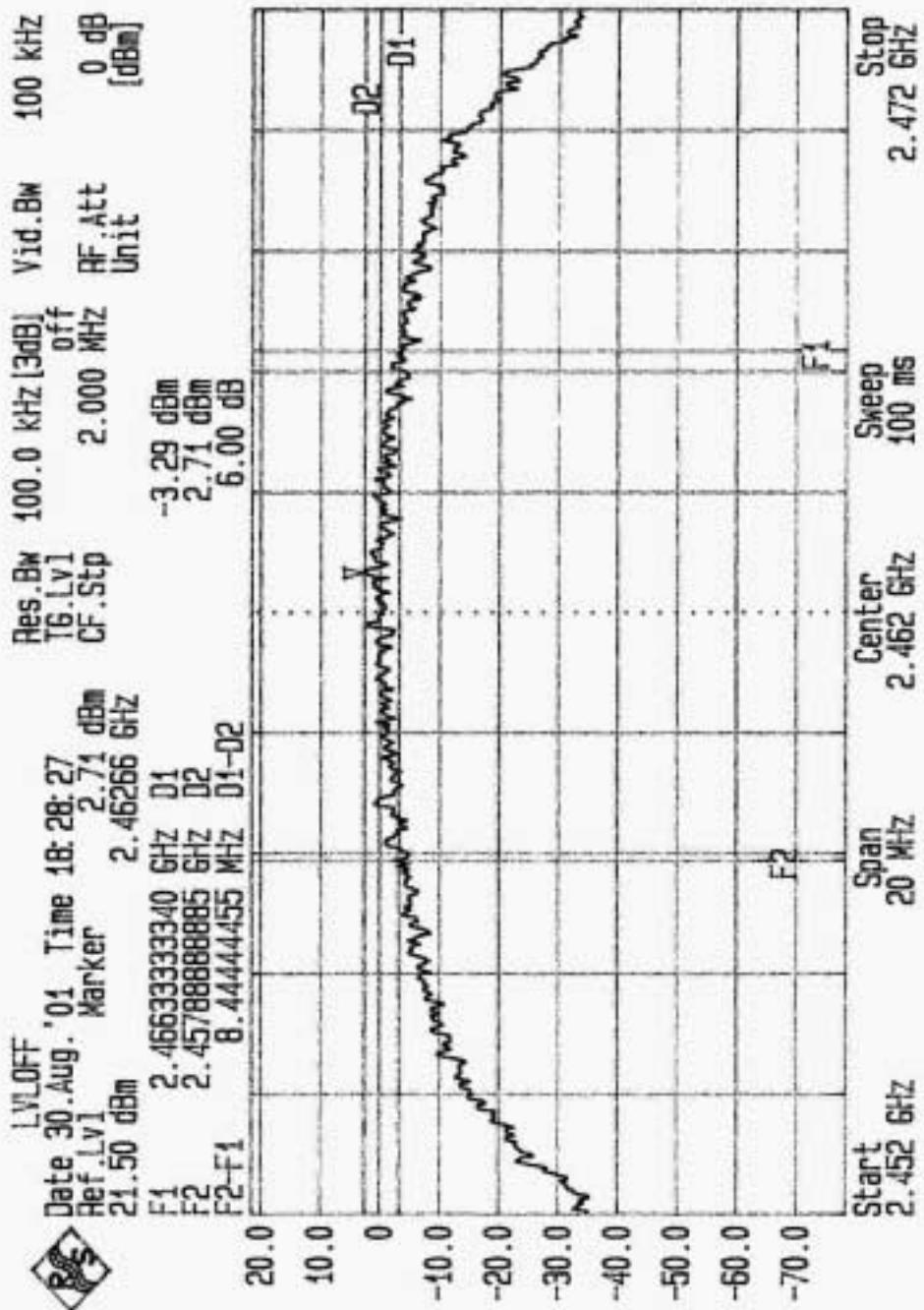
CH1



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
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839379/002	Dec. 28, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

