



# FCC TEST REPORT

**REPORT NO.:** RF90021505C

**MODEL NO.:** F5D6130

**RECEIVED:** February 15, 2001

**TESTED:** February 26, 2001

**APPLICANT:** Belkin Components

**ADDRESS:** 1303 Walnut Parkway, Compton, 90220, CA, U.S.A

**ISSUED BY:** Advance Data Technology Corporation

**LAB LOCATION:** 13-1, Lane 19, Wen Shan 3<sup>rd</sup> St., Kweishan,  
Taoyuan Hsien, Taiwan, R.O.C.

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**0528**



Lab Code: 200102-0

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## 1 CERTIFICATION

**PRODUCT :** Wireless Access Point  
**BRAND NAME :** Belkin  
**MODEL NO. :** F5D6130  
**APPLICANT :** Belkin Components  
**STANDARDS :** 47 CFR Part 15, Subpart C (Section 15.247),  
ANSI C63.4-1992  
**SITE REGISTRATION** 90422 (FCC)  
**NO :** IC 3789-5 (Canada IC)

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility on February 26, 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 : Steven Lu , DATE: Nov. 6, 2001  
Steven Lu

CHECKED BY : Emily Lu , DATE: Nov. 6, 2001  
Emily Lu

APPROVED BY : Alan Lane , DATE: Nov. 6, 2001  
Dr. Alan Lane, Manager

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

<b>APPLIED STANDARD: 47 CFR Part 15, Subpart C</b>			
<b>STANDARD PARAGRAPH</b>	<b>TEST REQUIREMENTS</b>	<b>RESULT</b>	<b>REMARK</b>
15.107	AC Power Conducted Emissions Spec.: 48 dBuV	Yes	Minimum passing margin is -8.92 dBuV At 7.16265 MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Spec.: min. 500 kHz	Yes	11.38 MHz > 500 kHz
15.247(b)	Maximum Peak Output Power Spec.: max. 30 dBm	Yes	17.21 dBm < 30 dBm
15.247(c)	Transmitter Radiated Emissions Spec.: Table 15.209	Yes	Minimum passing margin is -11.0 dBuV At 704.01 MHz
15.247(d)	Power Spectral Density Spec.: max. 8dBm	Yes	-10.91 dBm < 8 dBm
15.247(c)	Band Edge Measurement	Yes	N/A
15.247(e)	Processing Gain of Direct Sequence Spread Spectrum System Spec.: min. 10 dB	Yes	11.4dB $\geq$ 10dB

### NOTE:

The receiver portion of the EUT has been tested in ADT. The test result has been verified to comply with FCC Part 15, Subpart B, Class B – Computing Devices (FCC DoC). The engineering test report can be provided upon FCC requests.

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Wireless Access Point
<b>MODEL NO.</b>	F5D6130
<b>POWER SUPPLY</b>	9VDC (from AC Adapter)
<b>DATA CABLE</b>	RJ45 Cable
<b>I/O PORTS</b>	NA
<b>MODULATION TYPE</b>	DSSS BPSK/QPSK/CCK
<b>TRANSFER RATE</b>	11/5.5/2/1Mbps
<b>FREQUENCY RANGE</b>	2400 ~ 2483.5MHz
<b>NUMBER OF CHANNEL</b>	11
<b>ANTENNA TYPE</b>	Dual Monopole
<b>ASSOCIATED DEVICES</b>	NA
<b>DESCRIPTION BETWEEN MODELS</b>	NA

**NOTE:**

- 1.This report is issued as supplementary report to the original report with no.: RF90021505.
- 2.The model: WA3001A of original and model: F5D6130 are identical.
- 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		

The EUT operated with following power adapter:

<b>Product :</b>	Adapter
<b>Manufacture :</b>	High Power
<b>MODEL NO. :</b>	HPW-1009U
<b>Input power :</b>	100-120V

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

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

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

### 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.	I/O Cable
1	NOTEBOOK	IBM	2635	97-84654	Nonshielded Signal (10m)
2	LAN CARD	ACCTON	10/100 Fast Ethernet PC Card	244226-000	NA



## 4 TEST PROCEDURES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

Notes:

- 1.The lower limit shall apply at the transition frequencies.
- 2.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
ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	July 6, 2001
ROHDE & SCHWARZ Artificial Mains Network	ESH3-Z5	839135/006	July 9, 2001
ROHDE & SCHWARZ 4-wire ISN	ENY41	835154/007	Apr. 26, 2001
EMCO-L.I.S.N.	3825/2	9204-1964	July 9, 2001
Shielded Room	Site 2	ADT-C02	NA

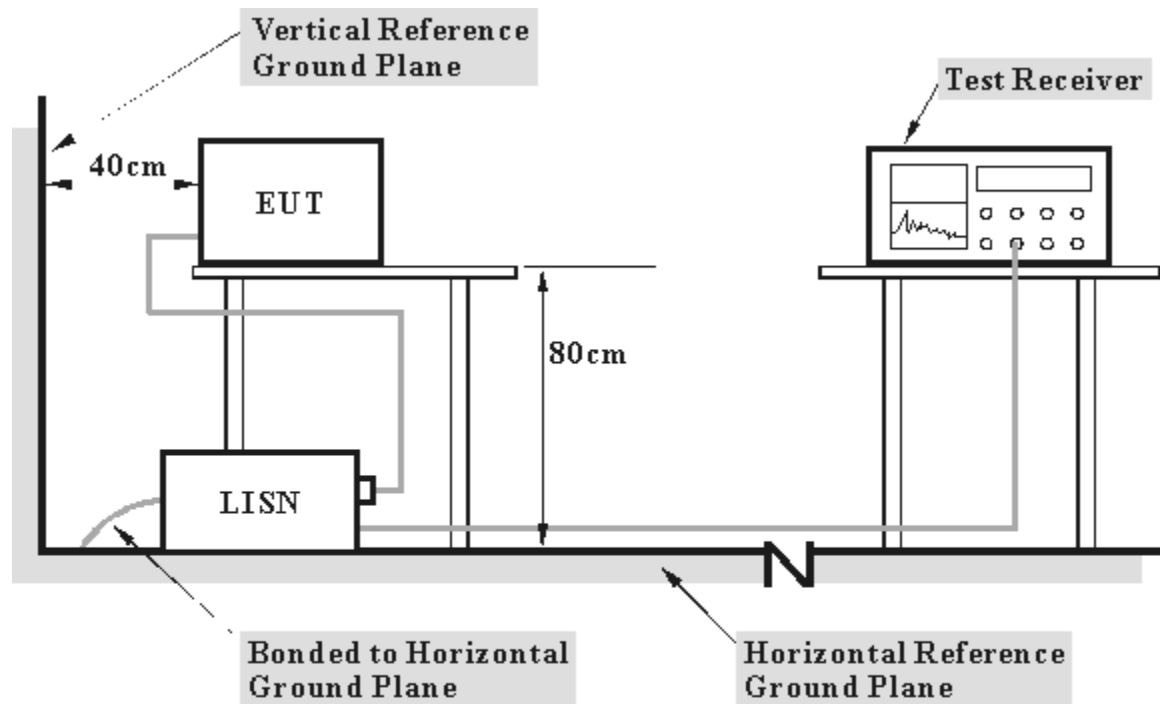
- Notes: 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.



#### 4.1.3 TEST PROCEDURES

1. Place the EUT at 0.4 meter away from the conduction wall of the shielded room.
2. Connect the EUT to the power mains through a Line Impedance Stabilization Network (LISN).
3. Connect the other support units to the other LISN too.
4. Make sure the  $50\Omega$ /  $50\mu\text{H}$  coupling impedance is provided to the measurement instrument by the LISNs.
5. Measure the maximum conducted interference on both lines of the power mains connects to the EUT, within frequency range 450KHz ~ 30MHz.
6. The emission level under limit by 10dB is not needed to be reported.

