



FCC TEST REPORT

REPORT NO.: RF930625L04

MODEL NO.: SF-3000 PLUS

RECEIVED: June 24, 2004

TESTED: June 24 ~ July 13, 2004

APPLICANT: SendFar Technology Co., Ltd.

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City, Taipei, Taiwan, R.O.C.

ISSUED BY: Advance Data Technology Corporation

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R.O.C.

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Table of Contents

1	CERTIFICATION	4
2	SUMMARY OF TEST RESULTS	5
3	GENERAL INFORMATION	6
3.1	GENERAL DESCRIPTION OF EUT	6
3.2	DESCRIPTION OF TEST MODES	7
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS	7
3.4	DESCRIPTION OF SUPPORT UNITS	8
3.5	CONFIGURATION OF SYSTEM UNDER TEST	9
4	TEST TYPES AND RESULTS	10
4.1	CONDUCTED EMISSION MEASUREMENT	10
4.1.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT	10
4.1.2	TEST INSTRUMENTS	11
4.1.3	TEST PROCEDURES	12
3.1.4	DEVIATION FROM TEST STANDARD	12
3.1.5	TEST SETUP	13
4.1.6	EUT OPERATING CONDITIONS	14
4.1.	TEST RESULTS	15
4.2	RADIATED EMISSION MEASUREMENT	21
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT	21
4.2.2	TEST INSTRUMENTS	22
4.2.3	TEST PROCEDURES	23
4.2.4	TEST SETUP	24
4.2.5	EUT OPERATING CONDITIONS	24
4.2.6	TEST RESULTS	25
4.3	6dB BANDWIDTH MEASUREMENT	30
4.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT	30
4.3.2	TEST INSTRUMENTS	30
4.3.3	TEST PROCEDURE	31
4.3.4	TEST SETUP	31
4.3.5	EUT OPERATING CONDITIONS	31
4.4	MAXIMUM PEAK OUTPUT POWER	36
4.4.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT	36
4.4.2	TEST INSTRUMENTS	36
4.4.3	TEST PROCEDURES	37



4.4.4	DEVIATION FROM TEST STANDARD	37
4.4.5	TEST SETUP	37
4.4.6	EUT OPERATING CONDITIONS.....	37
4.4.7	TEST RESULTS.....	38
4.5	POWER SPECTRAL DENSITY MEASUREMENT	39
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	39
4.5.2	TEST INSTRUMENTS	39
4.5.3	TEST PROCEDURE	40
4.5.4	TEST SETUP	40
4.5.5	EUT OPERATING CONDITIONS.....	40
4.5.6	TEST RESULTS.....	41
4.6	BAND EDGES MEASUREMENT	45
4.6.1	LIMITS OF BAND EDGES MEASUREMENT	45
4.6.2	TEST INSTRUMENTS	45
4.6.3	TEST PROCEDURE	45
4.6.4	EUT OPERATING CONDITION	45
4.6.5	TEST RESULTS.....	46
4.7	ANTENNA REQUIREMENT.....	51
4.7.1	STANDARD APPLICABLE	51
4.7.2	ANTENNA CONNECTED CONSTRUCTION.....	51
5	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	52
6	INFORMATION ON THE TESTING LABORATORIES	54



1 CERTIFICATION

PRODUCT: Wireless Access Bridge
MODEL NO.: SF-3000 PLUS
BRAND NAME: SendFar
APPLICANT: SendFar Technology Co., Ltd.
TESTED: June 24 ~ July 13, 2004
TEST ITEM: ENGINEERING SAMPLE
STANDARDS: FCC Part 15, Subpart C (Section 15.247)
ANSI C63.4-2001

The above equipment 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: Stacy Hsueh, **DATE:** July 14, 2004
Stacy Hsueh

APPROVED BY: Cody Chang, **DATE:** July 14, 2004
Cody Chang / Supervisor

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is -15.37dB at 0.154MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit
15.247(c)	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -0.60dB at 2483.5MHz
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

NOTE: The information of measurement uncertainty is available upon the customer's request.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless Access Bridge
MODEL NO.	SF-3000 PLUS
POWER SUPPLY	24Vdc from POE
MODULATION TYPE	BPSK, QPSK, CCK
RADIO TECHNOLOGY	DSSS
TRANSFER RATE	1/2/5.5/6/9/11Mbps
FREQUENCY RANGE	2412MHz ~ 2462MHz
NUMBER OF CHANNEL	11
OUTPUT POWER	23.00dBm
ANTENNA TYPE	Patch antenna with 9dBi antenna gain
DATA CABLE	30m RJ45 shielded cable.
I/O PORTS	RJ45 port
ASSOCIATED DEVICES	NA

NOTE:

1. The following POE (Power over Ethernet) powered the EUT:

BRAND :	SendFar
MODEL :	1PW-2408
INPUT :	100-240Vac
OUTPUT :	24Vdc, 0.8A

The following AC adapter powered the POE:

BRAND :	FAIRWAY
MODEL :	WN20U-240
INPUT :	100-240Vac, 50-60Hz, 1.0A MAX
OUTPUT :	24Vdc, 0.83A

2. The EUT operates in the 2.4GHz frequency spectrum with throughput of up to 11Mbps.
3. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Eleven channels are provided to this EUT.

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

NOTE:

1. Below 1GHz, the channel 1, 6, and 11 were pre-tested in chamber. The channel 11, worst case one, was chosen for final test.
2. Above 1GHz, the channel 1, 6, and 11 were tested individually.
3. From our experience and technical viewpoint, we have chosen data rate 11Mbps for CCK technique, as the worst case for the test among other data rate.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Wireless Access Bridge. 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 : 2001

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

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



3.4 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP05L	16484462992	E2K24CLNS

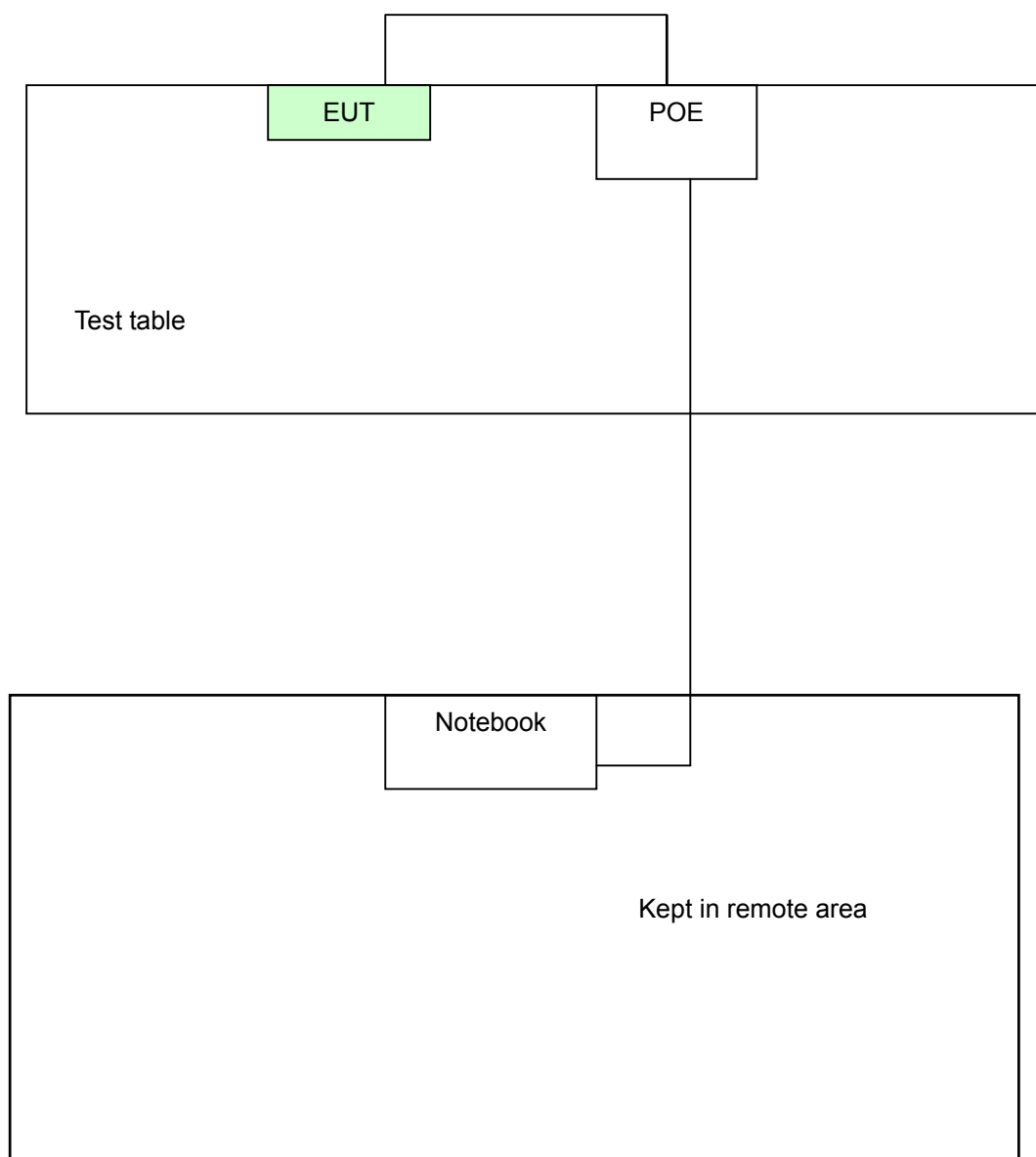
NOTE:

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 1 act as a communication partner to transfer data.

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ 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	Dec. 11, 2004
RF signal cable Woken	5D-FB	Cable-HyC02-01	Mar. 07, 2005
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Mar. 10, 2005
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Mar. 04, 2005
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.