**NOTE:** 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.

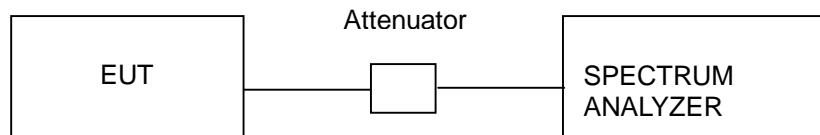
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.4.3 TEST PROCEDURES

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The center frequency of the spectrum analyzer was set to the fundamental frequency and using 3 MHz RBW and 3 MHz VBW.
3. The span of the spectrum analyzer was larger than 6dB BandWidth plus 10MHz.
4. Used Peak Search to read the peak power after Maximum Hold function is activated.
5. Shifted the marker to +/- 3MHz and +/-6MHz, and recorded the reading.
6. The Maximum Peak Output Power is the linear summation of the five readings in 4 and 5.

**NOTE:** This measurement is the total power of 12MHz bandwidth which is far more wider than 6dB bandwidth.

#### 4.4.4 TEST SETUP



#### 4.4.5 EUT OPERATING CONDITIONS

Same as Item 3.4.5



## 4.4.6 TEST RESULTS

<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	28 deg. C, 75%RH, 1005 hPa
<b>TESTED BY:</b> James Lee			

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	18.09	30	PASS
6	2437	18.09	30	PASS
11	2462	18.06	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
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839379/002	Dec. 28, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

**NOTE:** 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.

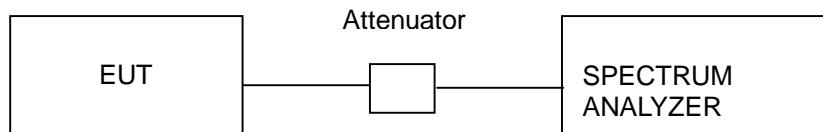
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 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 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.