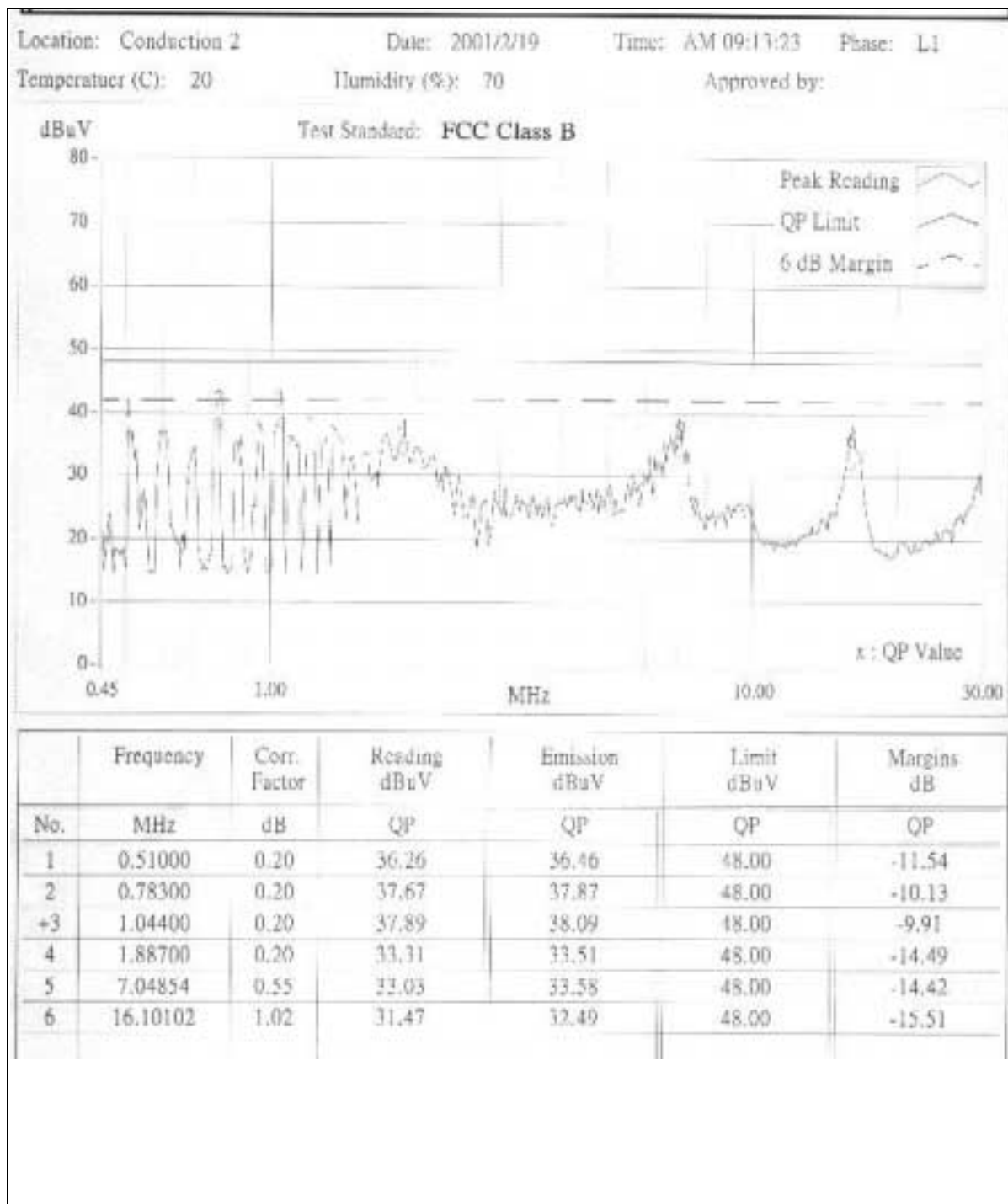
#### 4.1.4 TEST SETUP



- 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 in this test report ( **Photographs of the Test Configuration**).