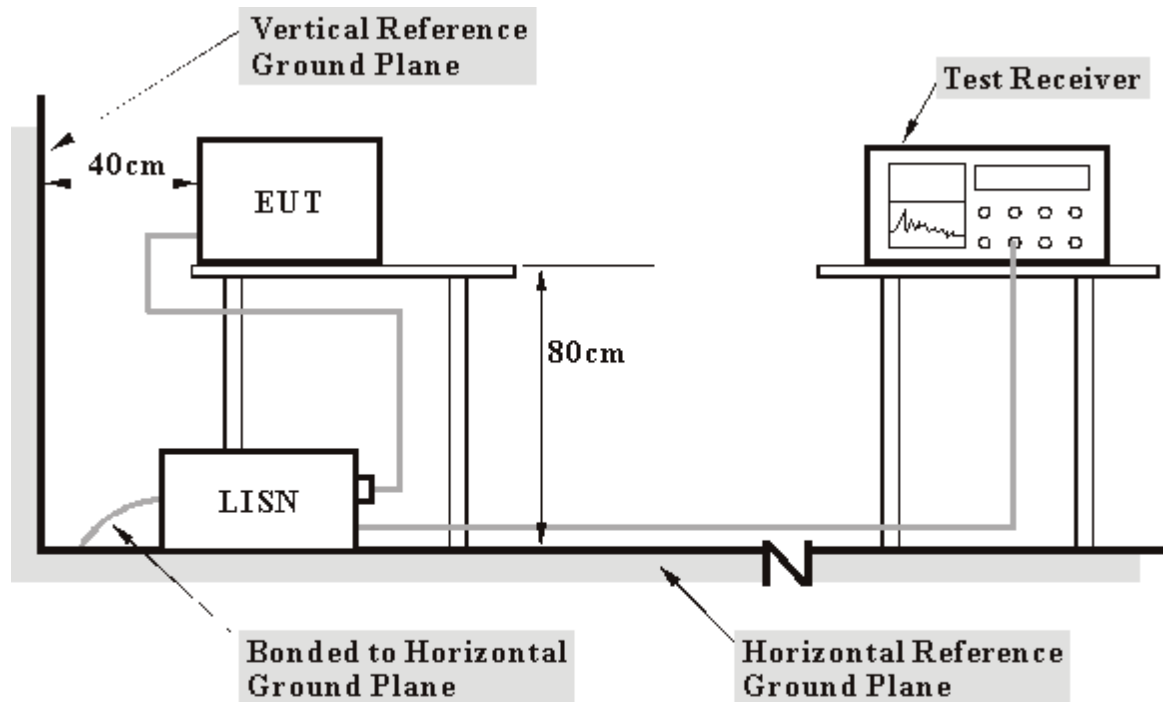
4.1.3 TEST PROCEDURES

- 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 150 kHz to 30 MHz was searched. Emission levels under Limit - 20dB was not recorded.

3.1.4 DEVIATION FROM TEST STANDARD

No deviation

3.1.5 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.



4.1.6 EUT OPERATING CONDITIONS

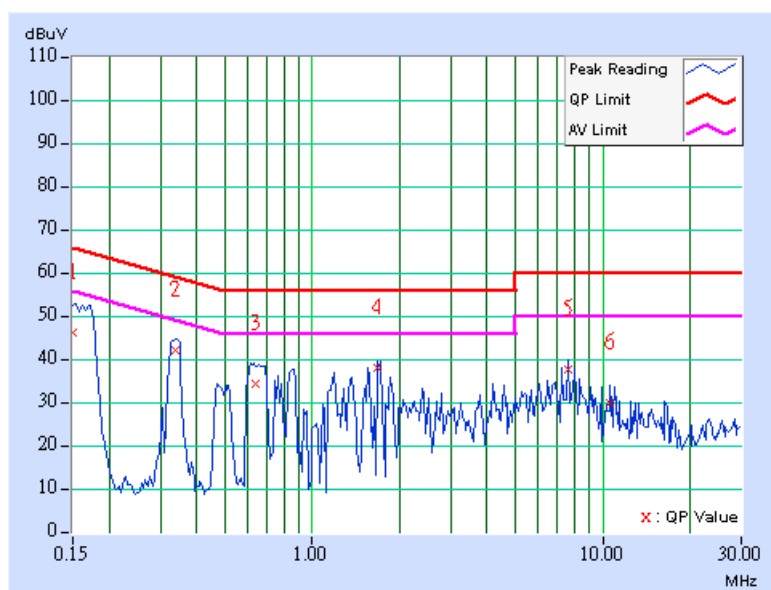
- a. Connected the EUT to a notebook system placed on a testing table.
- b. Prepared another notebook system to act as a communication partner and placed it outside of testing area.
- c. The communication partner run a test program (provided by manufacturer) to enable EUT under transmission/receiving condition continuously at specific channel frequency via a RJ 45 cable.
- d. The communication partner sent data to EUT by command "PING".

4.1.7 TEST RESULTS

EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 1	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24 deg. C, 75%RH, 991 hPa	TESTED BY: Long Chen	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.11	45.79	-	45.90	-	66.00	56.00	-20.10	-
2	0.338	0.11	41.53	-	41.64	-	59.26	49.26	-17.63	-
3	0.636	0.17	33.73	-	33.90	-	56.00	46.00	-22.10	-
4	1.678	0.26	37.47	-	37.73	-	56.00	46.00	-18.27	-
5	7.598	0.46	37.26	-	37.72	-	60.00	50.00	-22.28	-
6	10.630	0.55	29.42	-	29.97	-	60.00	50.00	-30.03	-

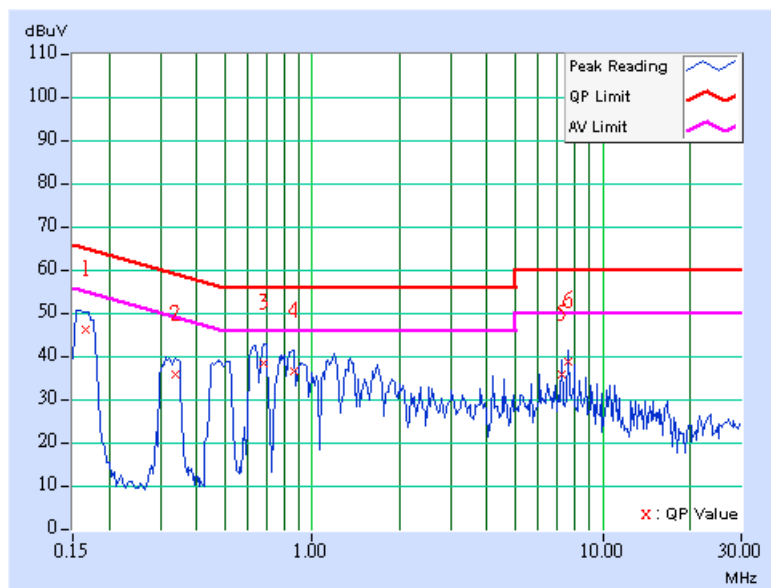
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value =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



EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 1	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24 deg. C, 75%RH, 991 hPa	TESTED BY: Long Chen	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.165	0.10	45.72	-	45.82	-	65.19	55.19	-19.37	-
2	0.340	0.11	35.41	-	35.52	-	59.19	49.19	-23.68	-
3	0.677	0.17	38.25	-	38.42	-	56.00	46.00	-17.58	-
4	0.861	0.21	36.23	-	36.44	-	56.00	46.00	-19.56	-
5	7.220	0.43	35.60	-	36.03	-	60.00	50.00	-23.97	-
6	7.600	0.43	38.27	-	38.70	-	60.00	50.00	-21.30	-

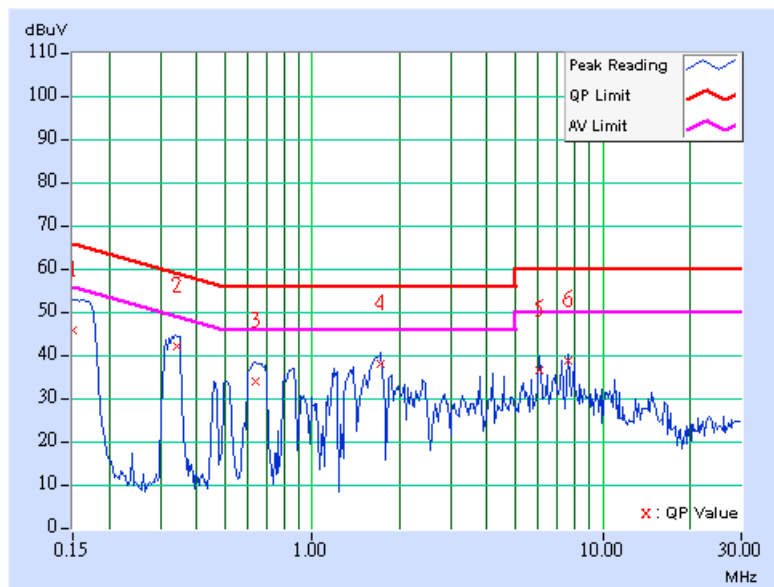
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value =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



EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 6	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24 deg. C, 75%RH, 991 hPa	TESTED BY: Long Chen	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.11	45.43	-	45.54	-	66.00	56.00	-20.46	-
2	0.341	0.11	41.64	-	41.75	-	59.18	49.18	-17.44	-
3	0.642	0.17	33.56	-	33.73	-	56.00	46.00	-22.27	-
4	1.719	0.26	37.67	-	37.93	-	56.00	46.00	-18.07	-
5	6.074	0.40	36.13	-	36.53	-	60.00	50.00	-23.47	-
6	7.591	0.46	38.41	-	38.87	-	60.00	50.00	-21.13	-

