FCC TEST REPORT

REPORT NO.: RF89022501E
MODEL NO.: F5D6020
RECEIVED: NA
TESTED: February 10, 2000

APPLICANT: Belkin Components

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

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: 47 14th Lin, Chiapau Tsun, Linko, Taipei, Taiwan, R.O.C.

0528

Lab Code: 200102-0

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1 CERTIFICATION

PRODUCT :	Wireless Network Card
BRAND NAME :	Belkin
MODEL NO. :	F5D6020
APPLICANT :	Belkin Components
STANDARDS :	47 CFR Part 15, Subpart C (Section 15.247), ANSI C63.4-1992
SITE REGISTERATION NO. :	90422 (FCC) IC 3789-5 (Canada IC)

We, **Advance Data Technology Corporation**, hereby certify that one sample RC11 RADIO CARD of the designation has been tested in our facility on February 10, 2000.
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 : Ellis Wu (Ellis Wu) · DATE: Nov. 6, 2001

CHECKED BY : Emily Lu (Emily Lu) · DATE: Nov. 6. 2001

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

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
STANDARD PARAGRAPH	**TEST REQUIREMENTS**	**RESULT**	**REMARK**
15.107	AC Power Conducted Emissions Spec.: 48 dBuV	Yes	Minimum passing margin is –8.6dBuV At 24.27 MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Spec.: min. 500 Khz	Yes	9.56 MHz > 500 kHz
15.247(b)	Maximum Peak Output Power Spec.: max. 30 dBm	Yes	16.09dBm < 30dBm
15.247(c)	Transmitter Radiated Emissions Spec.: Table 15.209	Yes	Minimum passing margin is –6.8dBuV At 4924.00 MHz
15.247(d)	Power Spectral Density Spec.: max. 8Dbm	Yes	-4.79dBm < 8 dBm
15.247(e)	Processing Gain of Direct Sequence Spread Spectrum System Spec.: min. 10 dB	Yes	11.4dB ≧ 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

PRODUCT	Wireless Network Card
MODEL NO.	F5D6020
POWER SUPPLY	DC power from Notebook
DATA CABLE	NA
CHANNEL SPACING	5MHz
MODULATION TYPE	CCK, BPSK, QPSK
RADIO TECHNOLOGY	DSSS
TRANSFER RATE	1/2/5.5/11Mbps
FREQUENCY RANGE	2412MHz ~ 2462MHz
NUMBER OF CHANNEL	11
POWER RATING	16.09dBm
ANTENNA TYPE	Patch Antenna
ASSOCIATED DEVICES	NA
DESCRIPTION OF MODELS	The WL11000 IEEE 802.11 PCMCIA PC Card is compatible with any standard, notebook computer Type II PCMCIA slot. Sa a Plug-and-Play device, Windows 95/98 will automatically recognize the WL11000 Wireless LAN PCMCIA Adapter and initiate the installation process. Upon successful installation, the WL11000 Wireless LAN PCMCIA Adapter will communicate seamlessly with other WL11000 wireless home and office networking products.

Note:
1. This report is issued as a supplementary report to the original report with no.: RF89022501.
2. The model: WL11000-1 of original report and model: F5D6020 are identical.

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		

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Wireless Network Card, 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	Twinhead	P90	10613524	Nonshoulded power (1.8m)
2	PRINTER	HP	2225C+	3123S97230	Nonshoulded power with a power adapter
3	MODEM	ACEEX	1414	980020508	Nonshielded power with a power adapter Shielded Signal (1.2m)

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 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 5, 2002
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

Notes:

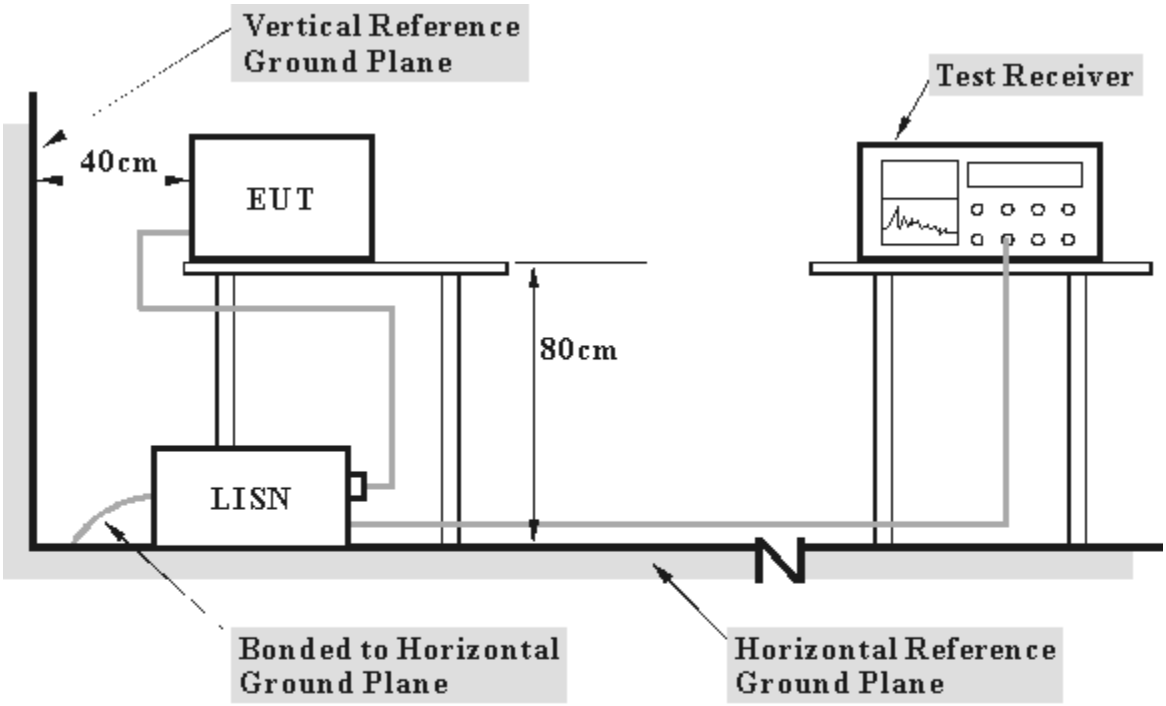
1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.