#### 4.5.4 TEST SETUP



#### 4.5.5 EUT OPERATING CONDITION

Same as Item 3.4.5

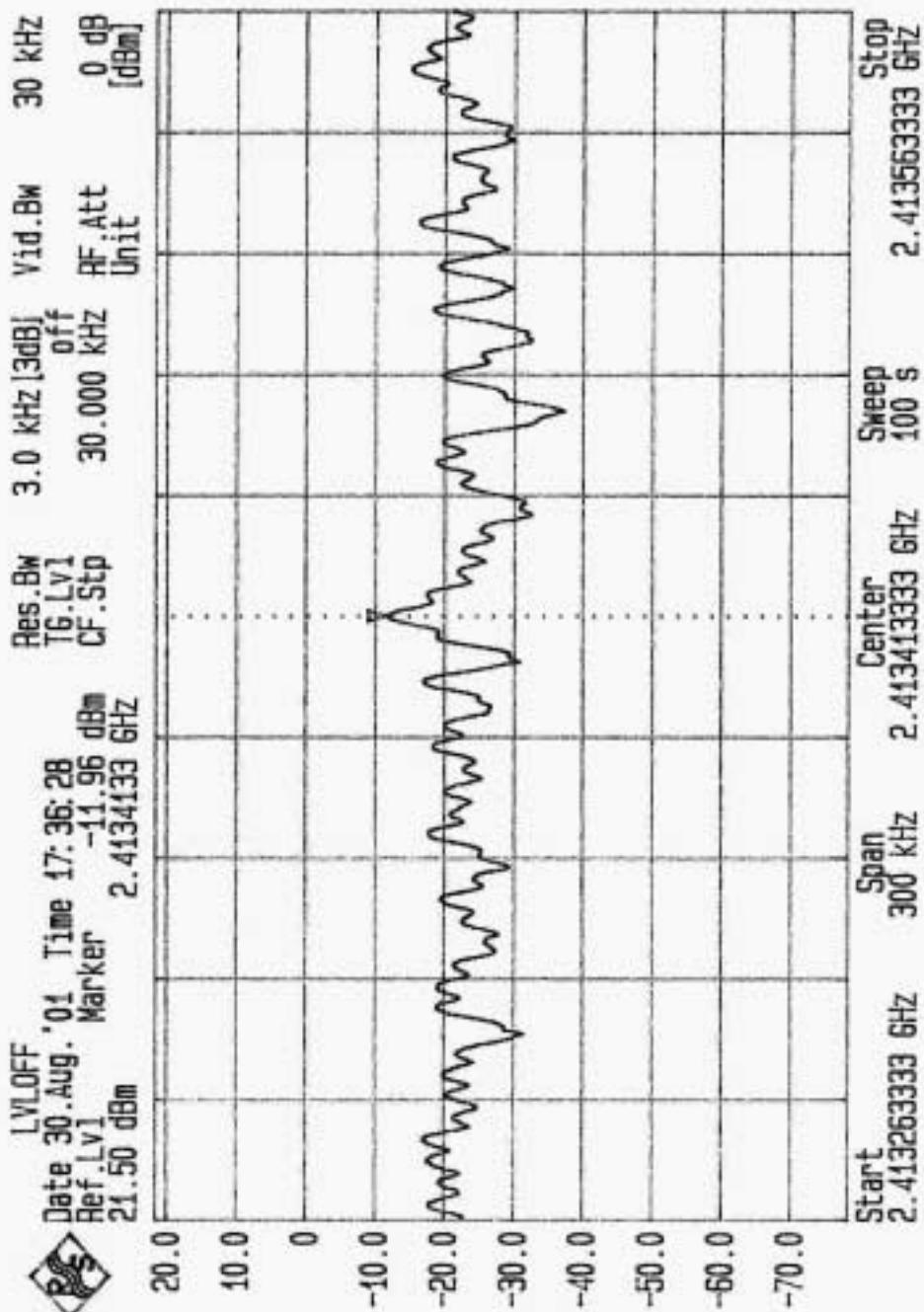


## 4.5.6 TEST RESULTS

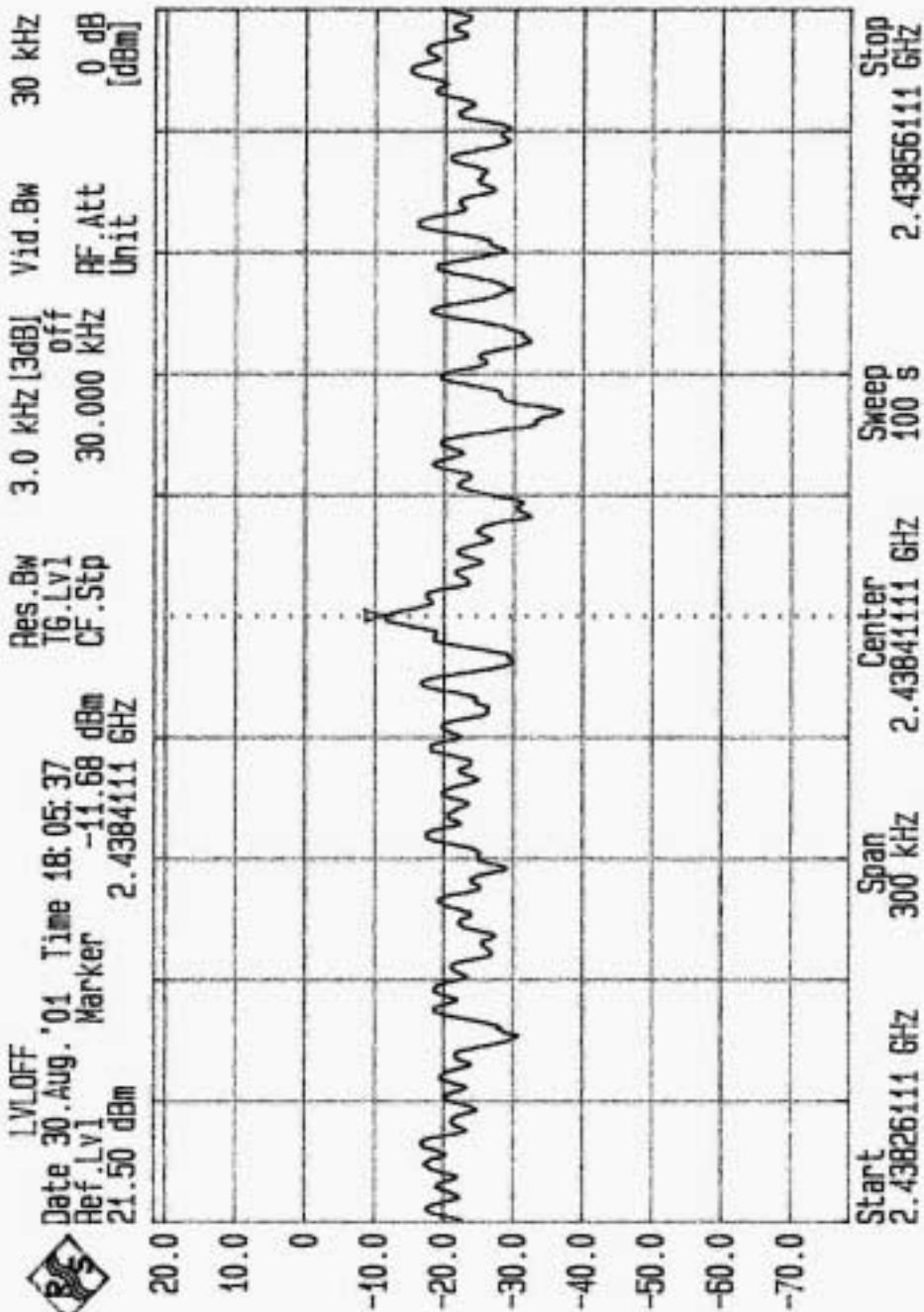
<b>EUT</b>	Wireless Access Point	<b>MODEL</b>	ST-AP2120
<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	28 deg. C, 75%RH, 1005 hPa
<b>TESTED BY:</b> James Lee			