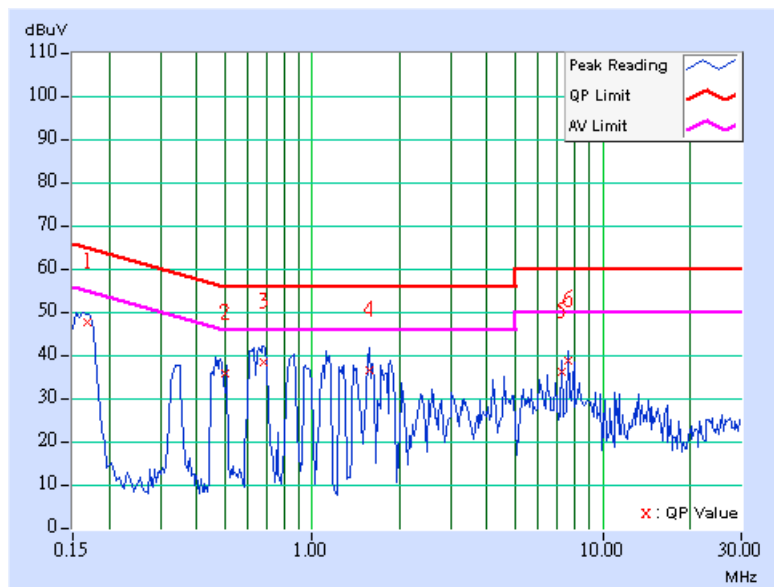
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 6	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	24 deg. C, 75%RH, 991 hPa	TESTED BY: Long Chen	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.168	0.10	47.17	-	47.27	-	65.05	55.05	-17.79	-
2	0.500	0.14	35.55	-	35.69	-	56.00	46.00	-20.31	-
3	0.681	0.17	38.22	-	38.39	-	56.00	46.00	-17.61	-
4	1.566	0.25	36.27	-	36.52	-	56.00	46.00	-19.48	-
5	7.211	0.42	35.77	-	36.19	-	60.00	50.00	-23.81	-
6	7.590	0.43	38.55	-	38.98	-	60.00	50.00	-21.02	-

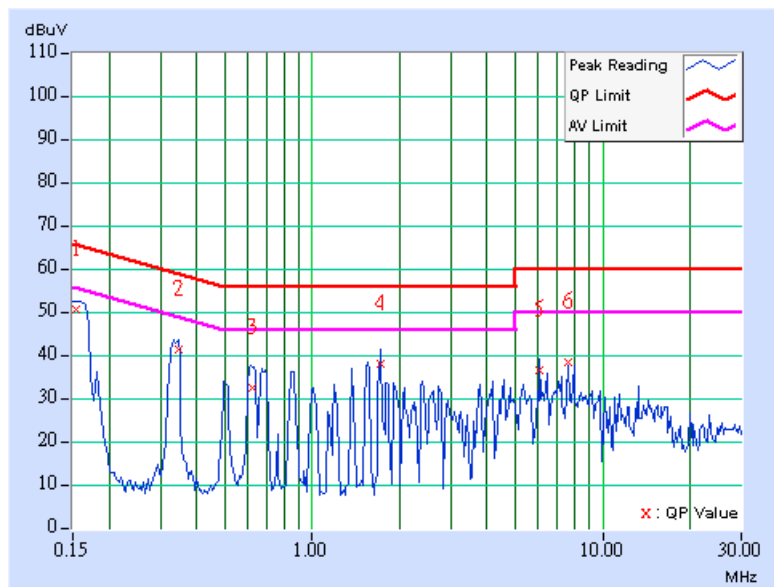
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 11	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	24 deg. C, 75%RH, 991 hPa	TESTED BY: Long Chen	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.10	50.31	-	50.41	-	65.79	55.79	-15.37	-
2	0.345	0.11	40.93	-	41.04	-	59.07	49.07	-18.03	-
3	0.626	0.16	32.02	-	32.18	-	56.00	46.00	-23.82	-
4	1.727	0.26	37.71	-	37.97	-	56.00	46.00	-18.03	-
5	6.066	0.40	36.27	-	36.67	-	60.00	50.00	-23.33	-
6	7.584	0.46	38.07	-	38.53	-	60.00	50.00	-21.47	-

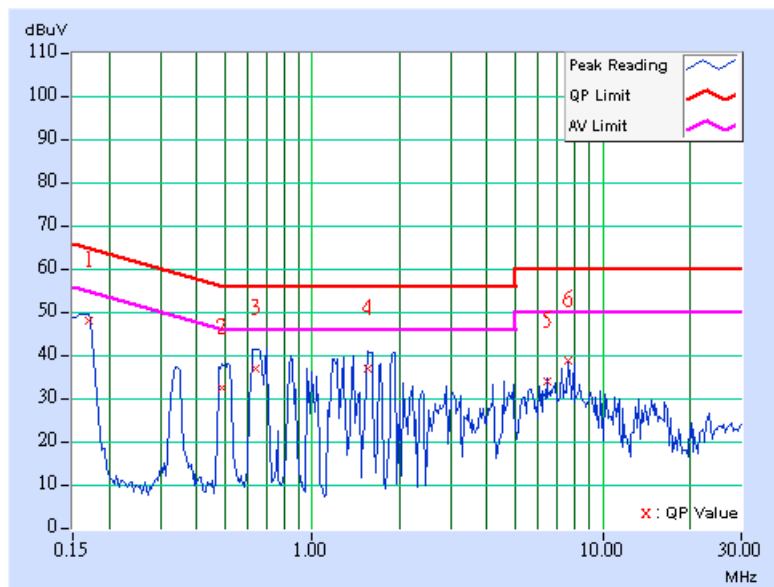
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 11	6dB BANDWIDTH	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	PHASE	Netural (N)
ENVIRONMENTAL CONDITIONS	24 deg. C, 75%RH, 991 hPa	TESTED BY: Long Chen	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.169	0.10	47.63	-	47.73	-	64.99	54.99	-17.26	-
2	0.490	0.13	32.22	-	32.35	-	56.17	46.17	-23.82	-
3	0.638	0.16	36.45	-	36.61	-	56.00	46.00	-19.39	-
4	1.563	0.25	36.42	-	36.67	-	56.00	46.00	-19.33	-
5	6.449	0.40	33.70	-	34.10	-	60.00	50.00	-25.90	-
6	7.587	0.43	38.39	-	38.82	-	60.00	50.00	-21.18	-

- 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	ESI7	100033	Jun, 08, 2005
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Dec. 15, 2004
BILOG Antenna SCHWARZBECK	VULB9168	9168-153	Feb. 03, 2005
HORN Antenna SCHWARZBECK	9120D	9120D-408	Feb. 03, 2005
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA 9170243	Feb. 23, 2005
Preamplifier Agilent	8447D	2944A10633	Jan. 15, 2005
Preamplifier Agilent	8449B	3008A01964	Jan. 27, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	218183/4	Mar. 05, 2005
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	218195/4	Mar. 05, 2005
Software ADT.	ADT_Radiated_V5.14	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA
Turn Table ADT.	TT100.	TT93021703	NA
Turn Table Controller ADT.	SC100.	SC93021703	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 IC4924-3.



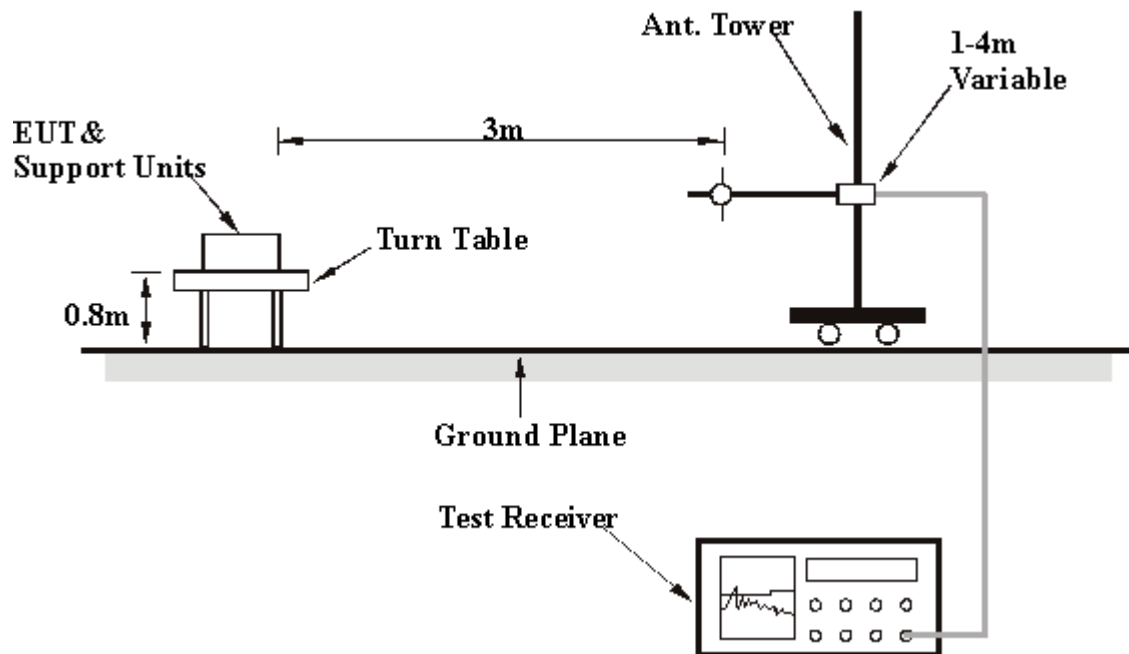
4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic 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 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 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 and video bandwidth of test receiver/spectrum analyzer is 1 MHz 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 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 4.1.6

4.2.6 TEST RESULTS

EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 11	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25 deg. C, 60 % RH, 991hPa	TEST BY	Long Chen

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	173.85	35.03 QP	43.50	-8.47	2.00 H	226	21.51	13.53
2	395.45	37.06 QP	46.00	-8.94	2.00 H	202	20.20	16.86
3	512.08	36.48 QP	46.00	-9.52	1.50 H	112	17.50	18.98
4	562.63	42.94 QP	46.00	-3.06	1.50 H	4	22.76	20.17
5	613.10	42.12 QP	46.00	-3.88	1.25 H	313	20.69	21.43
6	626.77	42.96 QP	46.00	-3.04	1.25 H	10	21.34	21.62
7	638.44	43.06 QP	46.00	-2.94	1.25 H	340	21.28	21.78
8	650.10	37.18 QP	46.00	-8.82	1.00 H	355	15.24	21.94
9	671.48	43.22 QP	46.00	-2.78	1.00 H	325	21.03	22.18
10	681.99	42.80 QP	46.00	-3.20	1.00 H	327	20.50	22.30
11	716.19	42.37 QP	46.00	-3.63	1.00 H	283	19.48	22.89
12	758.96	38.05 QP	46.00	-7.95	1.00 H	346	14.35	23.70
13	819.22	38.22 QP	46.00	-7.78	1.00 H	346	14.27	23.95

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.

EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 11	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25 deg. C, 60 % RH, 991hPa	TEST BY	Long Chen

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	37.78	31.18 QP	40.00	-8.82	1.25 V	256	15.72	15.46
2	70.82	36.02 QP	40.00	-3.98	1.00 V	124	23.25	12.77
3	96.09	35.04 QP	43.50	-8.46	1.00 V	61	24.14	10.90
4	510.14	39.70 QP	46.00	-6.30	1.00 V	88	20.77	18.93
5	550.96	33.27 QP	46.00	-12.73	1.00 V	184	13.43	19.84
6	562.63	40.52 QP	46.00	-5.48	1.00 V	4	20.34	20.17
7	613.17	43.12 QP	46.00	-2.88	1.50 V	346	21.69	21.43
8	663.71	41.25 QP	46.00	-4.75	1.50 V	343	19.16	22.10
9	683.15	39.74 QP	46.00	-6.26	1.50 V	16	17.42	22.32
10	716.19	38.58 QP	46.00	-7.42	1.25 V	106	15.69	22.89
11	836.71	33.23 QP	46.00	-12.77	1.00 V	340	9.10	24.12
12	867.82	34.39 QP	46.00	-11.61	1.00 V	352	9.78	24.60
13	920.30	35.72 QP	46.00	-10.28	1.00 V	358	10.24	25.48

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
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.



EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60 % RH, 991 hPa	TESTED BY: Gary Chang	

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	2038.00	49.77 PK	74.00	-24.23	1.44 H	31	19.85	29.92
1	2038.00	47.21 AV	54.00	-6.79	1.44 H	31	17.29	29.92
2	2387.50	63.80 PK	74.00	-10.20	1.00 H	0	32.67	31.13
2	2387.50	53.30 AV	54.00	-0.70	1.00 H	0	22.17	31.13
3	*2412.00	122.74 PK			1.00 H	0	91.53	31.21
3	*2412.00	115.38 AV			1.00 H	0	84.17	31.21
4	4076.00	48.94 PK	74.00	-25.06	1.16 H	300	13.41	35.53
5	4824.00	49.94 PK	74.00	-24.06	1.09 H	34	12.06	37.88
6	6113.00	50.58 PK	74.00	-23.42	1.41 H	23	10.45	40.13
6	6113.00	40.81 AV	54.00	-13.19	1.41 H	23	0.68	40.13
7	7236.00	54.86 PK	74.00	-19.14	1.42 H	341	11.41	43.46
7	7236.00	43.76 AV	54.00	-10.24	1.42 H	341	0.31	43.46

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	2038.00	51.30 PK	74.00	-22.70	1.00 V	360	21.38	29.92
1	2038.00	49.59 AV	54.00	-4.41	1.00 V	360	19.67	29.92
2	2387.50	47.50 PK	74.00	-26.50	1.72 V	33	16.37	31.13
3	*2412.00	107.28 PK			1.72 V	33	76.07	31.21
3	*2412.00	99.19 AV			1.72 V	33	67.98	31.21
4	4076.00	50.14 PK	74.00	-23.86	1.12 V	7	14.61	35.53
4	4076.00	43.91 AV	54.00	-10.09	1.12 V	7	8.38	35.53
5	4824.00	49.07 PK	74.00	-24.93	1.56 V	341	11.19	37.88
6	6113.00	49.48 PK	74.00	-24.52	1.23 V	251	9.35	40.13
6	6113.00	42.21 AV	54.00	-11.79	1.23 V	251	2.08	40.13
7	7236.00	53.72 PK	74.00	-20.28	1.31 V	34	10.27	43.46
7	7236.00	45.16 AV	54.00	-8.84	1.31 V	34	1.71	43.46

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
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	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60 % RH, 991 hPa	TESTED BY: Gary Chang	

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	2063.00	43.39 PK	74.00	-30.61	1.16 H	34	13.37	30.02
2	*2437.00	125.04 PK			1.16 H	2	93.71	31.34
2	*2437.00	116.43 AV			1.16 H	2	85.09	31.34
3	4126.00	49.18 PK	74.00	-24.82	1.14 H	95	13.37	35.81
4	4874.00	52.54 PK	74.00	-21.46	1.08 H	257	14.55	37.99
4	4874.00	44.84 AV	54.00	-9.16	1.08 H	257	6.85	37.99
5	6188.00	49.32 PK	74.00	-24.68	1.20 H	345	8.96	40.36
5	6188.00	42.12 AV	54.00	-11.88	1.20 H	345	1.76	40.36
6	7311.00	53.85 PK	74.00	-20.15	1.15 H	95	10.20	43.66
6	7311.00	44.63 AV	54.00	-9.37	1.15 H	95	0.98	43.66

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	2063.00	51.99 PK	74.00	-22.01	1.26 V	34	21.97	30.02
1	2063.00	49.41 AV	54.00	-4.59	1.26 V	34	19.39	30.02
2	*2437.00	107.28 PK			1.42 V	33	75.95	31.34
2	*2437.00	99.09 AV			1.42 V	33	67.76	31.34
3	4126.00	48.93 PK	74.00	-25.07	1.00 V	251	13.12	35.81
4	4874.00	49.70 PK	74.00	-24.30	1.33 V	75	11.71	37.99
5	6188.00	49.66 PK	74.00	-24.34	1.58 V	34	9.30	40.36
5	6188.00	41.12 AV	54.00	-12.88	1.58 V	34	0.76	40.36
6	7311.00	60.42 PK	74.00	-13.58	1.25 V	47	16.77	43.66
6	7311.00	44.98 AV	54.00	-9.02	1.25 V	47	1.33	43.66

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
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	Wireless Access Bridge	MODEL	SF-3000 PLUS
MODE	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25 deg. C, 60 % RH, 991 hPa	TESTED BY: Gary Chang	

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	2088.00	50.32 PK	74.00	-23.68	1.19 H	348	20.19	30.13
1	2088.00	47.11 AV	54.00	-6.89	1.19 H	348	16.98	30.13
2	*2462.00	123.36 PK			1.17 H	0	91.90	31.46
2	*2462.00	114.20 AV			1.17 H	0	82.74	31.46
3	2483.50	60.40 PK	74.00	-13.60	1.17 H	0	28.83	31.57
3	2483.50	53.40 AV	54.00	-0.60	1.17 H	0	21.83	31.57
4	4176.00	50.85 PK	74.00	-23.15	1.17 H	31	14.75	36.10
4	4176.00	44.10 AV	54.00	-9.90	1.17 H	31	8	36.10
5	4924.00	50.28 PK	74.00	-23.72	1.12 H	345	12.17	38.11
6	6263.00	50.51 PK	74.00	-23.49	1.54 H	34	9.91	40.61
6	6263.00	42.45 AV	54.00	-11.55	1.54 H	34	1.84	40.61
7	7389.50	61.79 PK	74.00	-12.21	1.08 H	38	17.86	43.93
7	7389.50	47.79 AV	54.00	-6.21	1.08 H	38	3.86	43.93

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	2088.00	50.41 PK	74.00	-23.59	1.56 V	34	20.28	30.13
1	2088.00	48.13 AV	54.00	-5.87	1.56 V	34	18	30.13
2	*2462.00	108.42 PK			1.38 V	35	76.96	31.46
2	*2462.00	99.96 AV			1.38 V	35	68.50	31.46
3	2483.50	47.90 PK	74.00	-26.10	1.38 V	35	16.33	31.57
4	4176.00	51.31 PK	74.00	-22.69	1.25 V	352	15.21	36.10
4	4176.00	44.60 AV	54.00	-9.40	1.25 V	352	8.50	36.10
5	4924.00	51.28 PK	74.00	-22.72	1.26 V	44	13.17	38.11
5	4924.00	42.78 AV	54.00	-11.22	1.26 V	44	4.67	38.11
6	6263.00	50.92 PK	74.00	-23.08	1.32 V	56	10.32	40.61
6	6263.00	42.05 AV	54.00	-11.95	1.32 V	56	1.44	40.61
7	7384.50	57.57 PK	74.00	-16.43	1.21 V	352	13.66	43.91
7	7384.50	45.46 AV	54.00	-8.54	1.21 V	352	1.55	43.91

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
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	FSEK30	100049	August 12, 2004

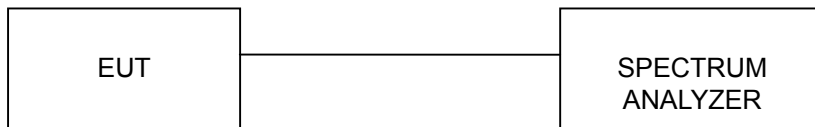
NOTE:

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 1 kHz RBW and 10 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 CONDITIONS