## 4.1.5 TEST RESULTS



Location: Conduction 2

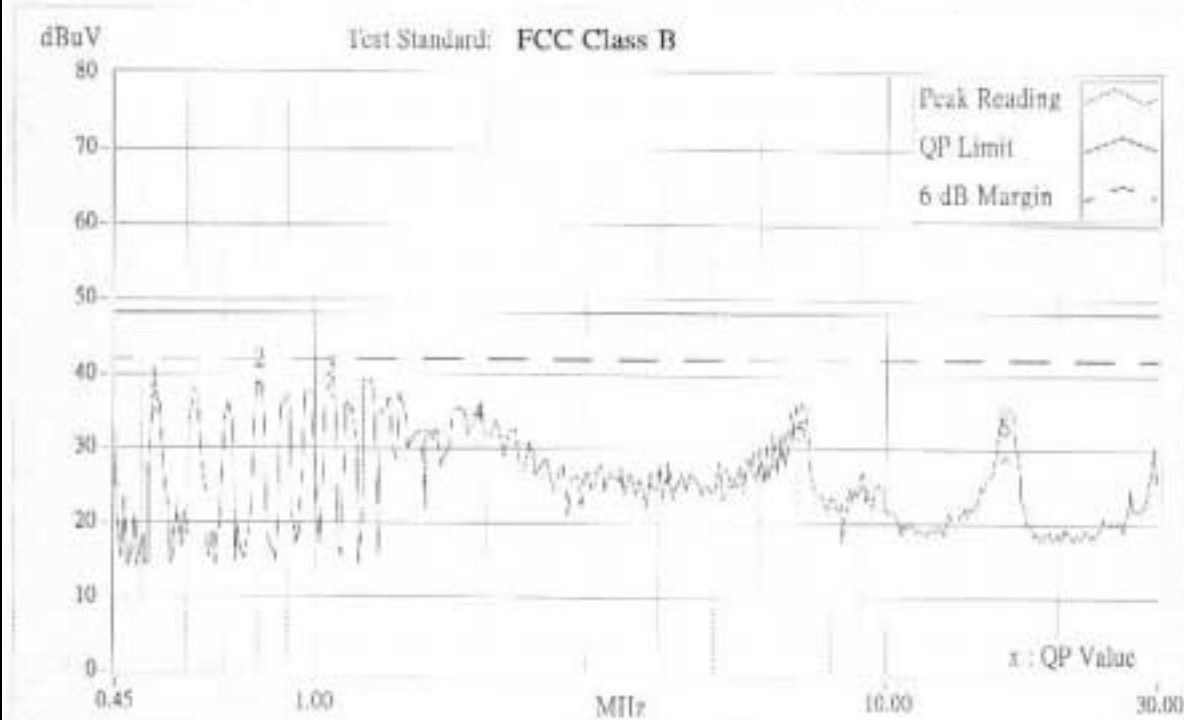
Date: 2001/2/19

Time: AM 09:07:43 Phase: N

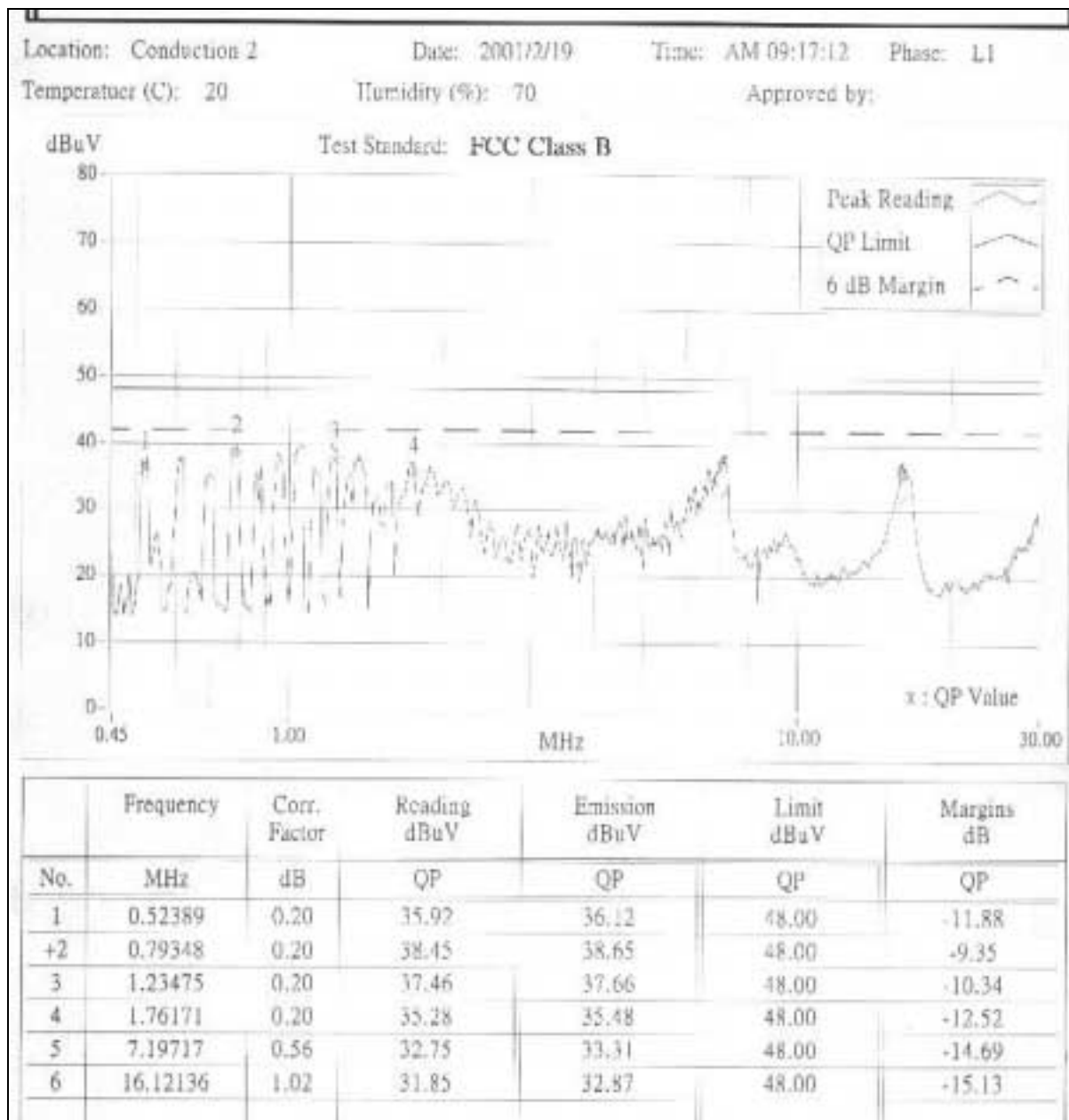
Temperature (C): 20

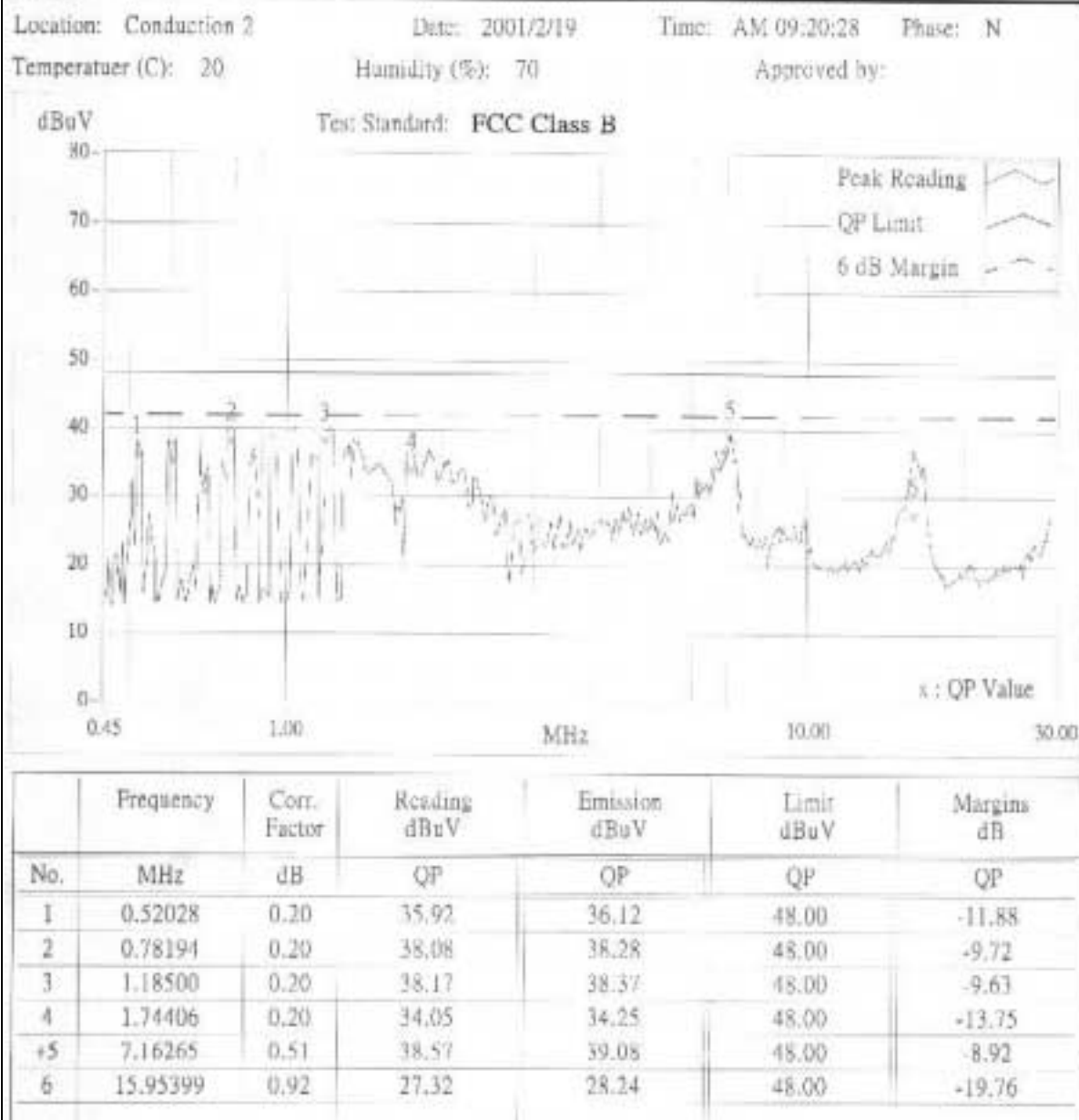
Humidity (%): 70

Approved by:



	Frequency	Corr. Factor	Reading dBuV	Emission dBuV	Limit dBuV	Margins dB
No.	MHz	dB	QP	QP	QP	QP
1	0.53100	0.20	35.04	35.24	48.00	-12.76
+2	0.80751	0.20	37.67	37.87	48.00	-10.13
3	1.07100	0.20	36.92	37.12	48.00	-10.88
4	1.93500	0.20	30.84	31.04	48.00	-16.96
5	7.12913	0.50	28.46	28.96	48.00	-19.04
6	16.17200	0.92	28.82	29.74	48.00	-18.26





Location: Conduction 2

Date: 2001/2/19

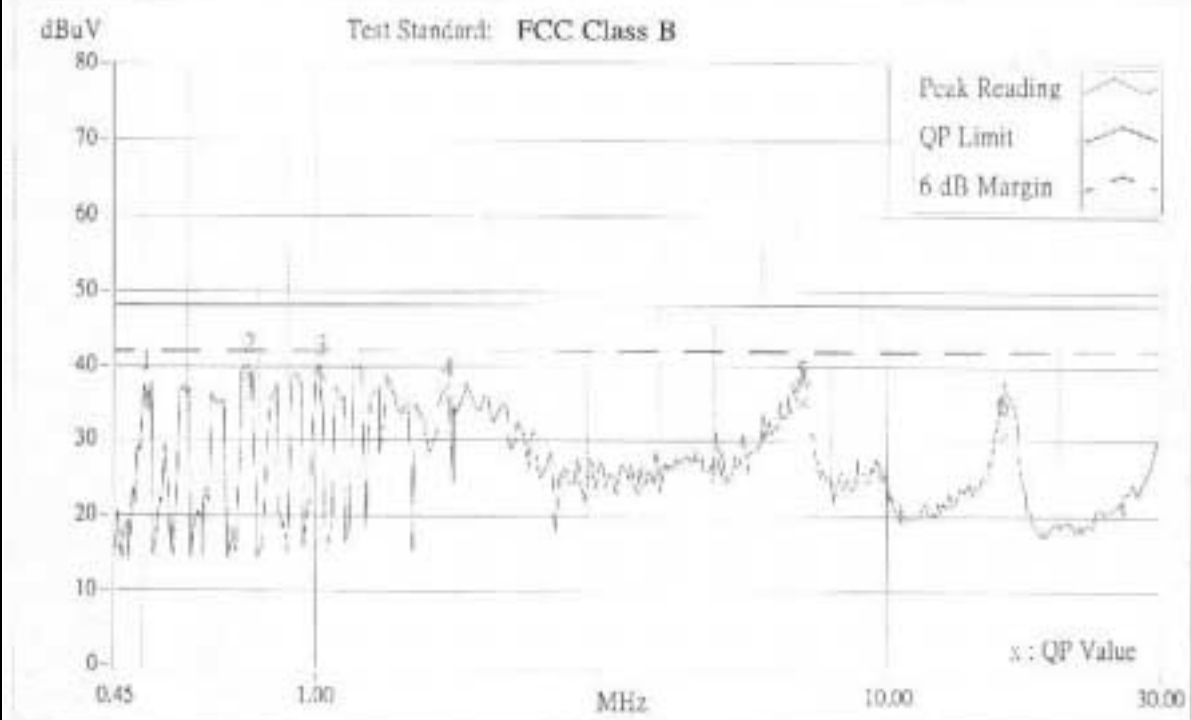
Time: AM 09:26:53

Phase: L1

Temperature (C): 20

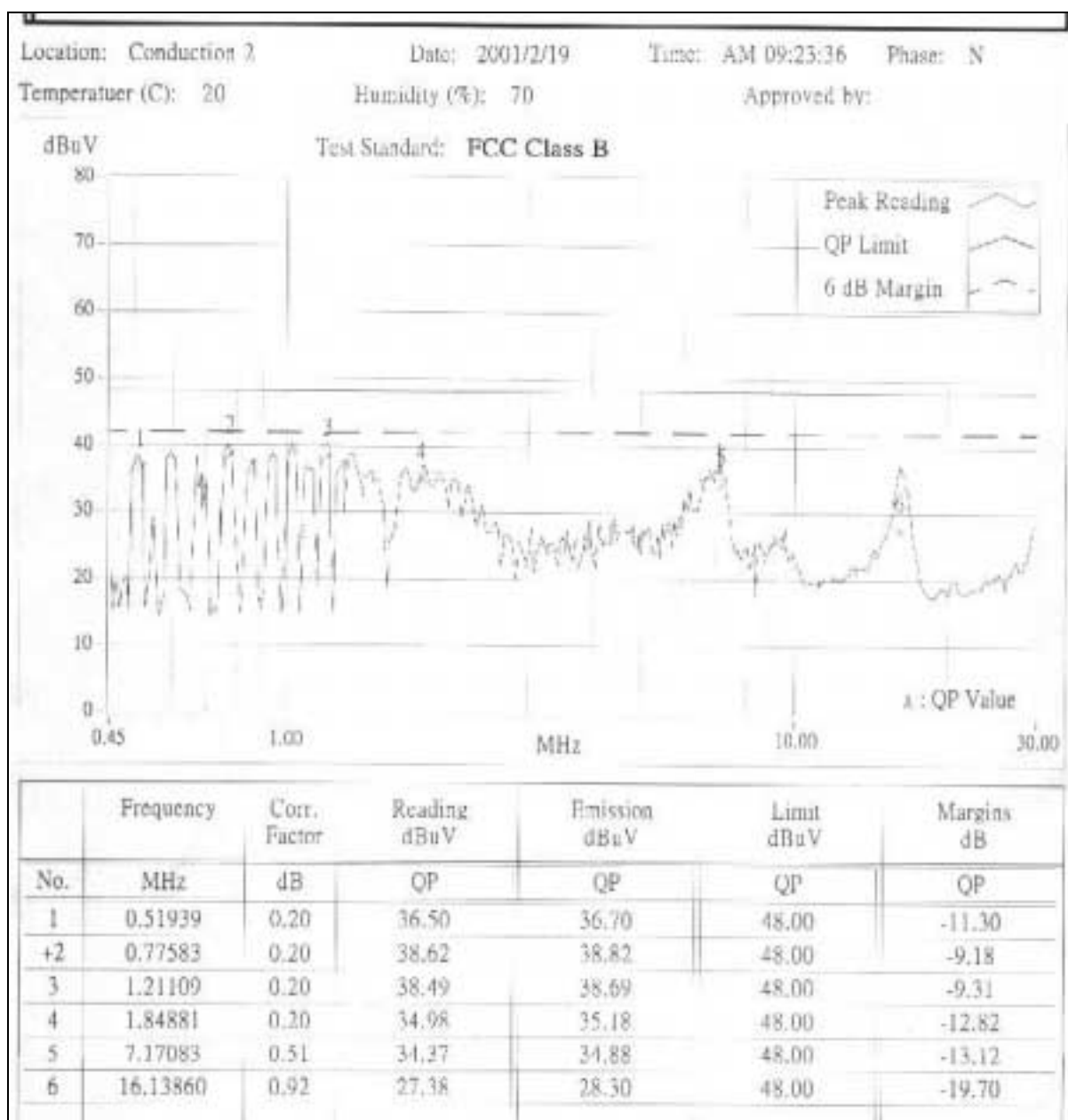
Humidity (%): 70

Approved by:



	Frequency	Corr. Factor	Reading	Emission	Limit	Margins
No.	MHz	dB	QP	QP	QP	QP
1	0.50953	0.20	36.26	36.46	48.00	-11.54
+2	0.77182	0.20	38.58	38.78	48.00	-9.22
3	1.02636	0.20	38.51	38.71	48.00	-9.29
4	1.71682	0.20	35.40	35.60	48.00	-12.40
5	7.16124	0.56	35.06	35.62	48.00	-12.38
6	16.05113	1.02	30.68	31.70	48.00	-16.30





## 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:

Frequencies (MHz)	Field Strength of Fundamental	
	$\mu\text{V}/\text{meter}$	$\text{dB}\mu\text{V}/\text{meter}$
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

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.