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 50Ω/ 50μH 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



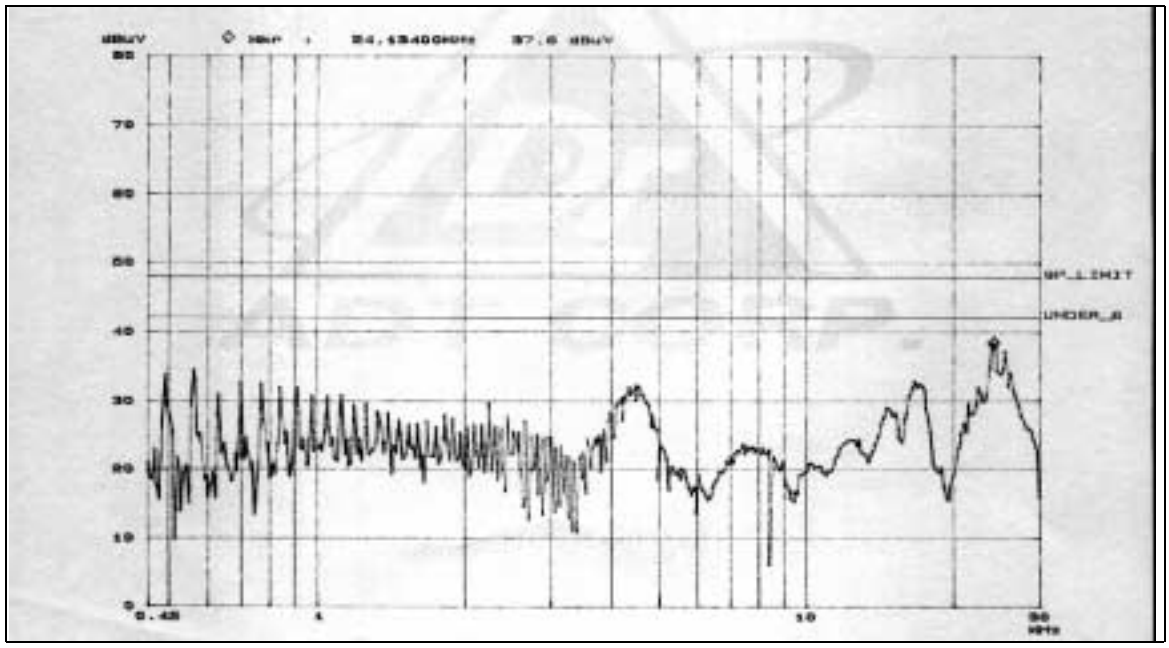
Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

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

EUT	Wireless Network Card	**Model**	F5D6020
Channel	Channel 1	**Phase**	L
Environmental Conditions	18℃, 73%RH	**Tested By**	Ellis Wu

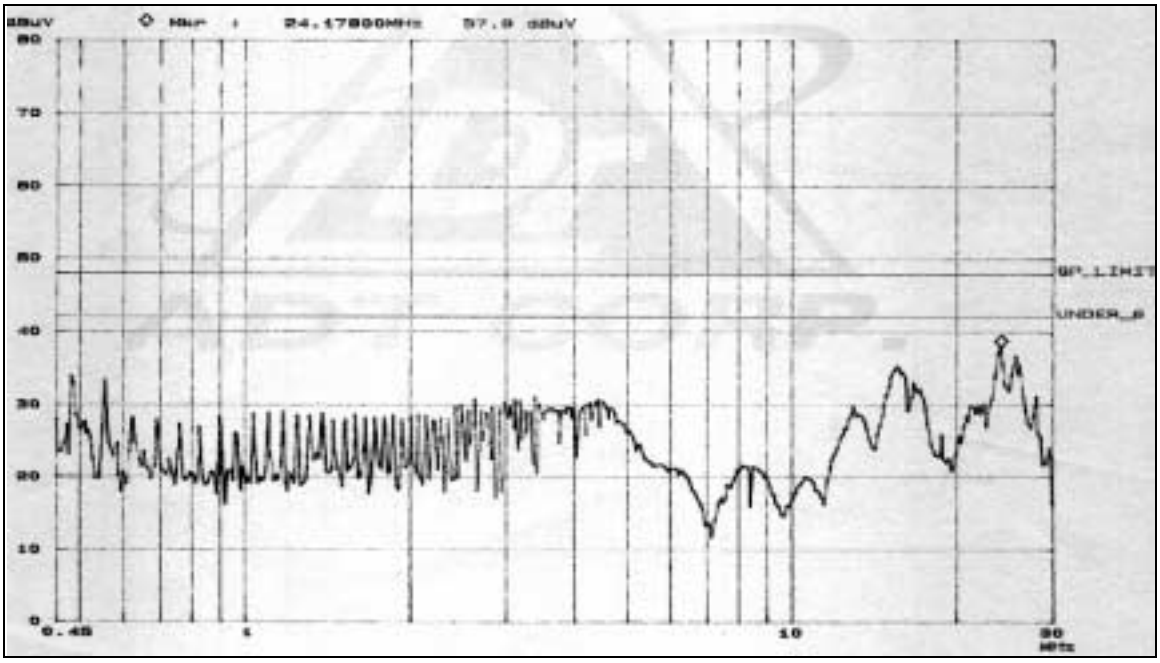
No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.48	0.2	32.7	-	32.9	-	48	-	-15.1	-
2	0.56	0.2	33.6	-	33.8	-	48	-	-14.2	-
3	2.63	0.2	26.0	-	26.2	-	48	-	-21.8	-
4	4.43	0.4	31.1	-	31.5	-	48	-	-16.5	-
5	15.64	1.0	31.4	-	32.4	-	48	-	-15.6	-
6	24.18	1.3	37.2	-	38.5	-	48	-	-9.5	-



Remarks:
1. "*": Undetectable
2. Q.P. 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.

EUT	Wireless Network Card	Model	F5D6020
Channel	Channel 1	Phase	N
Environmental Conditions	18℃, 73%RH	Tested By	Ellis Wu