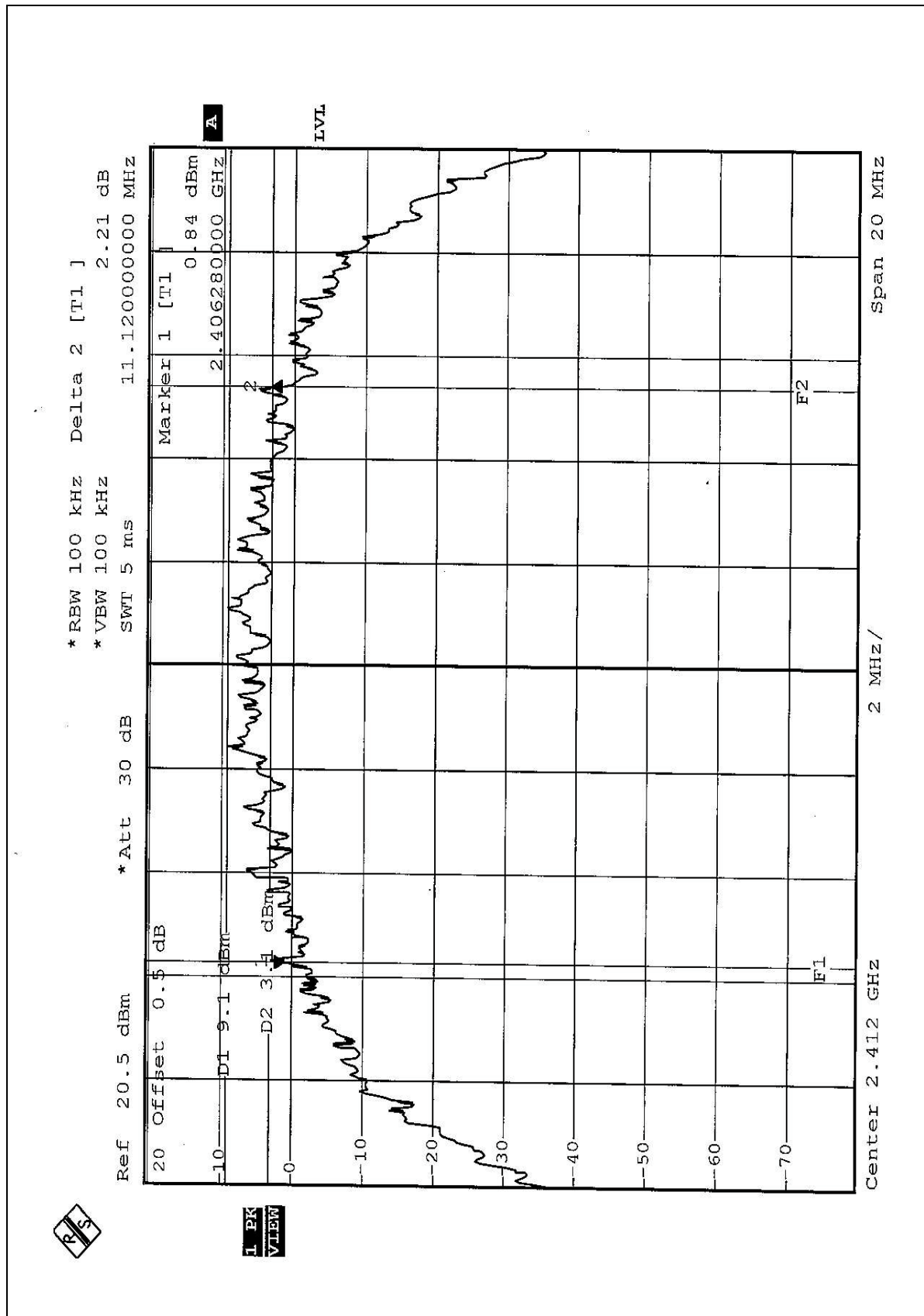
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



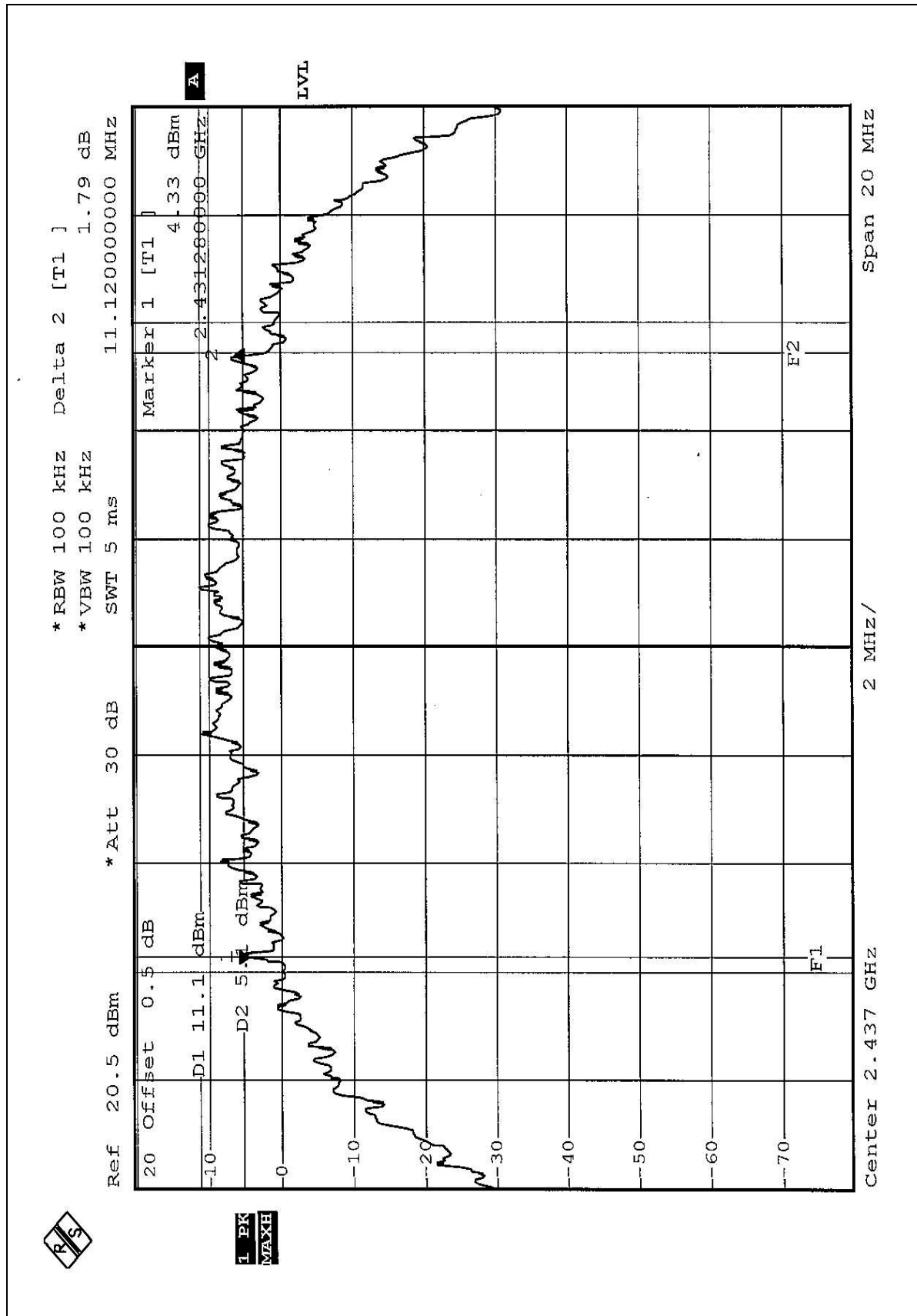
EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 67%RH, 991 hPa
TESTED BY: Long Chen			

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	11.12	0.5	PASS
6	2437	11.12	0.5	PASS
11	2462	11.04	0.5	PASS