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-11.96	8	PASS
6	2437	-11.68	8	PASS
11	2462	-11.46	8	PASS

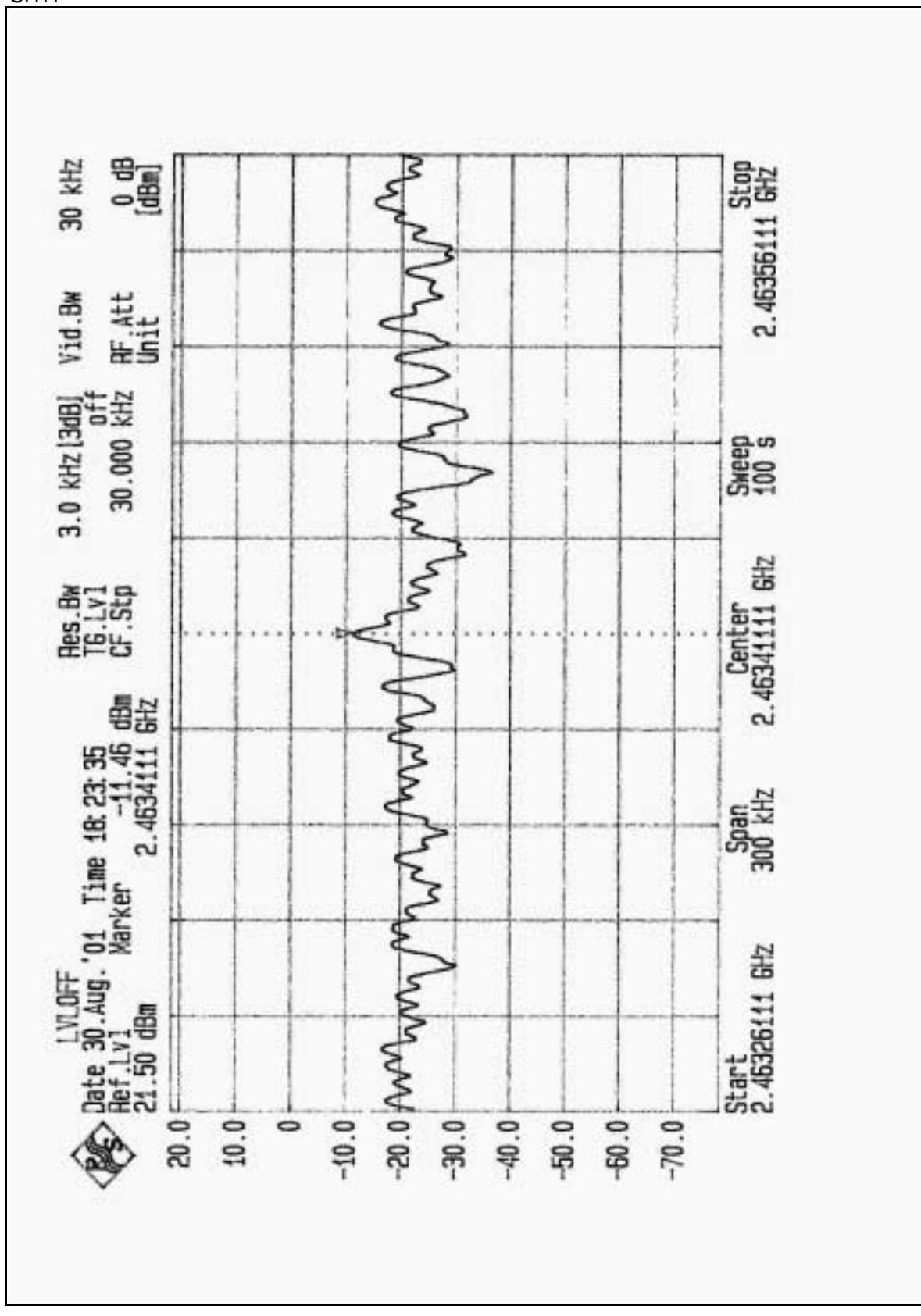
CH1



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
ROHDE & SCHWARZ TEST RECEIVER	ESMI	848926/005 846839/018	Dec 28, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

#### 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.

### 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 100 kHz with suitable frequency span including 100 kHz bandwidth from band edge. The band edges was measured and recorded.