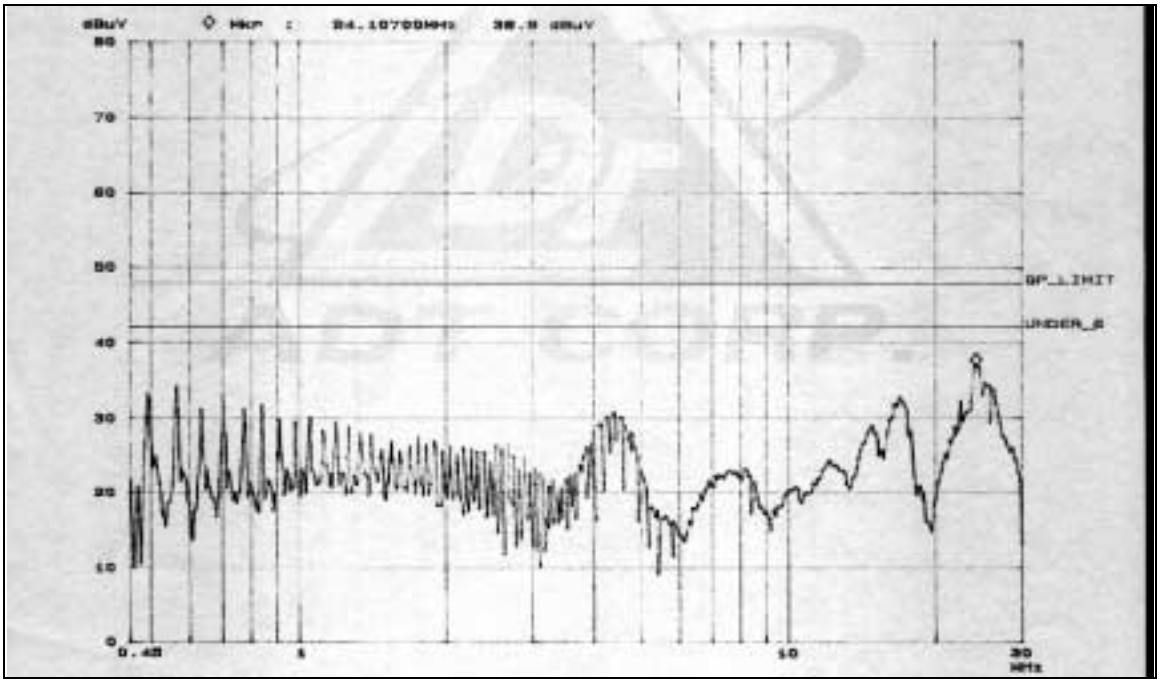
No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.48	0.2	32.9	-	33.1	-	48	-	-14.9	-
2	0.56	0.2	32.3	-	32.5	-	48	-	-15.5	-
3	2.63	0.2	29.7	-	29.9	-	48	-	-18.1	-
4	4.43	0.4	30.6	-	31.0	-	48	-	-17	-
5	15.64	0.8	34.2	-	35.0	-	48	-	-13	-
6	24.18	1.2	36.9	-	38.1	-	48	-	-9.9	-



Remarks:
1. "*": Undetectable
2. Q.P. 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.

EUT	Wireless Network Card	Model	F5D6020
Channel	Channel 6	Phase	L
Environmental Conditions	18℃, 73%RH	Tested By	Ellis Wu

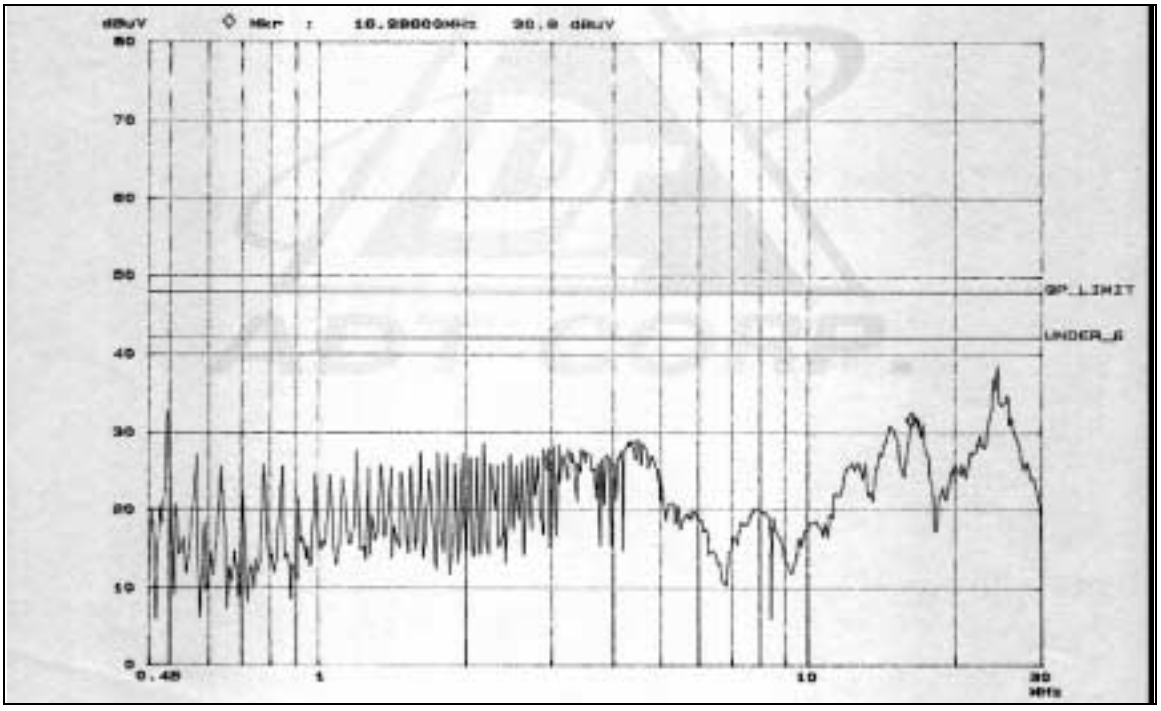
No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.49	0.2	32.1	-	32.3	-	48	-	-15.7	-
2	0.54	0.2	33.2	-	33.4	-	48	-	-14.6	-
3	2.67	0.2	25.7	-	25.9	-	48	-	-22.1	-
4	4.42	0.4	30.0	-	30.4	-	48	-	-17.6	-
5	16.87	1.0	31.7	-	32.7	-	48	-	-15.3	-
6	23.98	1.3	35.8	-	37.1	-	48	-	-10.9	-



Remarks:
1. "*": Undetectable
2. Q.P. 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.

EUT	Wireless Network Card	Model	F5D6020
Channel	Channel 6	Phase	N
Environmental Conditions	18, 73%RH	Tested By	Ellis Wu