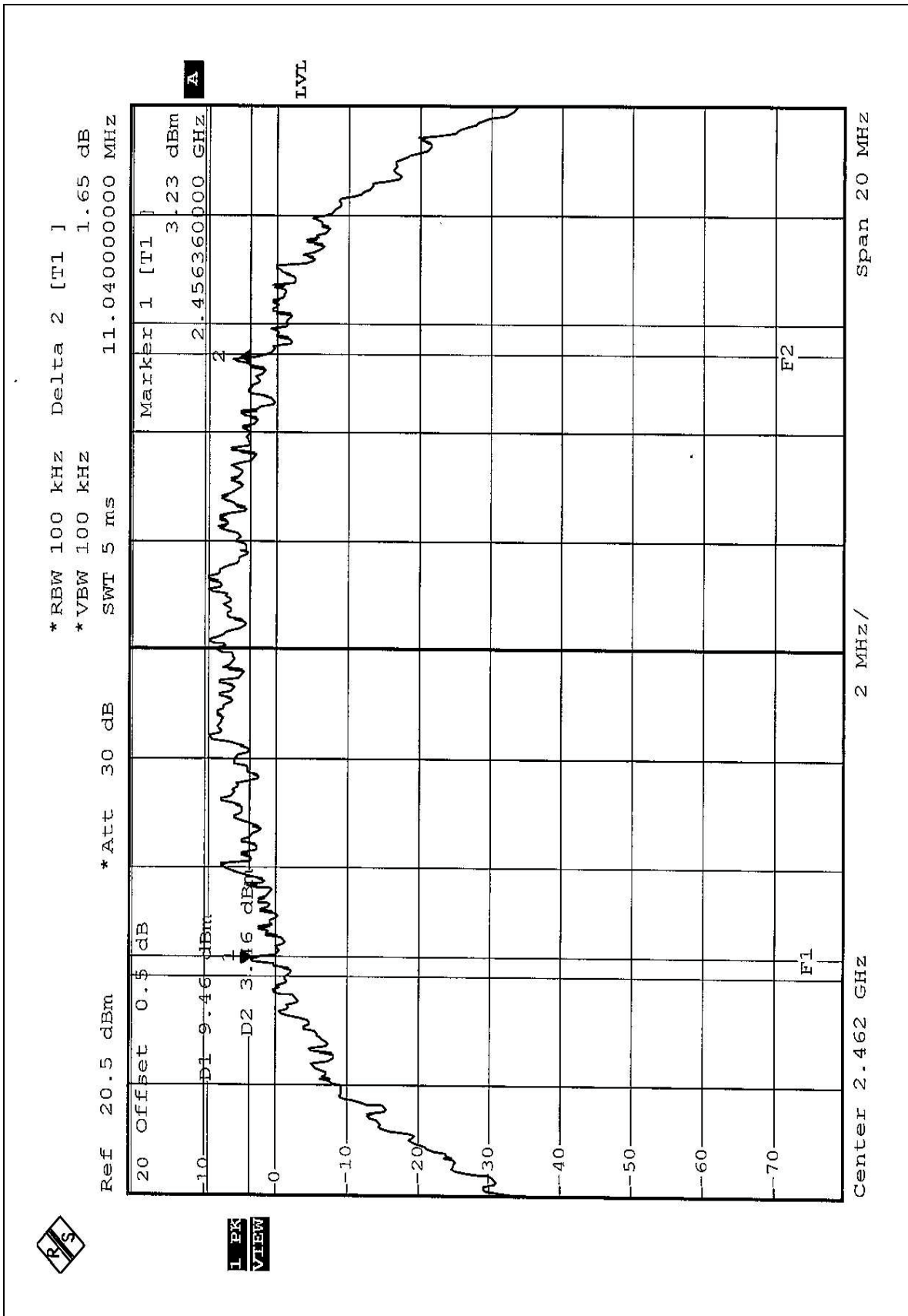
CH1



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 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 12, 2004
AGILENT SIGNAL GENERATOR	E8257C	MY43320668	Dec. 31, 2004
TEKTRONIX OSCILLOSCOPE	TDS 220	C019167	Feb. 01, 2005
NARDA DETECTOR	4503A	FSCM99899	NA

NOTE:

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

4.4.3 TEST PROCEDURES

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

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.1.6



4.4.7 TEST RESULTS

EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 67%RH, 991 hPa
TESTED BY: Long Chen			

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	20.00	27	PASS
6	2437	23.00	27	PASS
11	2462	20.50	27	PASS

Note: According to 15.247(b)(4), the maximum antenna gain 9 dBi is higher than 6 dBi, so the limit of peak power shall be reduce by 3dB.



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
SPECTRUM ANALYZER	FSEK30	100049	August 12, 2004

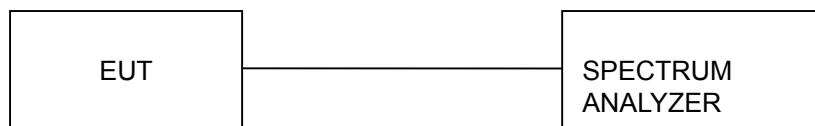
NOTE:

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 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



4.5.5 EUT OPERATING CONDITIONS

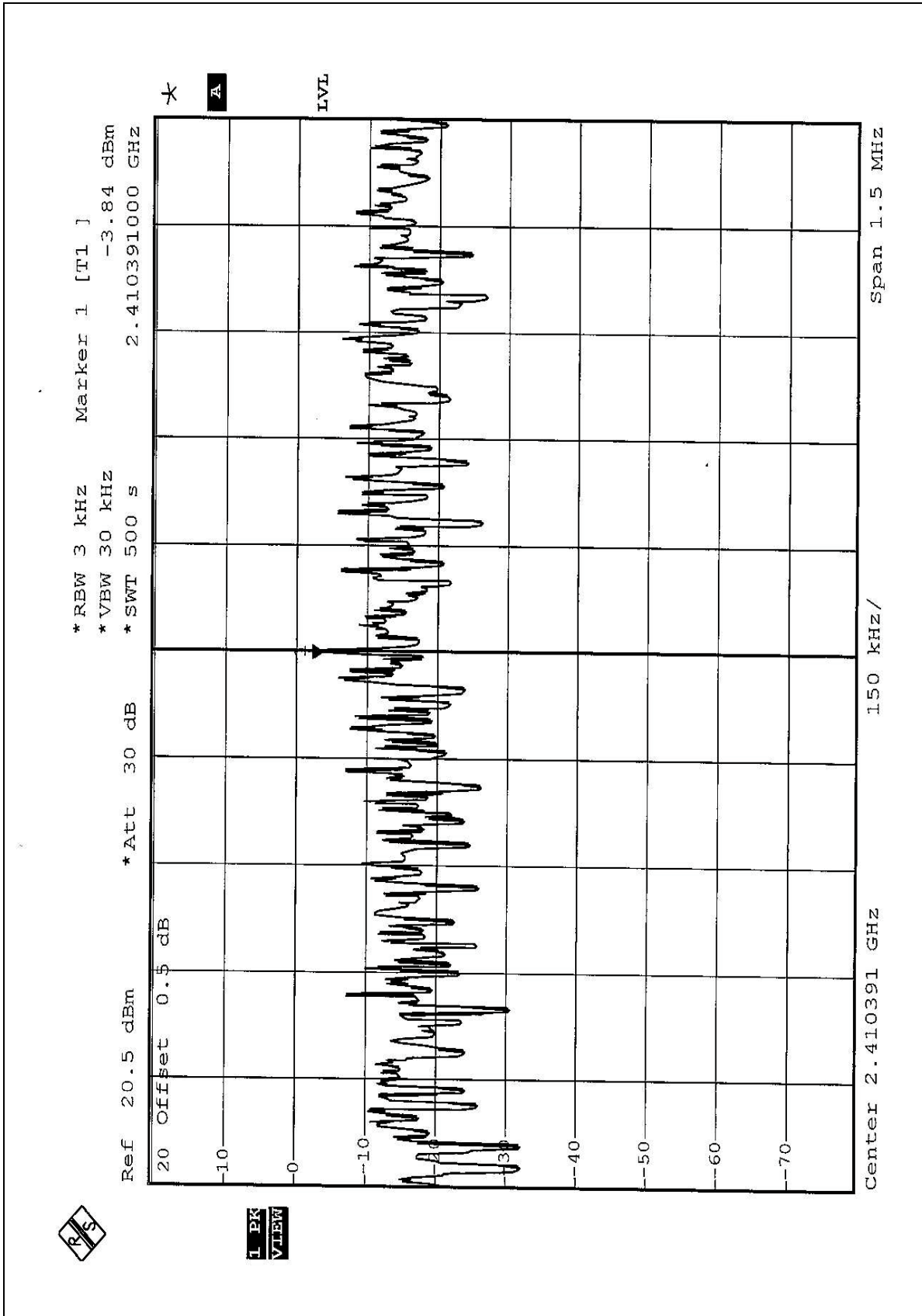
Same as 4.3.5

4.5.6 TEST RESULTS

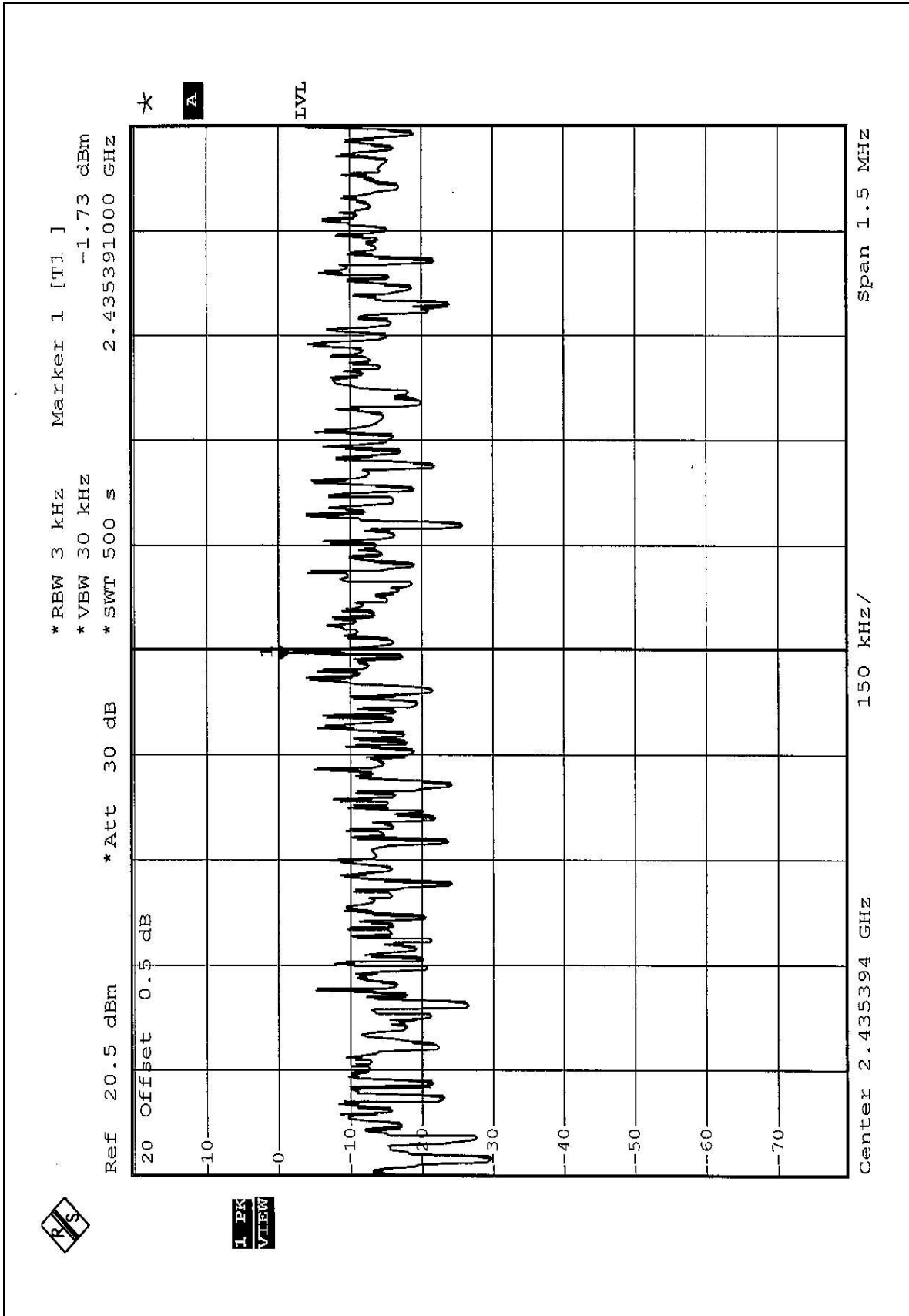
EUT	Wireless Access Bridge	MODEL	SF-3000 PLUS
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 67%RH, 991 hPa
TESTED BY: Long Chen			