### LIMIT OF RADIATED EMISSION OF FCC PART 15, SUBPART B FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (MHz)	Class A (at 10m)		Class B (at 3m)	
	$\mu\text{V}/\text{m}$	$\text{dB}\mu\text{V}/\text{m}$	$\mu\text{V}/\text{m}$	$\text{dB}\mu\text{V}/\text{m}$
Above 1000	300	49.5	500	54.0

- Note: 1 The lower limit shall apply at the transition frequencies.  
 2 Emission level ( $\text{dB}\mu\text{V}/\text{m}$ ) =  $20 \log$  Emission level ( $\mu\text{V}/\text{m}$ ).  
 3 All emanation 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.

#### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8590L	3544A01176	Apr. 18, 2001
HP Preamplifier	8447D	2944A08485	Apr. 27, 2001
HP Preamplifier	8347A	3307A01088	Sep. 04, 2001
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Aug. 3, 2001
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	N/A
CHASE BILOG Antenna	CBL6112A	2221	Aug. 4, 2001
SCHWARZBECK Horn Antenna	BBHA9120-D	D130	Jul. 9, 2001
SCHWARZBECK Horn Antenna	BBHA9170	123	Jan. 30, 2001
EMCO Turn Table	1060	1115	N/A
SHOSHIN Tower	AP-4701	A6Y005	N/A
Open Field Test Site	Site 5	ADT-R05	Aug. 08, 2001

#### Notes:

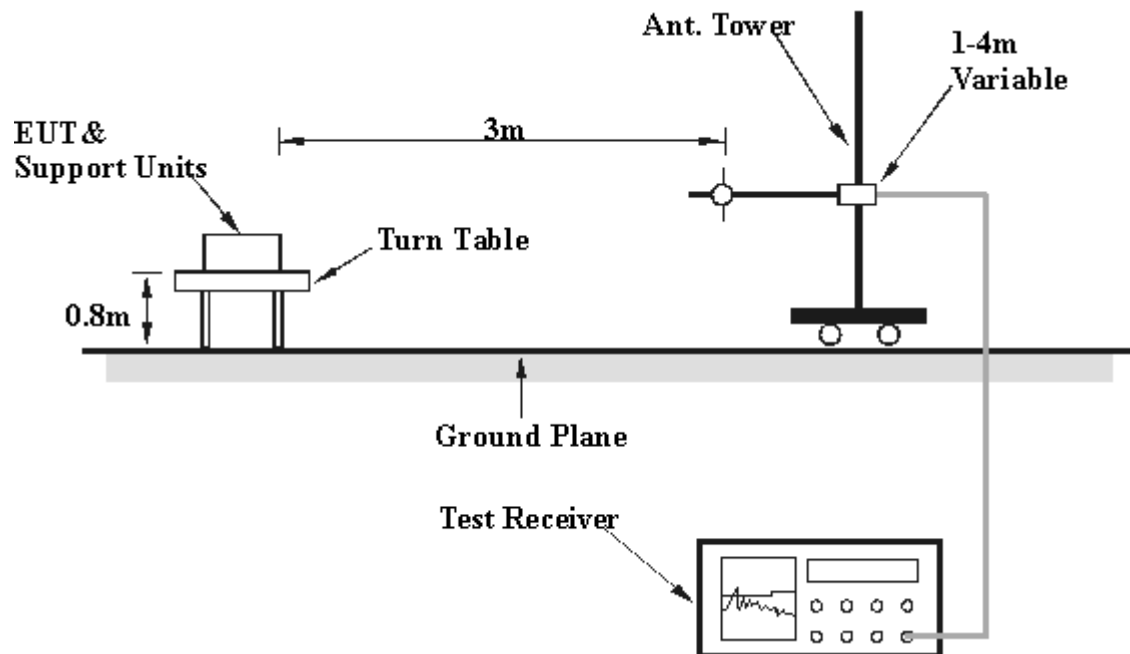
- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.2.3 TEST PROCEDURES

1. The EUT was placed on the turn table 0.8 meter above ground in 3 meter open area test site.
2. Set the resolution bandwidth to 120KHz in the test receiver and select Peak function to scan the frequency below 1 GHz.
3. Shift the interference-receiving antenna located in antenna tower upwards and downwards between 1 and 4 meters above ground and find out the local peak emission on frequency domain.
4. Locate the interference-receiving antenna at the position where the local peak reach the maximum emission.
5. Rotate the turn table and stop at the angle where the measurement device has maximum reading
6. Shift the interference-receiving antenna again to detect the maximum emission of the local peak
7. If the reading of the local peak under Peak function is lower than limit by 6dB, then Quasi Peak detection is not needed and this reading should be recorded. And if it is higher than Peak limit, then the test is fail. Others, switch the receiver to Quasi Peak function, set the resolution bandwidth to 100kHz and repeat the procedures C ~ F. If the reading is lower than limit, this reading should be recorded, otherwise, the test is fail.
8. Set the resolution and video bandwidth of the spectrum analyzer to 1MHz and repeat procedures C ~ F for frequency band from 1 GHz to 10 times carrier frequency.
9. If the reading for the local peak is lower than the Average limit, no further testing is needed in this local peak and this reading should be recorded. If it is higher than Average limit but lower than Peak limit, then set the resolution bandwidth to 1MHz and video bandwidth to 300Hz. Repeat procedures C ~ F. If the maximum reading is lower than Average limit, then this reading should be recorded. If it is higher, then the test is fail.

Note:1. The frequency range of verification is either from 30 MHz to 1GHz or from 30 MHz up to 10 times carrier frequency of EUT (whichever is the highest frequency range).  
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for frequency below 1GHz.  
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for frequency above 1GHz.

#### 4.2.4 TEST SETUP



For the actual test configuration, please refer to the related Item in this test report (**Photographs of the Test Configuration**).

## 4.2.5 TEST RESULTS

### Digital Portion

<b>EUT</b>	Wireless Access Point	<b>Model</b>	F5D6130
<b>Mode</b>	Channel 1	<b>Detector Function</b>	Quasi-Peak
<b>Frequency Range</b>	30-1000 MHz	<b>Test Distance</b>	3M
<b>Environmental Conditions</b>	20°C , 70% RH	<b>Tested By</b>	Steven Lu

ANTENNA POLARITY: VERTICAL							
Frequency (MHz)	CORRECTION FACTOR (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
395.99	8.32	20.58	28.9	46.0	-17.1	154	96
439.98	7.80	19.80	27.6	46.0	-18.4	156	174
484.02	6.80	18.70	25.5	46.0	-20.5	163	306
528.03	6.29	17.71	24.0	46.0	-22.0	156	130
572.02	6.01	22.29	28.3	46.0	-17.7	99	139
704.03	4.47	26.93	31.4	46.0	-14.6	140	315
748.03	3.98	24.52	28.5	46.0	-17.5	106	363
792.02	3.79	24.31	28.1	46.0	-17.9	176	234
880.03	2.83	26.77	29.6	46.0	-16.4	149	155
924.02	2.02	28.68	30.7	46.0	-15.3	138	93

ANTENNA POLARITY: HORIZONTAL							
Frequency (MHz)	CORRECTION FACTOR (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
352.01	9.75	12.45	22.2	46.0	-23.8	100	109
396.02	8.32	19.88	28.2	46.0	-17.8	195	104
484.02	6.80	20.20	27.0	46.0	-19.0	100	240
528.02	6.29	19.11	25.4	46.0	-20.6	117	14
616.01	5.71	24.39	30.1	46.0	-15.9	143	210
663.03	5.39	22.11	27.5	46.0	-18.5	150	288
704.01	4.47	30.53	35.0	46.0	-11.0	166	290
748.01	3.98	29.42	33.4	46.0	-12.6	161	9
792.01	3.79	26.11	29.9	46.0	-16.1	109	142
880.01	2.83	27.87	30.7	46.0	-15.3	100	125
924.01	2.02	28.58	30.6	46.0	-15.4	100	234

- Notes: 1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).  
 2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)  
 3. The other emission levels were very low against the limit.  
 4. Margin value = Emission level - Limit value

**RF Portion**

<b>EUT</b>	Wireless Access Point	<b>Model</b>	F5D6130
<b>Mode</b>	Channel 1	<b>Detector Function</b>	PK Average
<b>Frequency Range</b>	Above 1000 MHz	<b>Test Distance</b>	3M
<b>Environmental Conditions</b>	20°C , 70%RH	<b>Tested By</b>	Steven Lu

<b>ANTENNA POLARITY: Vertical</b>		<b>Detector Function :</b>				<b>6dB Bandwidth: 1MHz</b>				<b>Frequency Range: Above 1000 MHz.</b>	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
2038.0	34.57	12.7	-	47.3	-	74.0	54.0	-26.7	-	108	234
*2413.5	36.09	67.4	59.4	103.5	95.5	-	-	-	-	115	196
4076.1	43.10	9.7	-	52.8	-	74.0	54.0	-21.2	-	111	133
4824.5	43.73	6.4	-	50.1	-	74.0	54.0	-23.9	-	105	208

<b>ANTENNA POLARITY: Horizontal</b>		<b>Detector Function :</b>				<b>6dB Bandwidth: 1MHz</b>				<b>Frequency Range: Above 1000 MHz.</b>	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
2038.2	34.57	12.33	-	46.9	-	74.0	54.0	-27.1	-	126	178
*2413.5	36.09	64.81	56.6	100.9	92.7	-	-	-	-	110	277
4076.1	43.10	9.30	-	52.4	-	74.0	54.0	-21.6	-	100	233
4824.0	43.73	7.27	-	51.0	-	74.0	54.0	-23.0	-	115	320