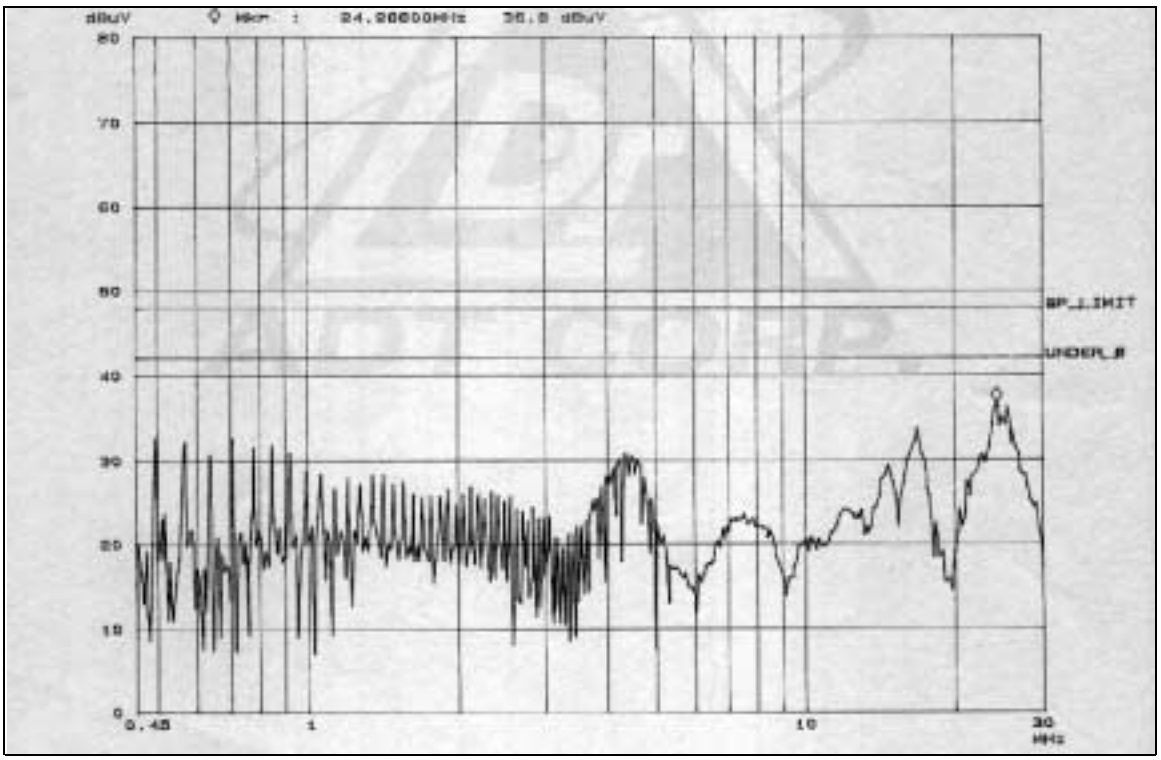
No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.49	0.2	21.8	-	22	-	48	-	-26	-
2	0.56	0.2	26.1	-	26.3	-	48	-	-21.7	-
3	2.67	0.2	26	-	26.2	-	48	-	-21.8	-
4	4.43	0.4	27.8	-	28.2	-	48	-	-19.8	-
5	16.87	0.8	30.9	-	31.7	-	48	-	-16.3	-
6	23.98	1.2	37.5	-	38.7	-	48	-	-9.3	-



Remarks:
1. "*": Undetectable
2. Q.P. 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.

EUT	Wireless Network Card	Model	F5D6020
Channel	Channel 11	Phase	L
Environmental Conditions	20℃, 60%RH	Tested By	Ellis Wu

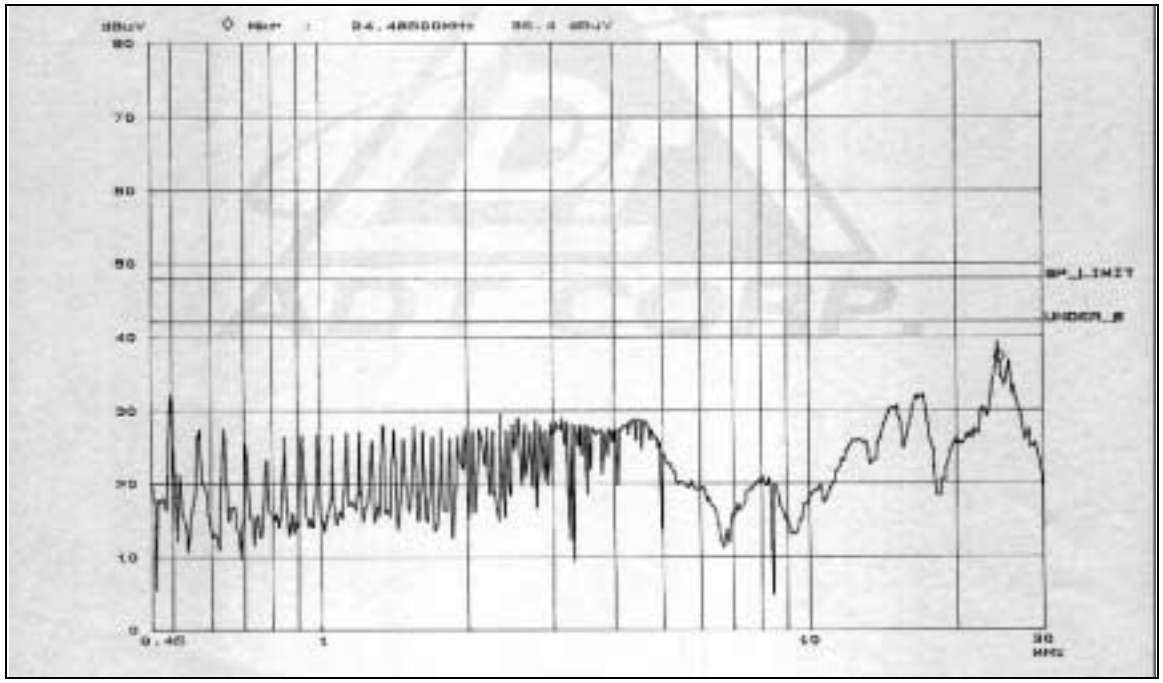
No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.50	0.2	31.5	-	31.7	-	48	-	-16.3	-
2	0.57	0.2	31.1	-	31.3	-	48	-	-16.7	-
3	2.62	0.2	23.3	-	23.5	-	48	-	-24.5	-
4	4.45	0.4	29	-	29.4	-	48	-	-18.6	-
5	16.89	1.0	32.7	-	33.7	-	48	-	-14.3	-
6	24.27	1.3	35.8	-	37.1	-	48	-	-10.9	-



Remarks:
1. "*": Undetectable
2. Q.P. 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.

EUT	Wireless Network Card	Model	F5D6020
Channel	Channel 11	Phase	N
Environmental Conditions	18℃, 73%RH	Tested By	Ellis Wu

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.50	0.2	31.1	-	31.3	-	48	-	-16.7	-
2	0.57	0.2	26.3	-	26.5	-	48	-	-21.5	-
3	2.62	0.2	27.2	-	27.4	-	48	-	-20.6	-
4	4.45	0.4	27.7	-	28.1	-	48	-	-19.9	-
5	16.89	0.8	30.7	-	31.5	-	48	-	-16.5	-
6	24.27	1.2	38.2	-	39.4	-	48	-	-8.6	-



Remarks:
1. "*": Undetectable
2. Q.P. 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:

Frequencies (MHz)	Field Strength of Fundamental	
	µV/meter	dBµV/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)	
	uV/m	dBuV/m	uV/m	dBuV/m
Above 1000	300	49.5	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. 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	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