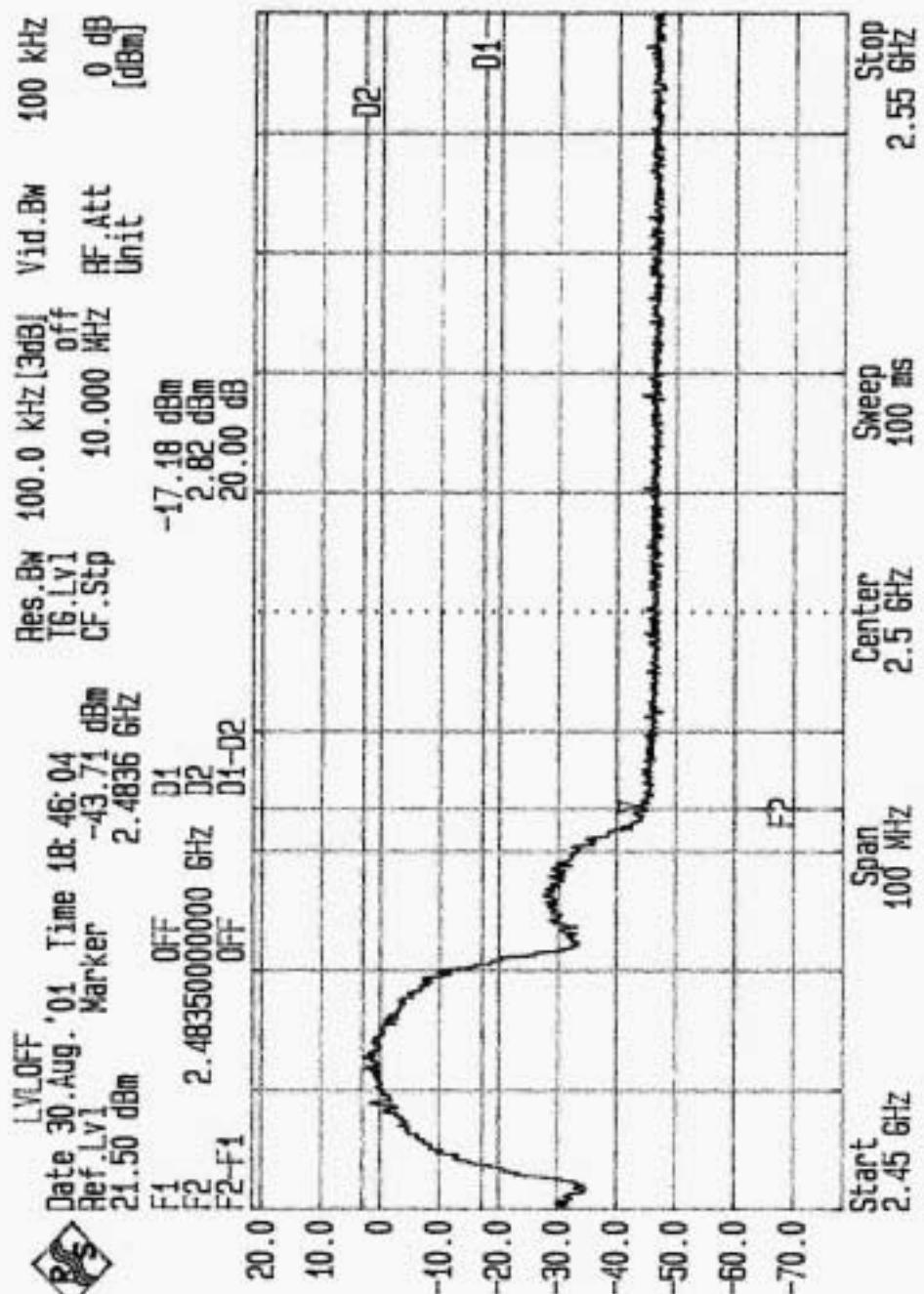
#### 4.6.4 EUT OPERATING CONDITION

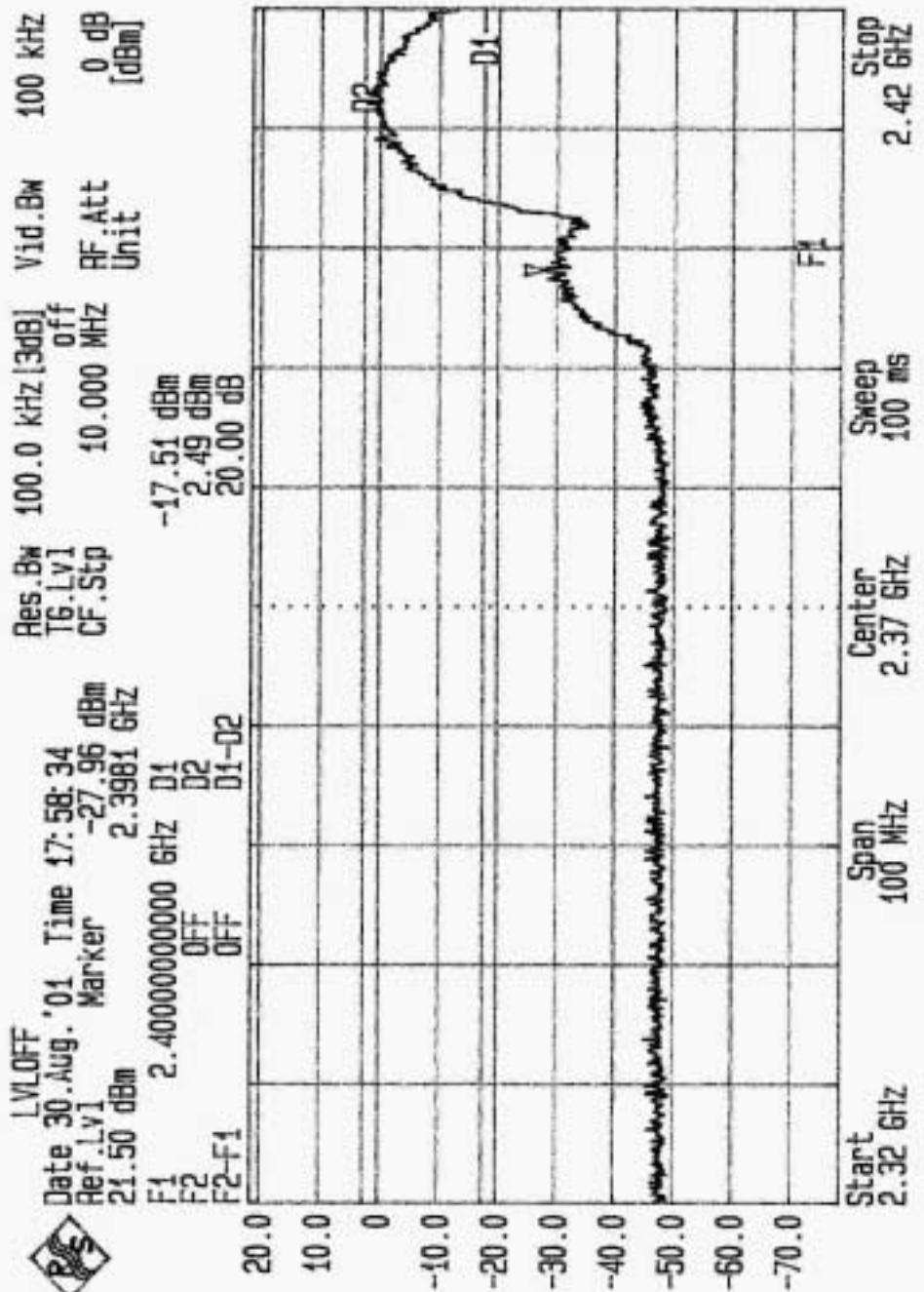
Same as Item 3.4.5

#### 4.6.5 TEST RESULTS

The spectrum plots are attached on the following 2 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(C).

**NOTE:** The band edge emission plot on the following 2 pages shows 46.53dB delta between carrier maximum power and local maximum emission in restrict band (2.4836GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.6 (Page 25) is 94.6dB<sub>UV</sub>/m, so the maximum field strength in restrict band is  $94.6 - 46.53 = 48.07$  dB<sub>UV</sub>/m which is under 54 dB<sub>UV</sub>/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.