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

<b>EUT</b>	Wireless Access Point	<b>Model</b>	F5D6130
<b>Mode</b>	Channel 6	<b>Detector Function</b>	PK Average
<b>Frequency Range</b>	Above 1000 MHz	<b>Test Distance</b>	3M
<b>Environmental Conditions</b>	20°C , 60%RH	<b>Tested By</b>	Steven Lu

<b>ANTENNA POLARITY:</b> Vertical		<b>Detector Function :</b>				<b>6dB Bandwidth: 1MHz</b>				<b>Frequency Range:</b> Above 1000 MHz.	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
2063.2	34.78	13.9	-	48.7	-	74.0	54.0	-25.3	-	108	342
*2436.8	36.37	66.6	58.8	103.0	95.2	-	-	-	-	102	214
4126.1	42.71	8.49	-	51.2	-	74.0	54.0	-22.8	-	102	214
4874.0	43.75	6.45	-	50.2	-	74.0	54.0	-23.8	-	100	295

<b>ANTENNA POLARITY:</b> Horizontal		<b>Detector Function :</b>				<b>6dB Bandwidth: 1MHz</b>				<b>Frequency Range:</b> Above 1000 MHz.	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
2063.2	34.78	13.12	-	47.9	-	74.0	54.0	-26.1	-	128	208
*2438.6	36.37	63.43	53.93	99.8	90.3	-	-	-	-	102	314
4126.1	42.71	9.49	-	52.2	-	74.0	54.0	-21.8	-	102	202
4874.2	43.75	6.35	-	50.1	-	74.0	54.0	-23.9	-	115	39

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



<b>EUT</b>	Wireless Access Point	<b>Model</b>	F5D6130
<b>Mode</b>	Channel 11	<b>Detector Function</b>	PK Average
<b>Frequency Range</b>	Above 1000 MHz	<b>Test Distance</b>	3M
<b>Environmental Conditions</b>	20°C , 60%RH	<b>Tested By</b>	Steven Lu

<b>ANTENNA POLARITY:</b> Vertical		<b>Detector Function :</b>				<b>6dB Bandwidth: 1MHz</b>				<b>Frequency Range:</b> Above 1000 MHz.	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
2088.2	35.07	14.9	-	50.0	-	74.0	54.0	-24.0	-	124	84
*2463.5	36.44	67.0	59.0	103.4	95.2	-	-	-	-	104	169
4176.3	42.76	8.5	-	51.3	-	74.0	54.0	-22.7	-	104	169
4924.6	43.27	7.13	-	50.4	-	74.0	54.0	-23.6	-	104	147

<b>ANTENNA POLARITY:</b> Horizontal		<b>Detector Function :</b>				<b>6dB Bandwidth: 1MHz</b>				<b>Frequency Range:</b> Above 1000 MHz.	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
2088.2	35.07	13.73	-	48.8	-	74.0	54.0	-25.2	-	100	43
*2463.5	36.44	61.56	53.6	98.0	90.0	-	-	-	-	100	290
4176.1	42.76	9.44	-	52.2	-	74.0	54.0	-21.8	-	100	228
4924.1	43.27	7.53	-	50.8	-	74.0	54.0	-23.2	-	100	19

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

### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The Limit 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	846839/018 848926/005	Mar. 03, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

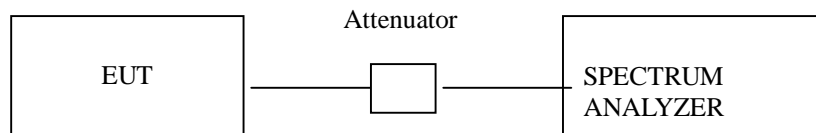
Notes:

- 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



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

#### 4.3.5 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



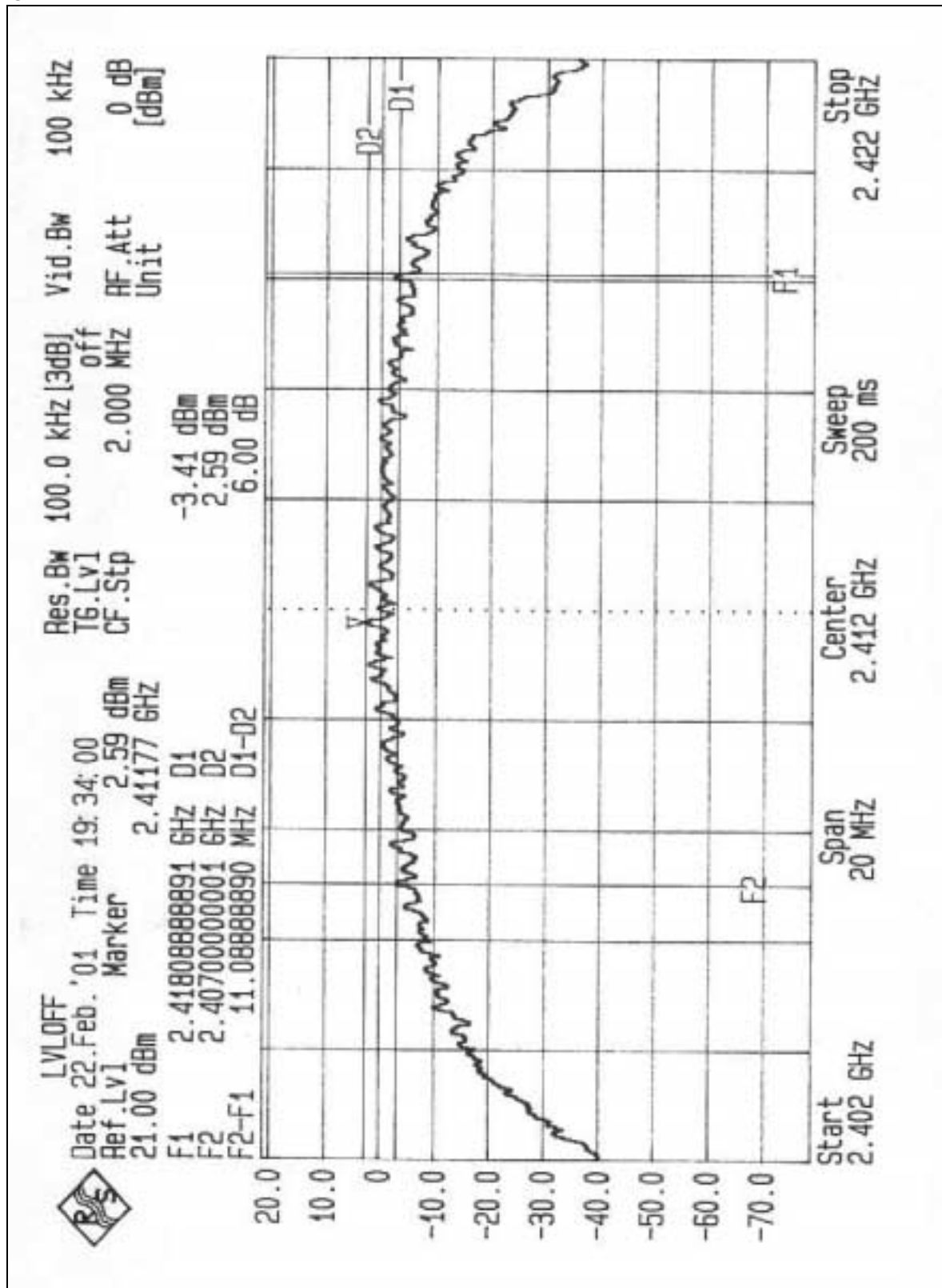
#### 4.3.6 TEST RESULTS

<b>EUT</b>	Wireless Access Point	<b>Model</b>	F5D6130
<b>Environmental Conditions</b>	20°C , 70%RH	<b>Tested By</b>	Steven Lu

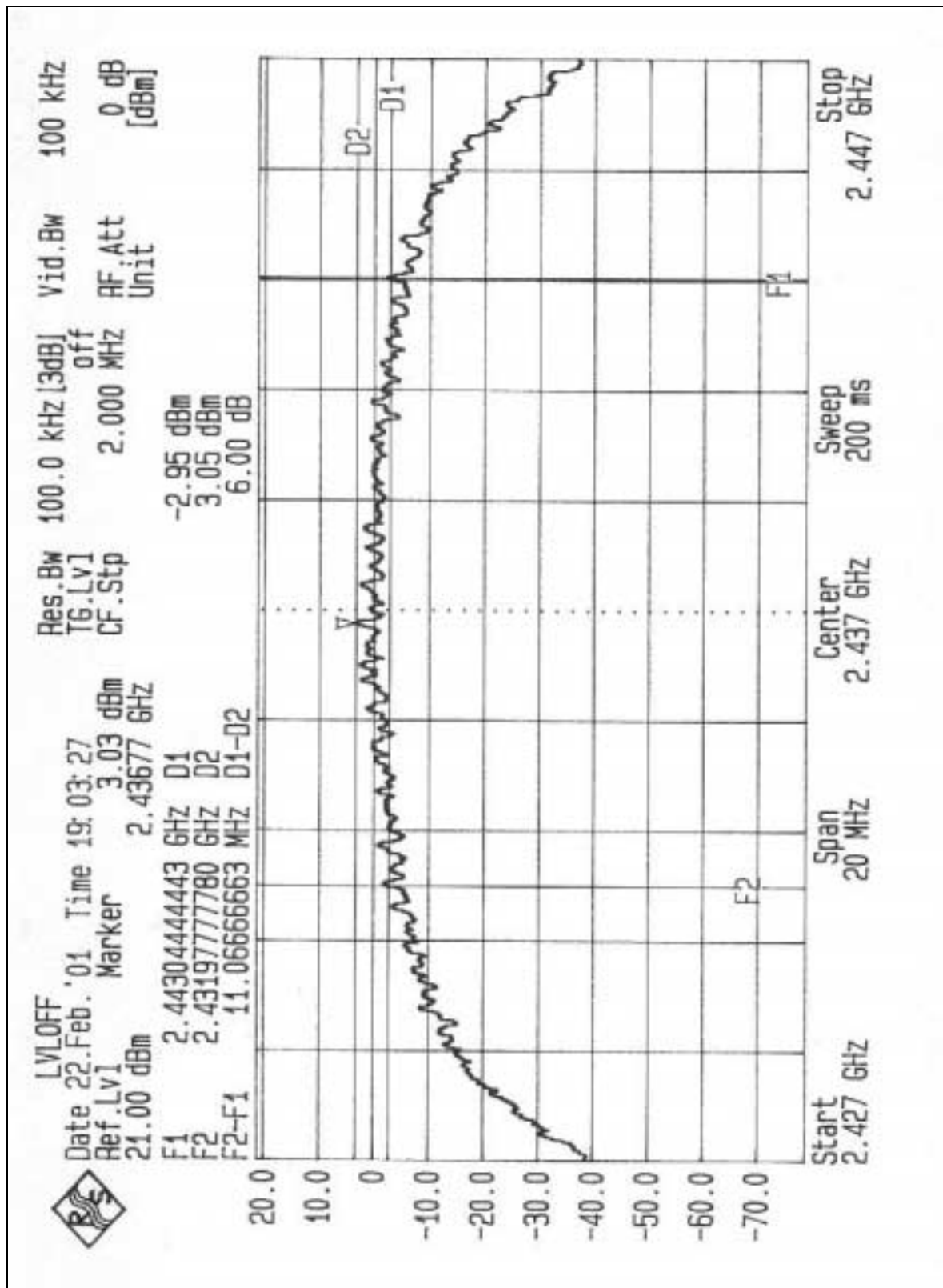
<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>6 dB BANDWIDTH (MHz)</b>	<b>MINIMUM LIMIT (MHz)</b>	<b>PASS/FAIL</b>
1	2412	11.09	0.5	PASS
6	2437	11.07	0.5	PASS
11	2462	11.38	0.5	PASS