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-3.84	8	PASS
6	2437	-1.73	8	PASS
11	2462	-3.74	8	PASS

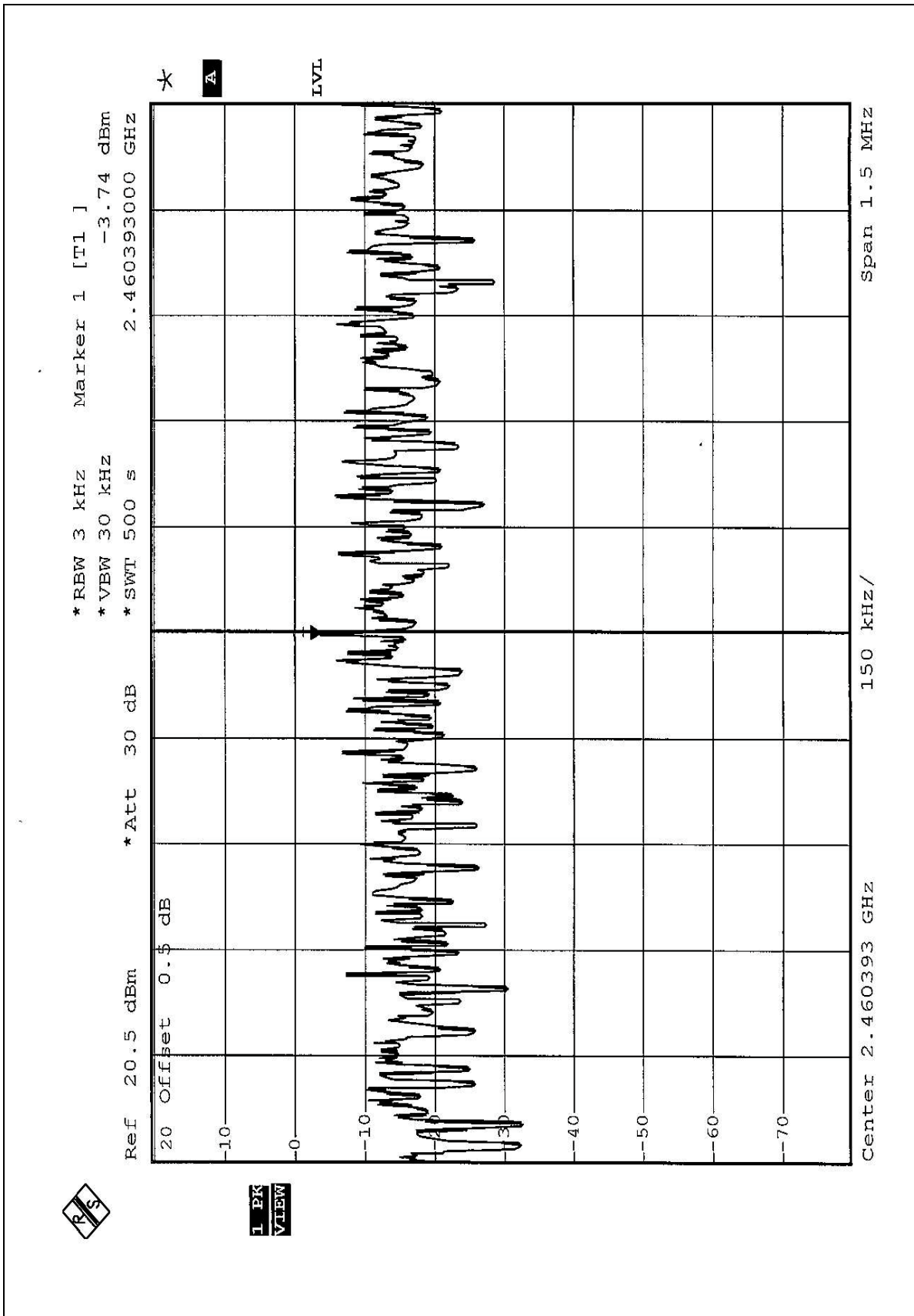
CH1



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
SPECTRUM ANALYZER	FSEK30	100049	August 12, 2004

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 lose cable. Set both RBW and VBW of spectrum analyzer to 1MHz and 10Hz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.6.4 EUT OPERATING CONDITION