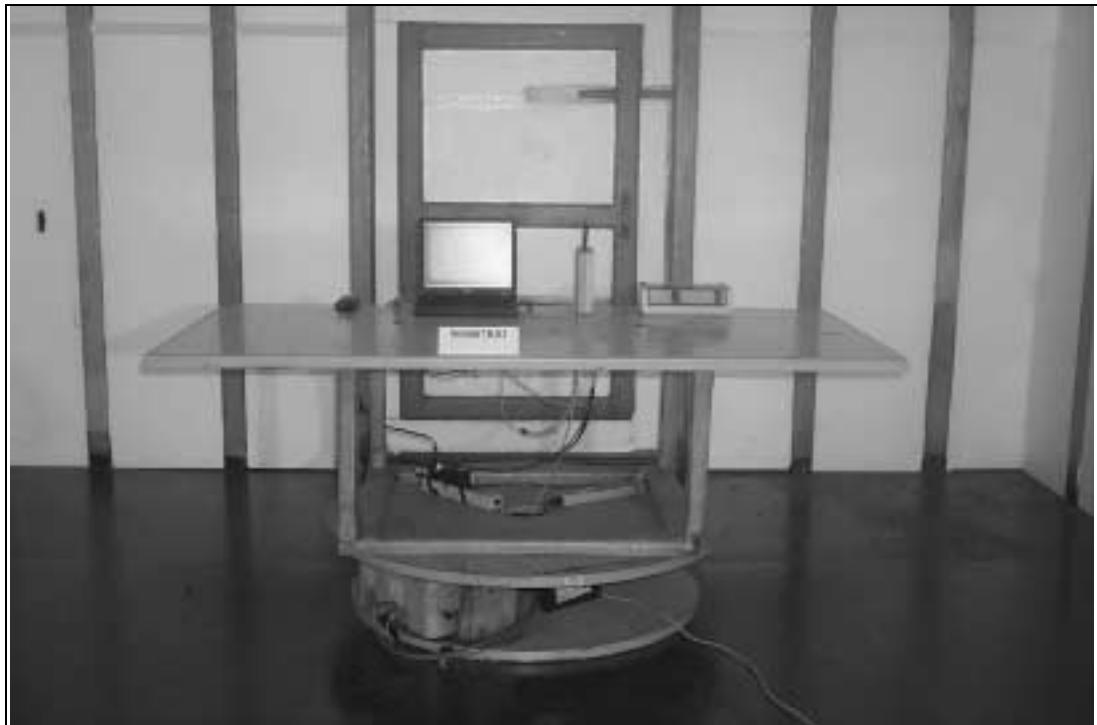
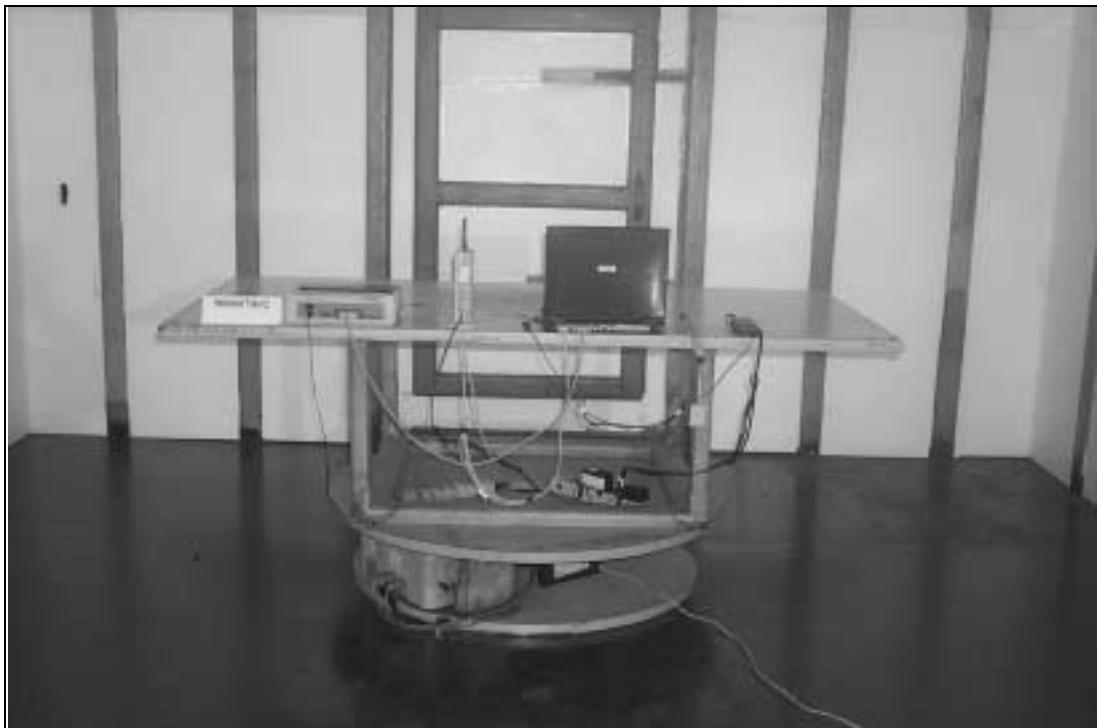
### 4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is dipole antenna and its connector type is MCX connector. The maximum Gain of the antenna is 1dBi only.

## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST



### RADIATED EMISSION TEST





## 6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

<b>USA</b>	FCC, NVLAP, UL
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>New Zealand</b>	MoC
<b>Norway</b>	NEMKO
<b>R.O.C.</b>	BSMI, DGT, CNLA

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:

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