CH1

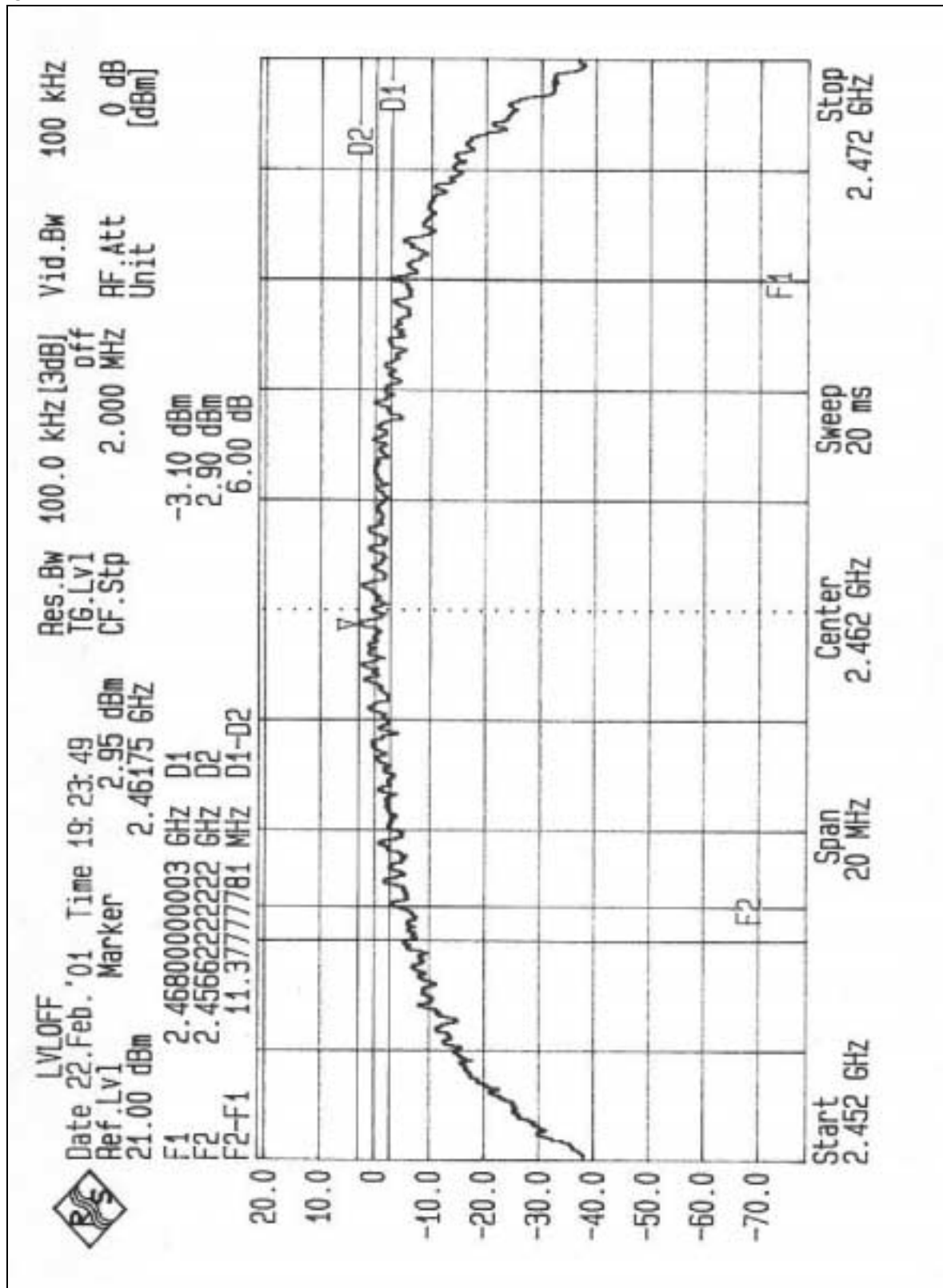


CH6





CH11



#### 4.4 MAXIMUM PEAK OUTPUT POWER

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

The Limit of Maximum Peak Output Power Measurement is 30dBm.

##### 4.4.2 INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP SPECTRUM ANALYZER	8593E	3926A04191	Mar. 03, 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.

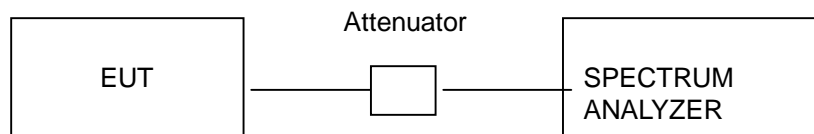


#### 4.4.3 TEST PROCEDURES

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

Note: This measurement is the total power of 15MHz bandwidth which is far more wider than 6dB bandwidth.

#### 4.4.4 TEST SETUP



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

#### 4.4.5 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.4.6 TEST RESULTS

Output Power Into Antenna:

<b>EUT</b>	Wireless Access Point	<b>Model</b>	F5D6130
<b>Environmental Conditions</b>	20°C , 70%RH	<b>Tested By</b>	Steven Lu

<b>CHANNEL</b>	<b>CHANNEL FREQUENCY (MHz)</b>	<b>PEAK POWER OUTPUT (dBm)</b>	<b>PEAK POWER LIMIT (dBm)</b>	<b>PASS/FAIL</b>
1	2412	17.21	30	PASS
6	2437	17.74	30	PASS
11	2462	17.54	30	PASS

## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Limit 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	846839/018 848926/005	Mar. 03, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

#### Notes:

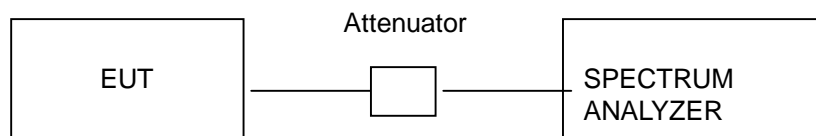
- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.5.3 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/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 TEST SETUP



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

#### 4.5.5 EUT OPERATING CONDITION

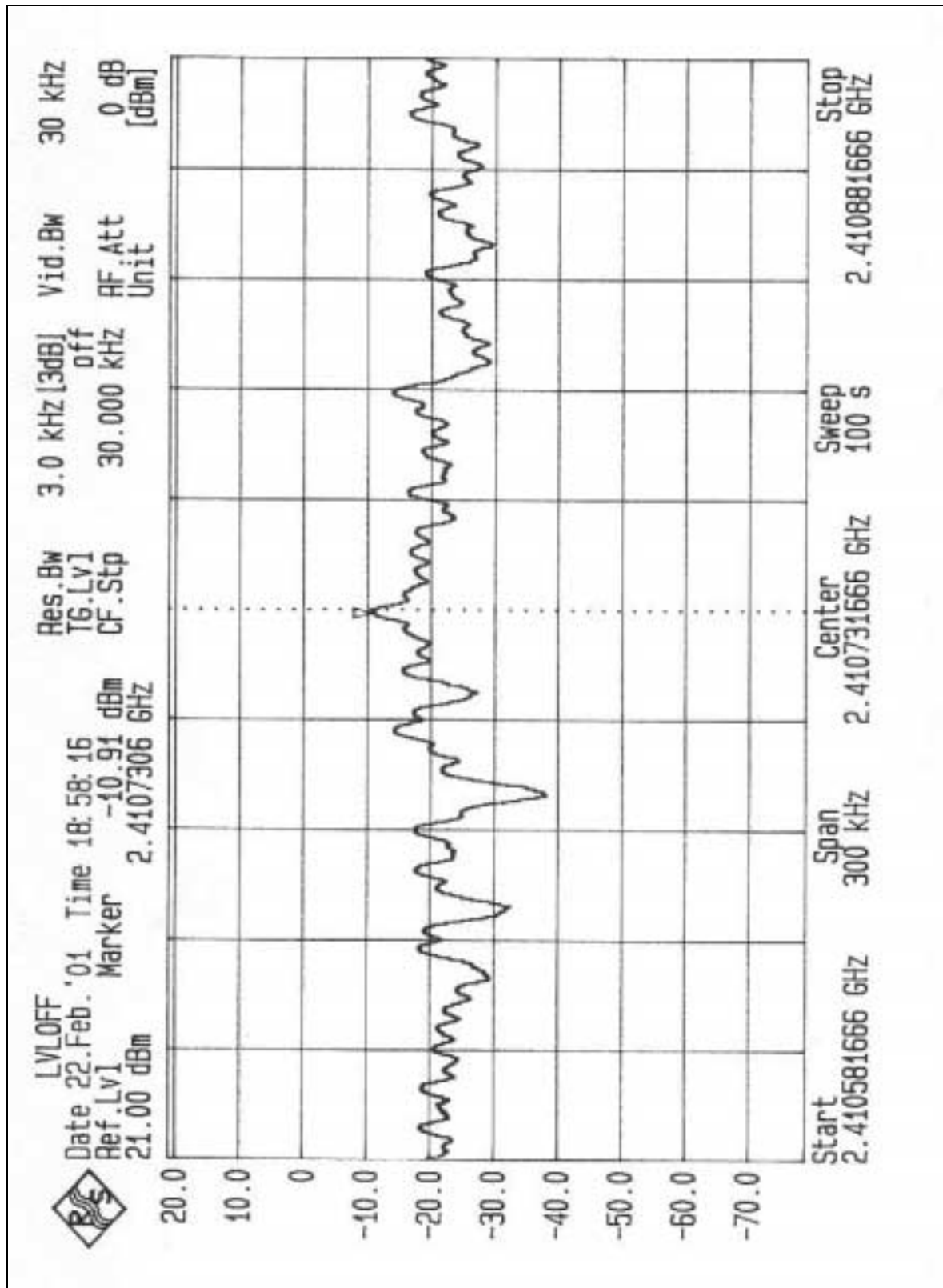
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