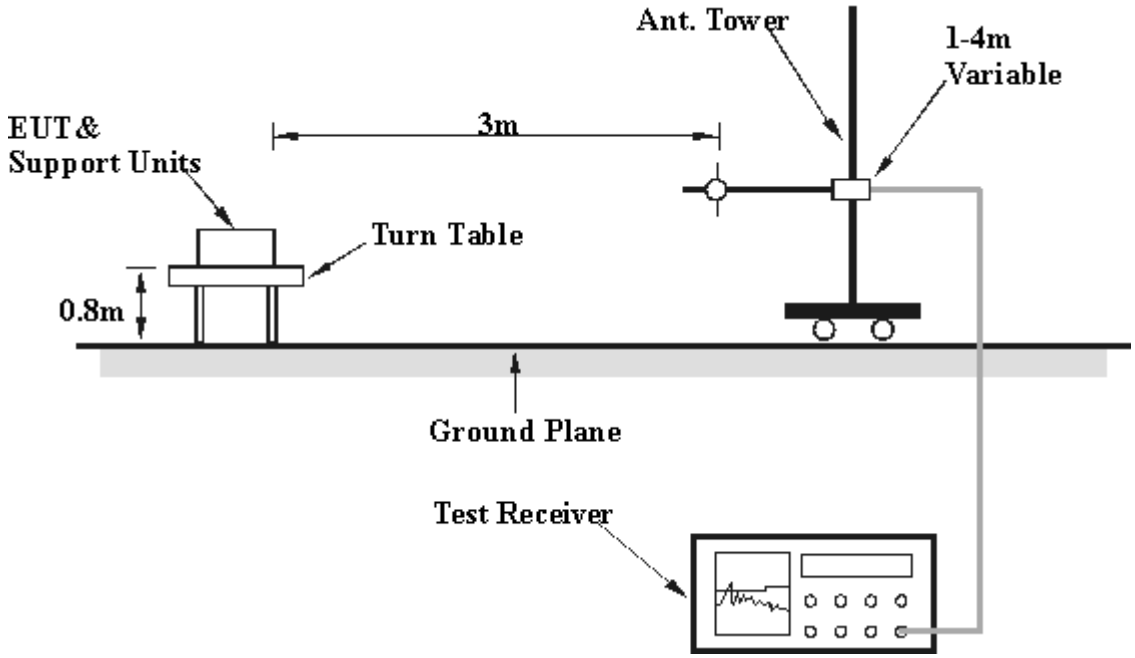
1. The EUT was placed on the turn table 0.8 meter above ground in 3 meter open area test site.
2. Set the resolution bandwidth to 120KHz in the test receiver and select Peak function to scan the frequency below 1 GHz.
3. Shift the interference-receiving antenna located in antenna tower upwards and downwards 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

EUT	Wireless Network Card	**Model**	F5D6020
Mode	Channel 1	**Detector Function**	Quasi-Peak
Frequency Range	30-1000 MHz	**Test Distance**	3M
Environmental Conditions	18℃, 73%RH	**Tested By**	Ellis Wu

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)
131.96	12.7	20.8	33.5	43.5	-10.0	99	365
572.01	20.9	13.7	34.6	46.0	-11.4	99	336
660.02	21.6	14.9	36.5	46.0	-9.5	132	72
704.02	21.7	11.6	33.3	46.0	-12.7	120	203
748.01	22.4	5.4	27.8	46.0	-18.2	99	71
792.02	22.4	9.3	31.7	46.0	-14.3	135	230
836.02	23.1	11.9	35.0	46.0	-11.0	173	195
924.02	23.7	10.6	34.3	46.0	-11.7	99	79

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)
264.02	14.6	18.6	33.2	46	-12.8	110	236
352.02	16.4	18.8	35.2	46	-10.8	99	72
440.02	18.5	13.6	32.1	46	-13.9	99	165
572.02	20.9	11.5	32.4	46	-13.6	99	362
660.02	21.6	14.1	35.7	46	-10.3	129	228
704.02	21.7	11.9	33.6	46	-12.4	117	186
748.02	22.4	11.5	33.9	46	-12.1	107	362
924.02	23.7	8.5	32.2	46	-13.8	117	31

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

EUT	Wireless Network Card	**Model**	F5D6020
Mode	Channel 6	**Detector Function**	Quasi-Peak
Frequency Range	30-1000 MHz	**Test Distance**	3M
Environmental Conditions	18℃, 73%RH	**Tested By**	Ellis Wu

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)
132.00	12.7	20.4	33.1	43.5	-10.4	99	125
484.00	19.4	12.1	31.5	46.0	-14.5	109	206
572.00	20.9	11.6	32.5	46.0	-13.5	263	231
660.00	21.6	12.4	34.0	46.0	-12.0	165	8
704.00	21.7	11.5	33.2	46.0	-12.8	145	246
836.00	23.1	8.8	31.9	46.0	-14.1	162	223
880.00	23.3	8.9	32.2	46.0	-13.8	159	163
924.01	23.7	7.0	30.7	46.0	-15.3	123	50

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)
132.01	12.7	17.6	30.3	43.5	-13.2	223	104
264.01	14.6	19.4	34.0	46.0	-12.0	108	334
484.01	19.4	13.4	32.8	46.0	-13.2	99	362
528.01	20.4	13.1	33.5	46.0	-12.5	99	365
572.01	20.9	14.2	35.1	46.0	-10.9	198	10
660.01	21.6	14.9	36.5	46.0	-9.5	138	146
704.01	21.7	13.4	35.1	46.0	-10.9	137	300
924.01	23.7	9.6	33.3	46.0	-12.7	120	38

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

EUT	Wireless Network Card	**Model**	F5D6020
Mode	Channel 11	**Detector Function**	Quasi-Peak
Frequency Range	30-1000 MHz	**Test Distance**	3M
Environmental Conditions	18℃, 73%RH	**Tested By**	Ellis Wu

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)
132.01	12.7	20.8	33.5	43.5	-10.0	99	98
572.01	20.9	12.2	33.1	46.0	-12.9	118	340
660.01	21.6	13.2	34.8	46.0	-11.2	152	77
704.01	21.7	11.7	33.4	46.0	-12.6	190	229
748.01	22.4	9.1	31.5	46.0	-14.5	178	157
792.01	22.4	8.9	31.3	46.0	-14.7	177	362
836.01	23.1	9.5	32.6	46.0	-13.4	101	276
880.01	23.3	7.5	30.8	46.0	-15.2	160	149

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)
132.00	12.7	17.0	29.7	43.5	-13.8	124	362
264.00	14.6	15.8	30.4	46.0	-15.6	124	-2
572.02	20.9	12.4	33.3	46.0	-12.7	168	213
616.02	21.1	10.6	31.7	46.0	-14.3	135	212
660.02	21.6	16.3	37.9	46.0	-8.1	125	140
704.00	21.7	14.3	36.0	46.0	-10.0	125	205
836.00	23.1	11.2	34.3	46.0	-11.7	116	184
924.00	23.7	8.7	32.4	46.0	-13.6	116	22

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

EUT	Wireless Network Card	**Model**	F5D6020
Mode	Channel 1	**Detector Function**	PK, AV
Frequency Range	Above 1000 MHz	**Test Distance**	3M
Environmental Conditions	18℃, 73%RH	**Tested By**	Ellis Wu