Same as Item 4.3.5

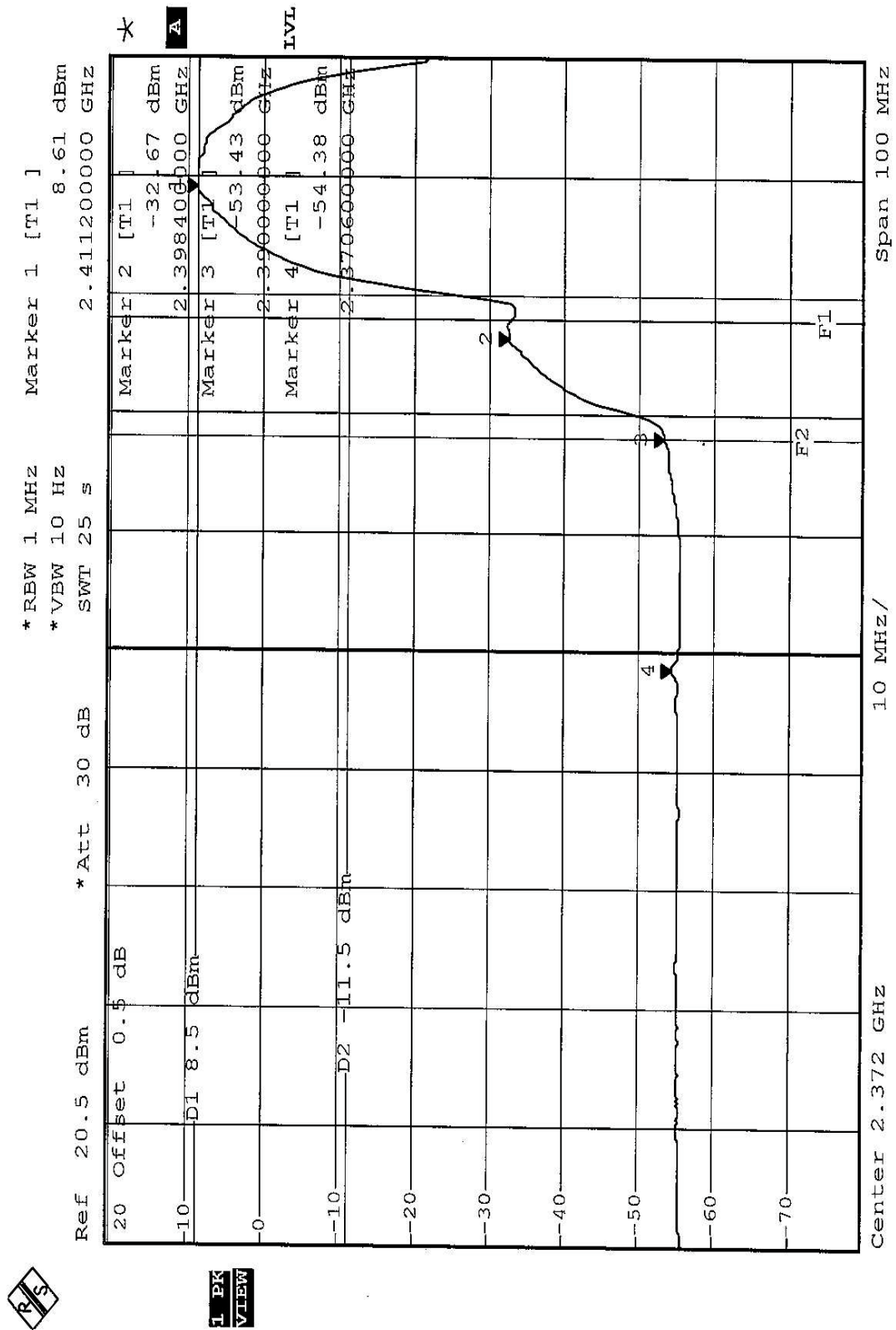


4.6.5 TEST RESULTS

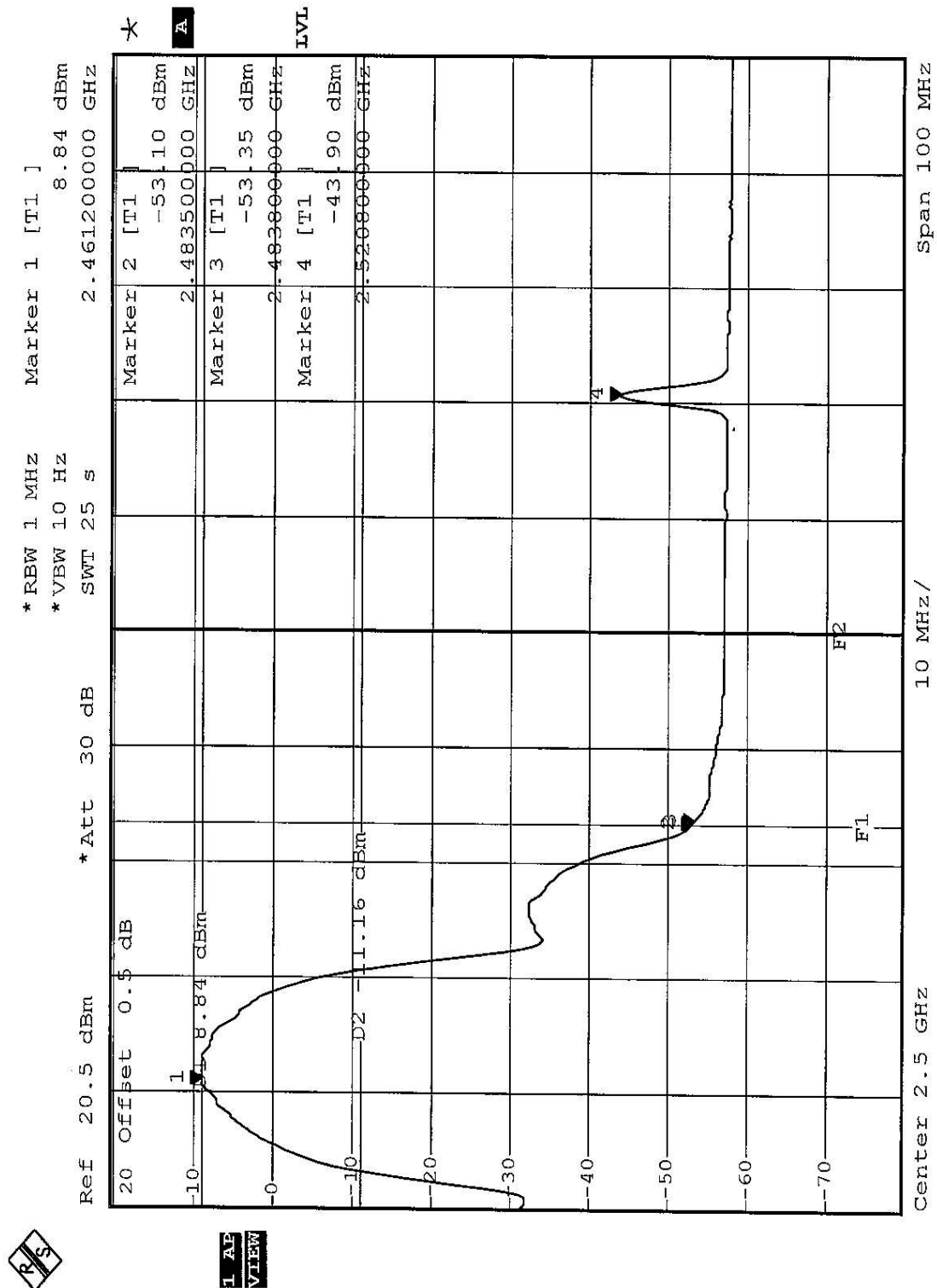
The spectrum plots are attached on the following 4 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

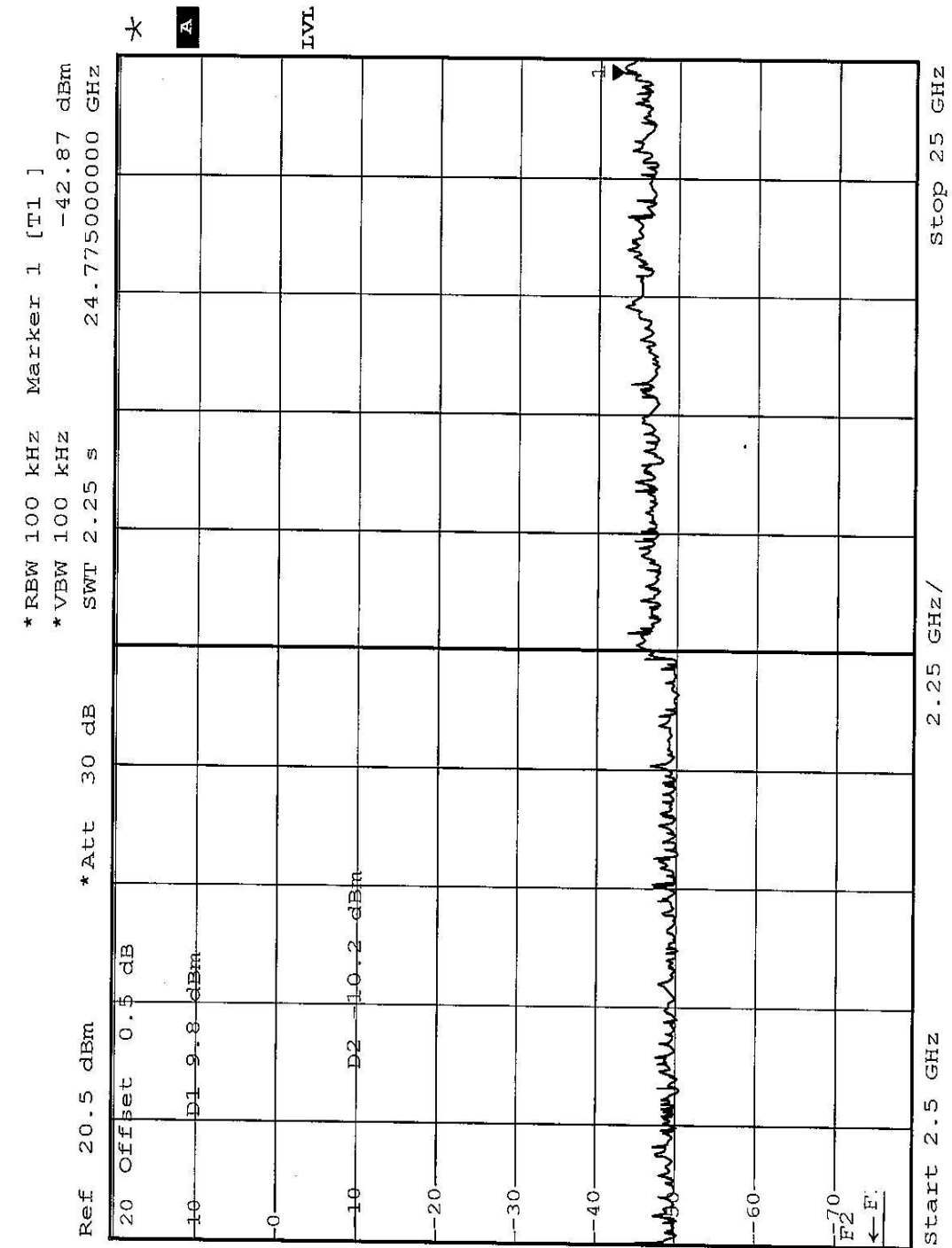
NOTE: The band edge emission plot on the following 1 ~ 2 pages shows 61.93dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.6 is 115.38dBuV/m, so the maximum field strength in restrict band is $115.38 - 61.93 = 53.45$ dBuV/m which is under 54 dBuV/m limit.

NOTE: The band edge emission plot on the following 3 ~ 4 pages shows 61.94dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.6 is 114.20dBuV/m, so the maximum field strength in restrict band is $114.20 - 61.94 = 52.26$ dBuV/m which is under 54 dBuV/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.

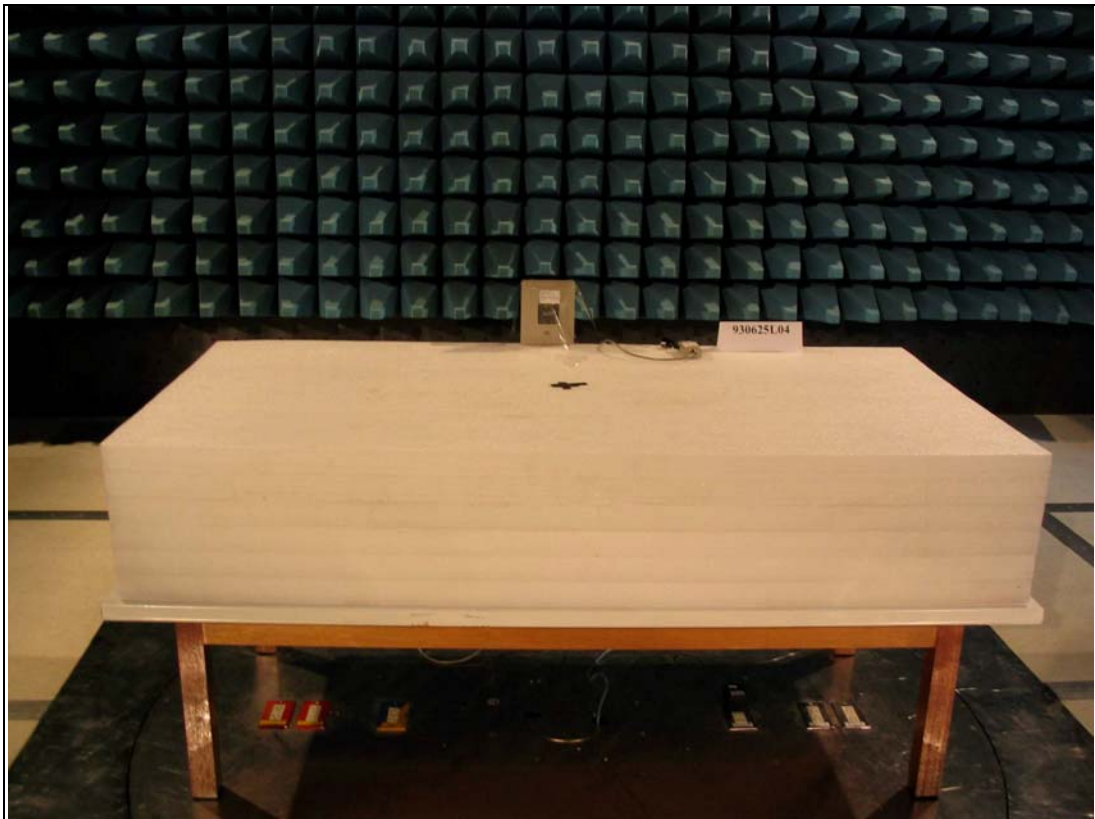
4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is Patch Antenna with MMCX Type connector. And the maximum Gain of this antenna is only 9dBi.

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, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

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

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

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