## 4.5.6 TEST RESULTS

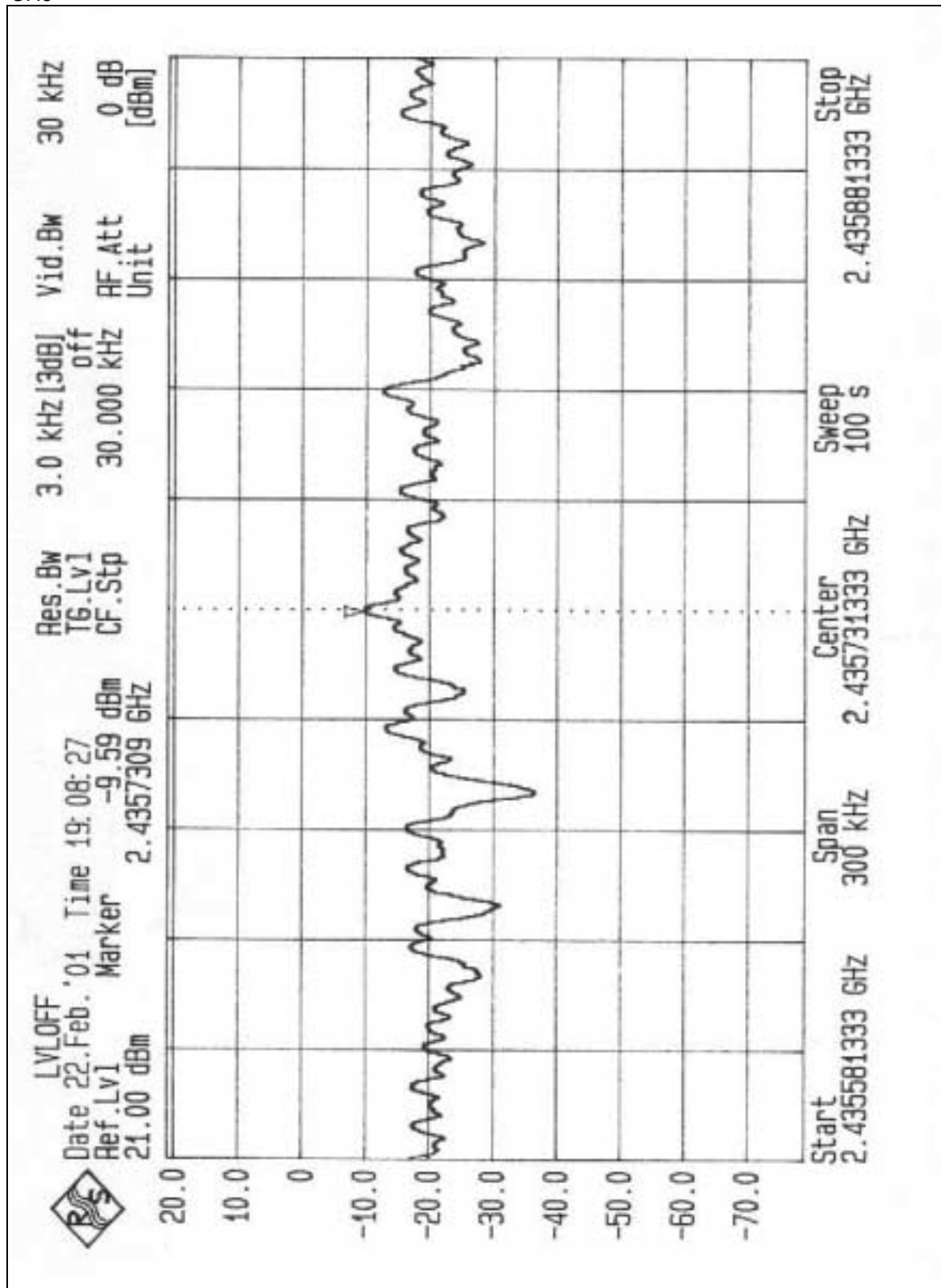
<b>EUT</b>	Wireless Access Point	<b>Model</b>	F5D6130
<b>Environmental Conditions</b>	20°C , 70%RH	<b>Tested By</b>	Steven Lu

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-10.91	8	PASS
6	2437	-9.59	8	PASS
11	2462	-10.69	8	PASS

CHI



CH6



LVLOFF  
 Date 22.Feb.'01 Time 19:28:43  
 Ref.Lvl 21.00 dBm  
 Marker -10.69 dBm  
 2.4613315 GHz

Res.Bw 3.0 kHz [3dB]  
 TG.Lvl off  
 CF.Stp 30.000 kHz  
 Vid.Bw 30 kHz  
 AF.Att 0 dB  
 Unit [dBm]

Start 2.46118222 GHz  
 Span 300 kHz  
 Center 2.46133222 GHz  
 Sweep 100 s  
 Stop 2.46148222 GHz



## 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 RB).

### 4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	848926/005 846839/018	Dec 03, 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.