ANTENNA POLARITY: Vertical	**Detector Function :**	**6dB Bandwidth : 1MHz**	**Frequency Range : Above 1GHz**

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.		
1012.01	27.3	15.5	-	42.8	-	74	54	-31.2	-	99	362
1364.00	29.7	17.0	-	46.7	-	74	54	-27.3	-	99	20
1452.00	30.2	17.2	-	47.4	-	74	54	-26.6	-	99	268
2038.00	33.6	17.6	-	51.2	-	74	54	-22.8	-	108	262
*2412.00	34.0	68.4	61.7	102.4	95.7	-	-	-	-	104	-2
4824.00	41.5	13.8	5.4	55.3	46.9	74	54	-18.7	-7.1	99	207
7236.00	-	-	-	-	-	74	54	-	-	-	-

ANTENNA POLARITY: Horizontal	**Detector Function :**	**6dB Bandwidth:1MHz**	**Frequency Range: Above 1GHz**

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.		
1452.00	30.2	16.2	-	46.4	-	74	54	-27.6	-	99	54
2038.00	33.6	17.7	-	51.3	-	74	54	-22.7	-	145	188
*2412.00	34.0	73.0	65.6	107.0	99.6	-	-	-	-	186	259
4824.00	41.5	13.4	5.5	54.9	47.0	74	54	-19.1	-7.0	99	202
7236.00	-	-	-	-	-	74	54	-	-	-	-

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

EUT	Wireless Network Card	**Model**	F5D6020
Mode	Channel 6	**Detector Function**	PK, AV
Frequency Range	Above 1000 MHz	**Test Distance**	3M
Environmental Conditions	18℃, 73%RH	**Tested By**	Ellis Wu

ANTENNA POLARITY: Vertical	**Detector Function :**	**6dB Bandwidth:1MHz**	**Frequency Range: Above 1GHz**

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.		
1364.10	29.7	15.6	-	45.3	-	74	54	-28.7	-	99	362
1452.10	30.2	16.1	-	46.3	-	74	54	-27.7	-	99	-2
2062.98	33.6	17.5	-	51.1	-	74	54	-22.9	-	153	266
*2437.00	34.1	68.9	62.6	103.0	96.7	-	-	-	-	102	-2
4874.00	41.5	13.7	5.3	55.2	46.8	74	54	-18.8	-7.2	103	-1
7311.00	-	-	-	-	-	74	54	-	-	-	-

ANTENNA POLARITY: Horizontal	**Detector Function :**	**6dB Bandwidth:1MHz.**	**Frequency Range: Above 1GHz.**

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.		
1364.10	29.7	15.2	-	44.9	-	74	54	-29.1	-	99	-2
1452.00	30.2	17.1	-	47.3	-	74	54	-26.7	-	99	323
2063.00	33.6	17.2	-	50.8	-	74	54	-23.2	-	99	-2
*2437.00	34.0	73.3	67.2	107.4	101.3	-	-	-	-	100	308
4874.00	41.5	13.8	5.4	55.3	46.9	74	54	-18.7	-7.1	101	306
7311.00	-	-	-	-	-	74	54	-	-	-	-

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

EUT	Wireless Network Card	Model	F5D6020
Mode	Channel 11	Detector Function	PK, AV
Frequency Range	Above 1000MHz	Test Distance	3M
Environmental Conditions	18℃, 73%RH	Tested By	Ellis Wu

ANTENNA POLARITY: Vertical	Detector Function :	6dB Bandwidth:1MHz.	Frequency Range: Above 1GHz

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.		
1364.10	29.7	16.8	-	46.5	-	74	54	-27.5	-	99	94
1451.97	30.2	16.1	-	46.3	-	74	54	-27.7	-	115	330
2087.30	33.7	18.2	-	51.9	-	74	54	-22.1	-	99	261
*2462.00	34.1	69.2	62.5	103.3	96.6	-	-	-	-	101	341
4924.00	41.6	13.8	5.4	55.4	47.0	74	54	-18.6	-7.0	101	341
7386.00	-	-	-	-	-	74	54	-	-	-	-

ANTENNA POLARITY: Horizontal	Detector Function :	6dB Bandwidth:1MHz.	Frequency Range: Above 1GHz

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.		
1364.02	29.7	15.0	-	44.7	-	74	54	-29.3	-	157	-2
1451.97	30.2	16.3	-	46.5	-	74	54	-27.5	-	164	174
1495.90	30.7	16.3	-	47.0	-	74	54	-27.0	-	164	174
2088.10	33.7	17.8	-	51.5	-	74	54	-22.5	-	146	204
*2462.00	34.1	74.4	68.0	108.5	102.1	-	-	-	-	188	259
4924.00	41.6	14.3	5.6	55.9	47.2	74	54	-18.1	-6.8	182	246
7386.00	-	-	-	-	-	74	54	-	-	-	-

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	839379/002	Dec. 28, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

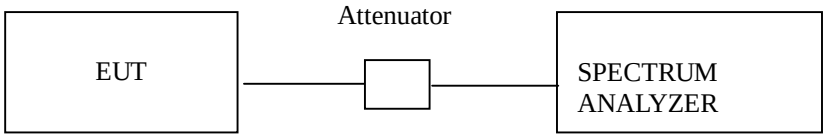
Notes:

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



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

4.3.5 EUT OPERATING CONDITION

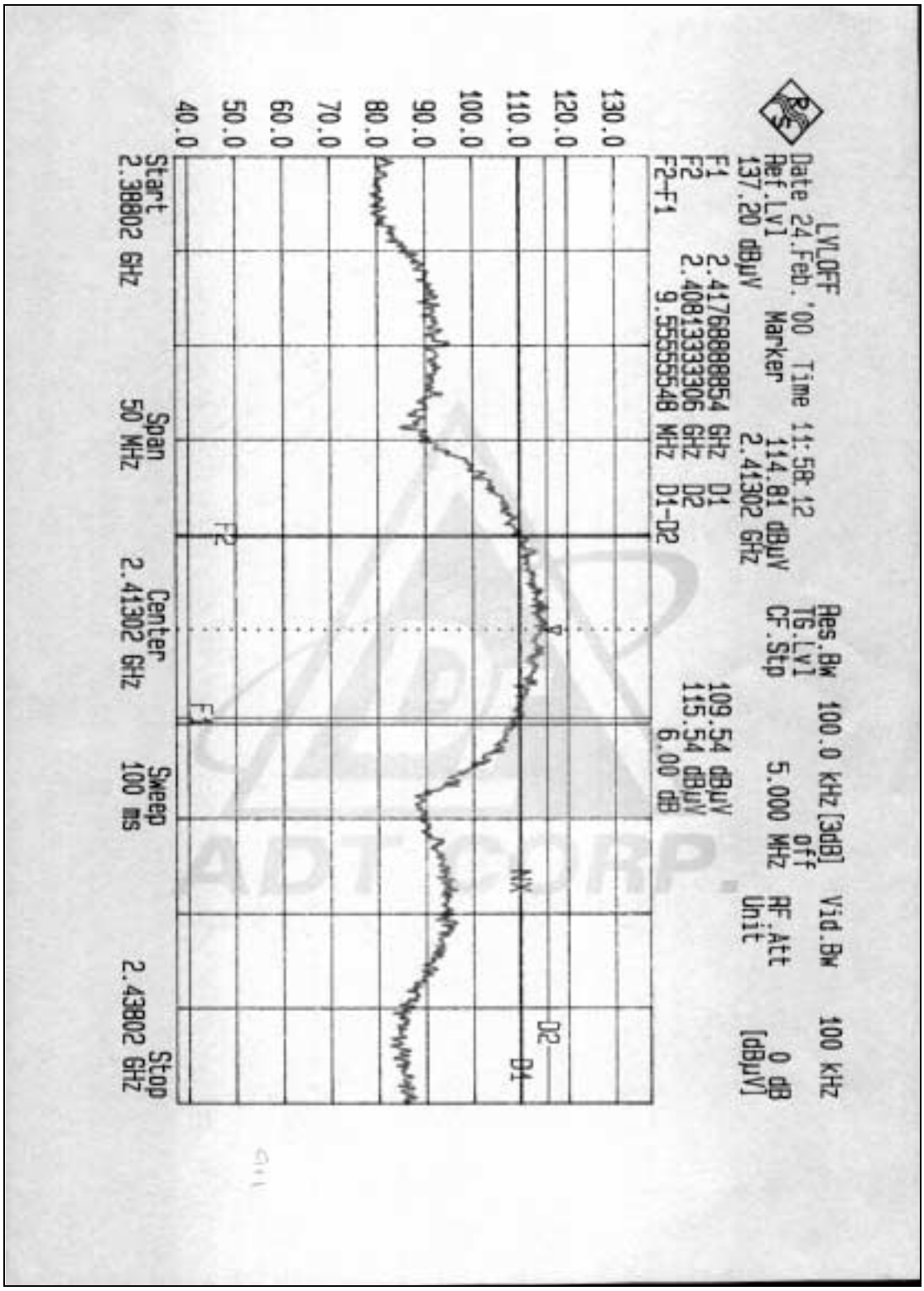
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.3.6 TEST RESULTS

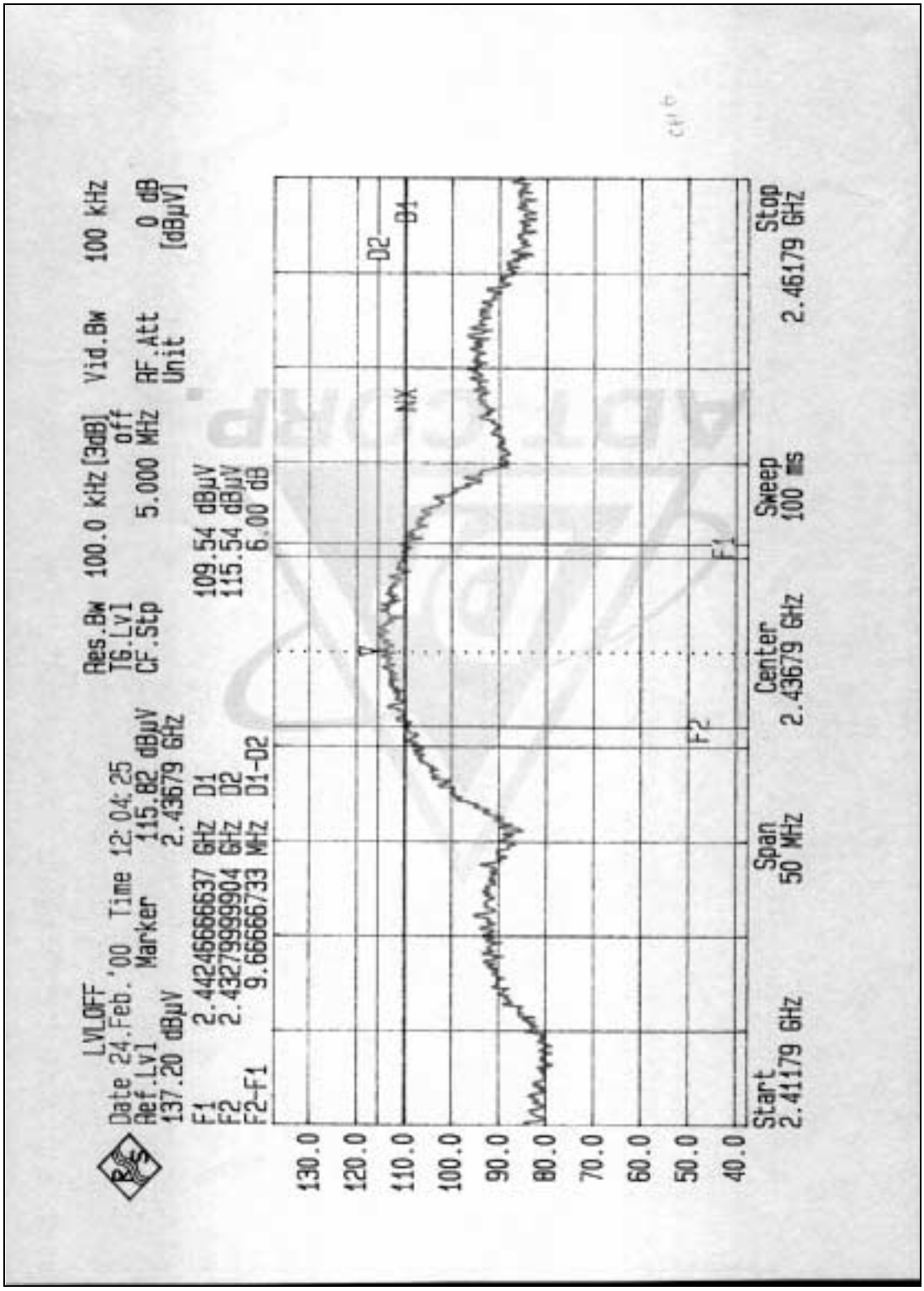
EUT	Wireless Network Card	**Model**	F5D6020
Environmental Conditions	18℃, 73%RH	**Tested By**	Ellis Wu

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	9.56	0.5	PASS
6	2437	9.67	0.5	PASS
11	2462	9.61	0.5	PASS