### 4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose 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

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

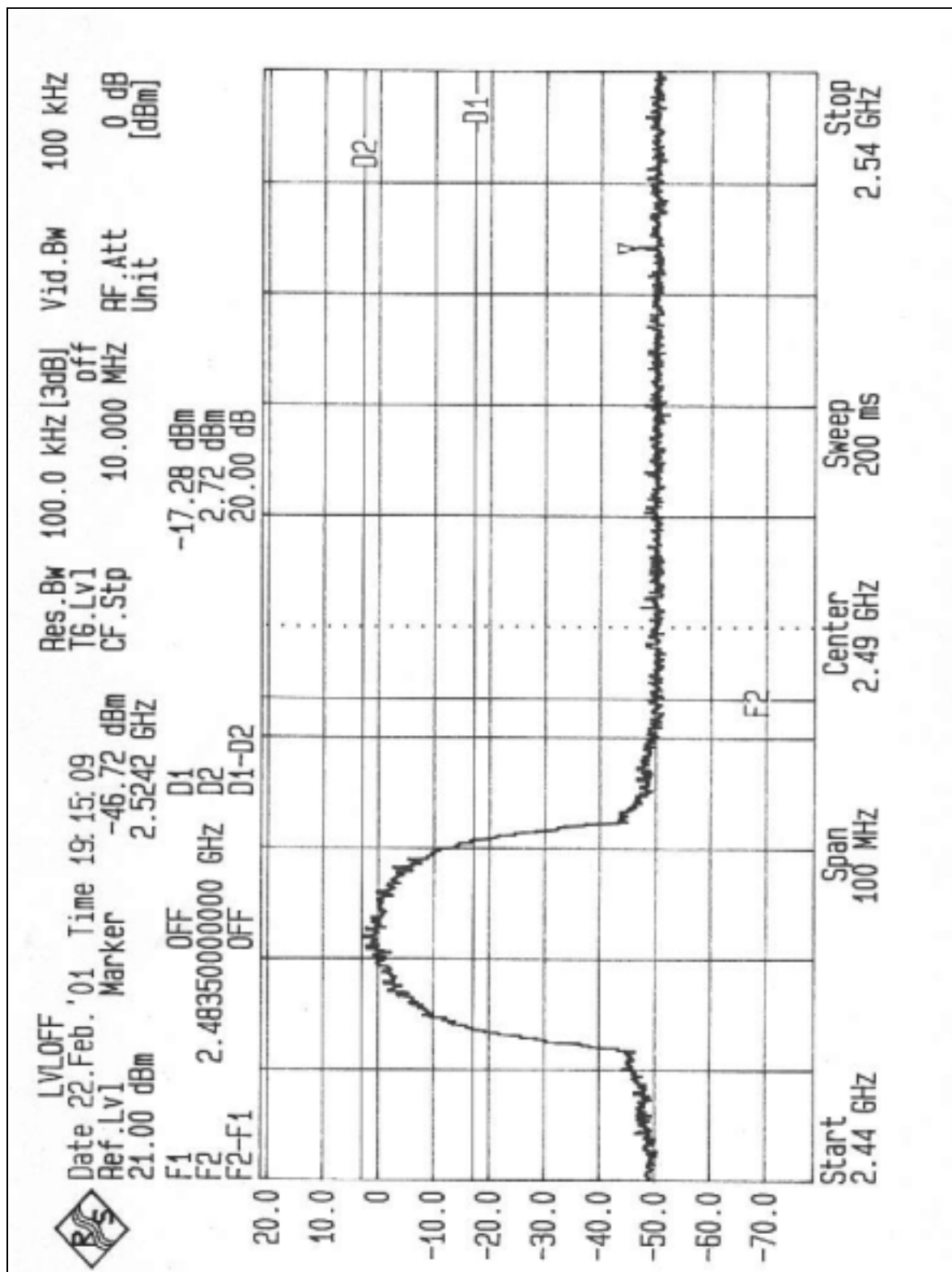
#### 4.6.5 TEST RESULTS

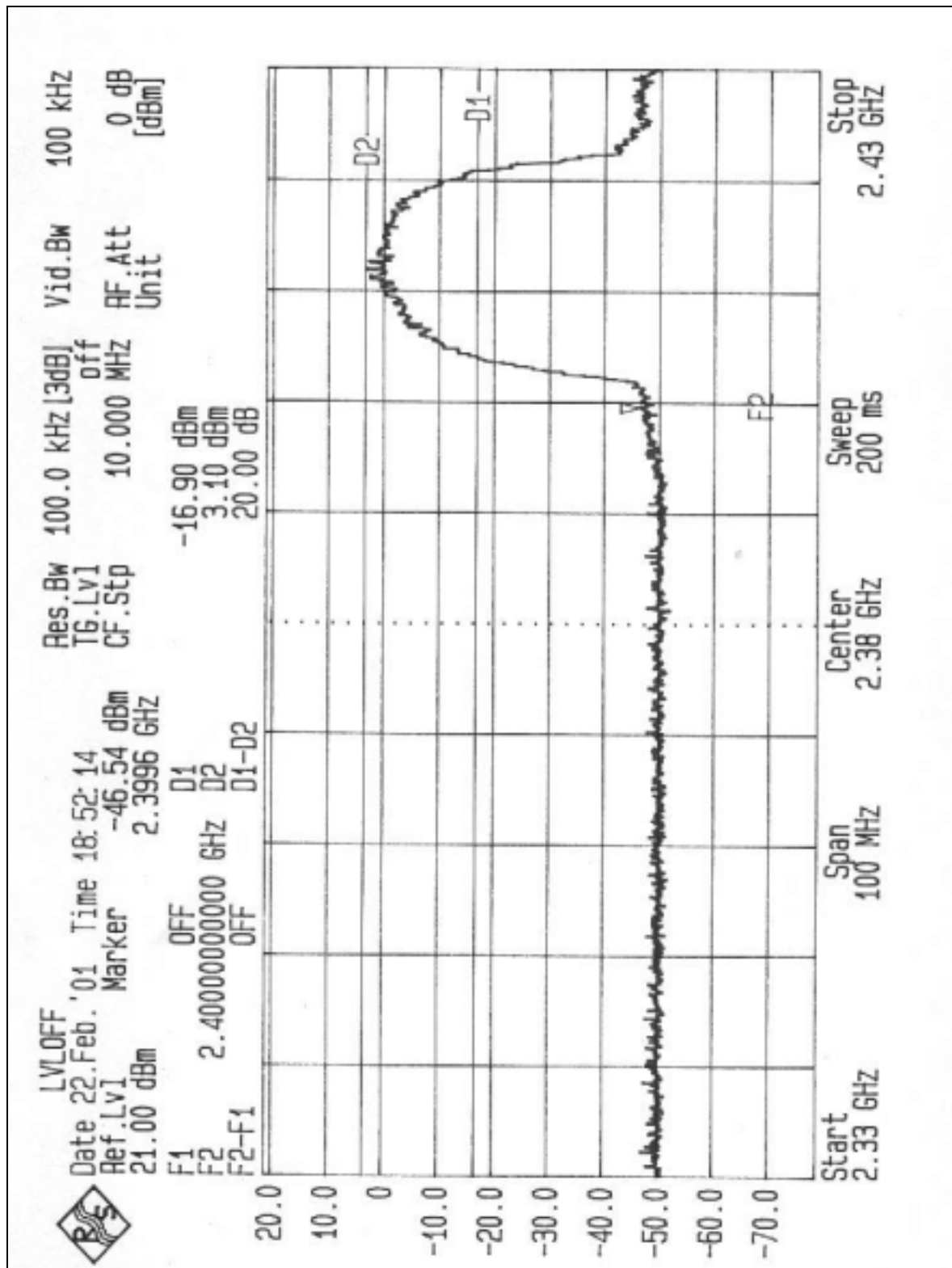
The spectrum plots are attached below. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).



#### 4.6.6 NOTE ON BAND EDGE EMISSION

The band edge emission plot on page 43 shows 49.44dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in table of page 24 is 95.2dB  $\mu$  V/m, so the maximum field strength in restrict band is  $95.2 - 49.44 = 45.76$ dB  $\mu$  V/m which is under 54 dB  $\mu$  V/m limit.







## **4.7 ANTENNA REQUIREMENT**

### **4.7.1 STANDARD APPLICABLE**

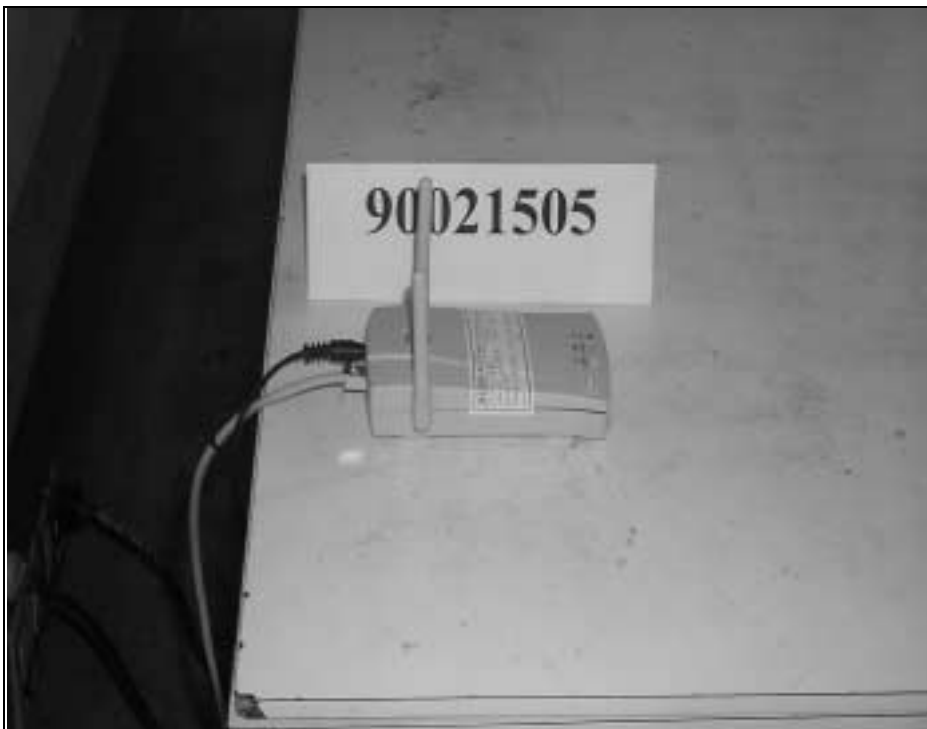
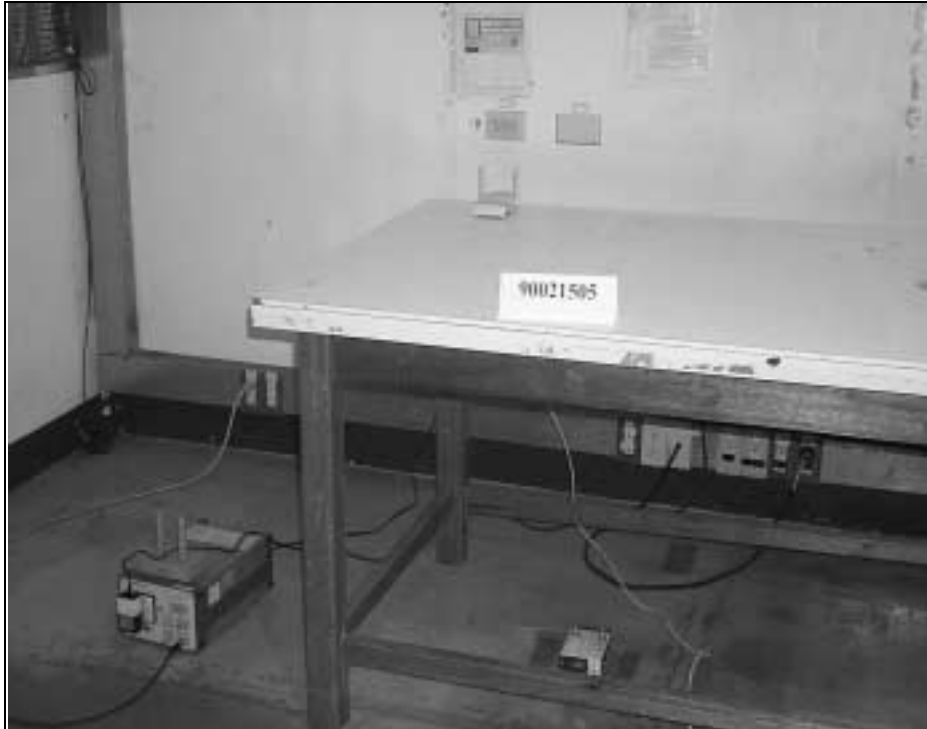
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

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

### **4.7.2 ANTENNA CONNECTED CONSTRUCTION**

The antenna used in this product is Dual Monopole. There is no antenna connector, but the connector used inside the product is MCX. The maximum Gain of this antenna is only 1dBi.

## 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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Fax: 886-2-26052943

**Hsin Chu EMC Lab:**

Tel: 886-35-935343

Fax: 886-35-935342

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Fax: 886-2-26093184

**Lin Kou RF&Telecom Lab**

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Fax: 886-3-3270892

**Email:** [service@mail.adt.com.tw](mailto:service@mail.adt.com.tw)

**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.