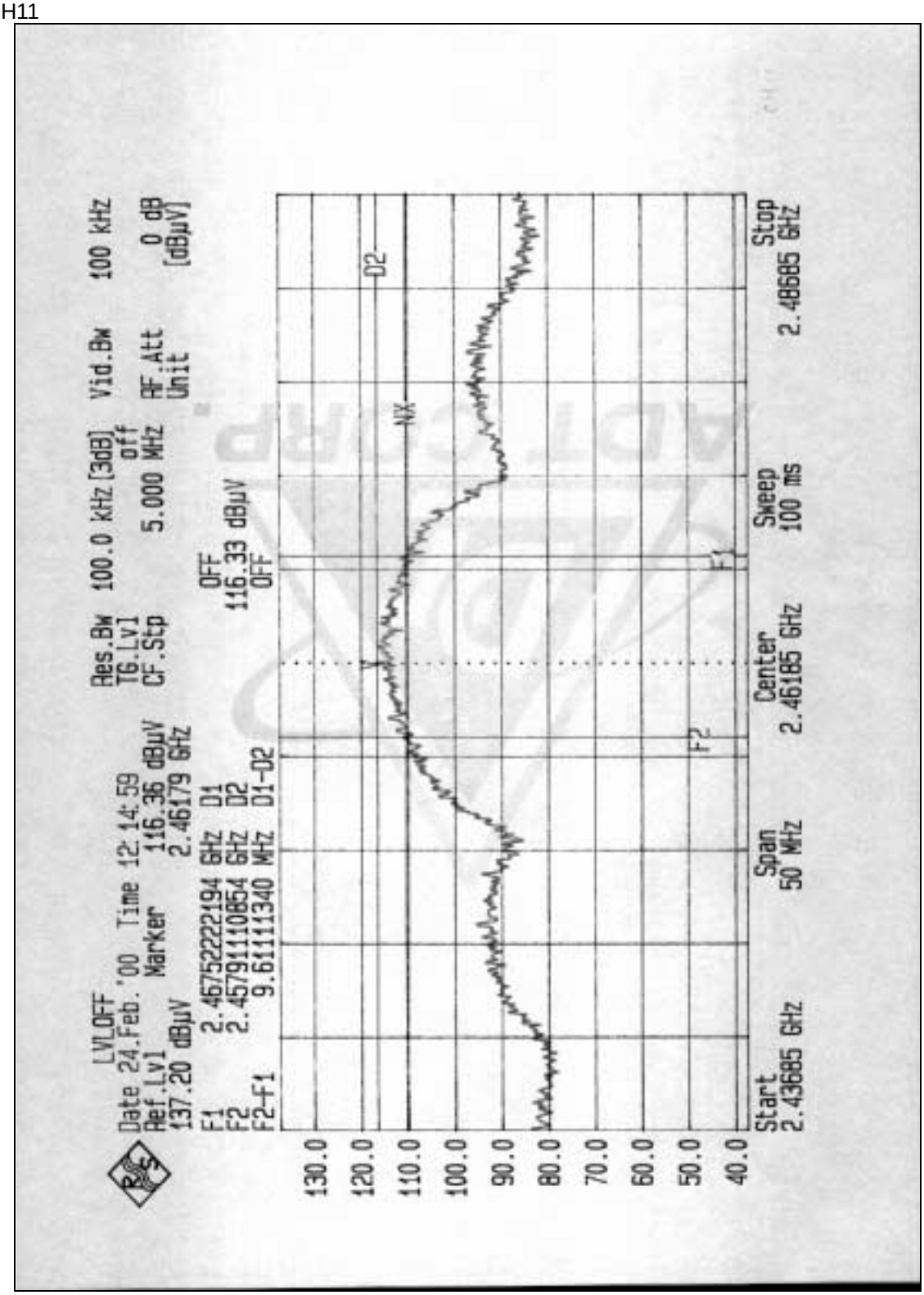
CH1


LVLOFF
Date 24.Feb.'00 Time 11:58:12
Ref.Lvl Marker 114.81 dBµV
137.20 dBµV 2.41302 GHz
F1 2.417688888854 GHz D1
F2 2.408133333306 GHz D2
F2-F1 9.555555548 MHz D1-D2
Res.Bw 100.0 kHz[3dB] Vid.Bw 100 kHz
TG.Lvl off
CF.Stp 5.000 MHz RF.Att 0 dB
Unit [dBµV]
109.54 dBµV
115.54 dBµV
6.00 dB
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
Start 2.38802 GHz
Span 50 MHz
Center 2.41302 GHz
Sweep 100 ms
Stop 2.43802 GHz
F2
F1
MIX
D2
D1

CH6


LVLOFF
Date 24.Feb.'00 Time 12:04:25
Ref.Lvl 115.82 dBµV
Marker 2.43679 GHz
137.20 dBµV
F1 2.44246666637 GHz D1 109.54 dBµV
F2 2.43279999904 GHz D2 115.54 dBµV
F2-F1 9.66666733 MHz D1-D2 6.00 dB
Res.Bw 100.0 kHz [3dB]
TG.Lvl off
CF.Stp 5.000 MHz
Vid.Bw 100 kHz
RF.Att 0 dB
Unit [dBµV]
Start 2.41179 GHz
Span 50 MHz
Center 2.43679 GHz
Sweep 100 ms
Stop 2.46179 GHz
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
D2
D1
NX
F1
F2

CH11


LVLOFF
Date 24.Feb.'00 Time 12:14:59
Ref.Lvl 116.36 dBµV
Marker 2.46179 GHz
137.20 dBµV
F1 2.46752222194 GHz D1
F2 2.45791110854 GHz D2
F2-F1 9.61111340 MHz D1-D2
Res.Bw 100.0 kHz [3dB]
T6.Lvl off
CF.Stp 5.000 MHz
OFF
116.33 dBµV
OFF
Vid.Bw 100 kHz
RF.Att 0 dB
Unit [dBµV]
D2
MX
F1
F2
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
Start 2.43685 GHz
Span 50 MHz
Center 2.46185 GHz
Sweep 100 ms
Stop 2.48685 GHz

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

Notes:

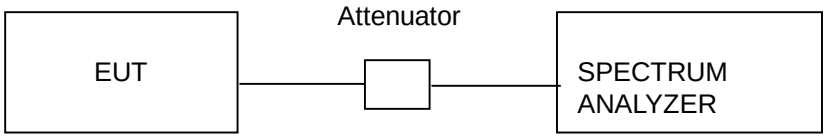
1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 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:

EUT	Wireless Network Card	**Model**	F5D6020
Environmental Conditions	18℃, 73%RH	**Tested By**	Ellis Wu

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	15.68	30	PASS
6	2437	15.55	30	PASS
11	2462	16.09	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	839379/002	Dec. 28, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

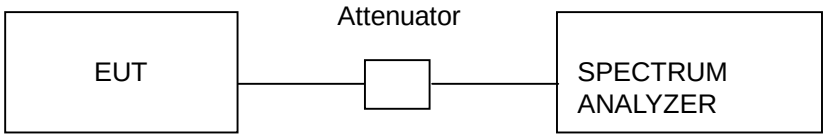
Notes:

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.

4.5.3 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

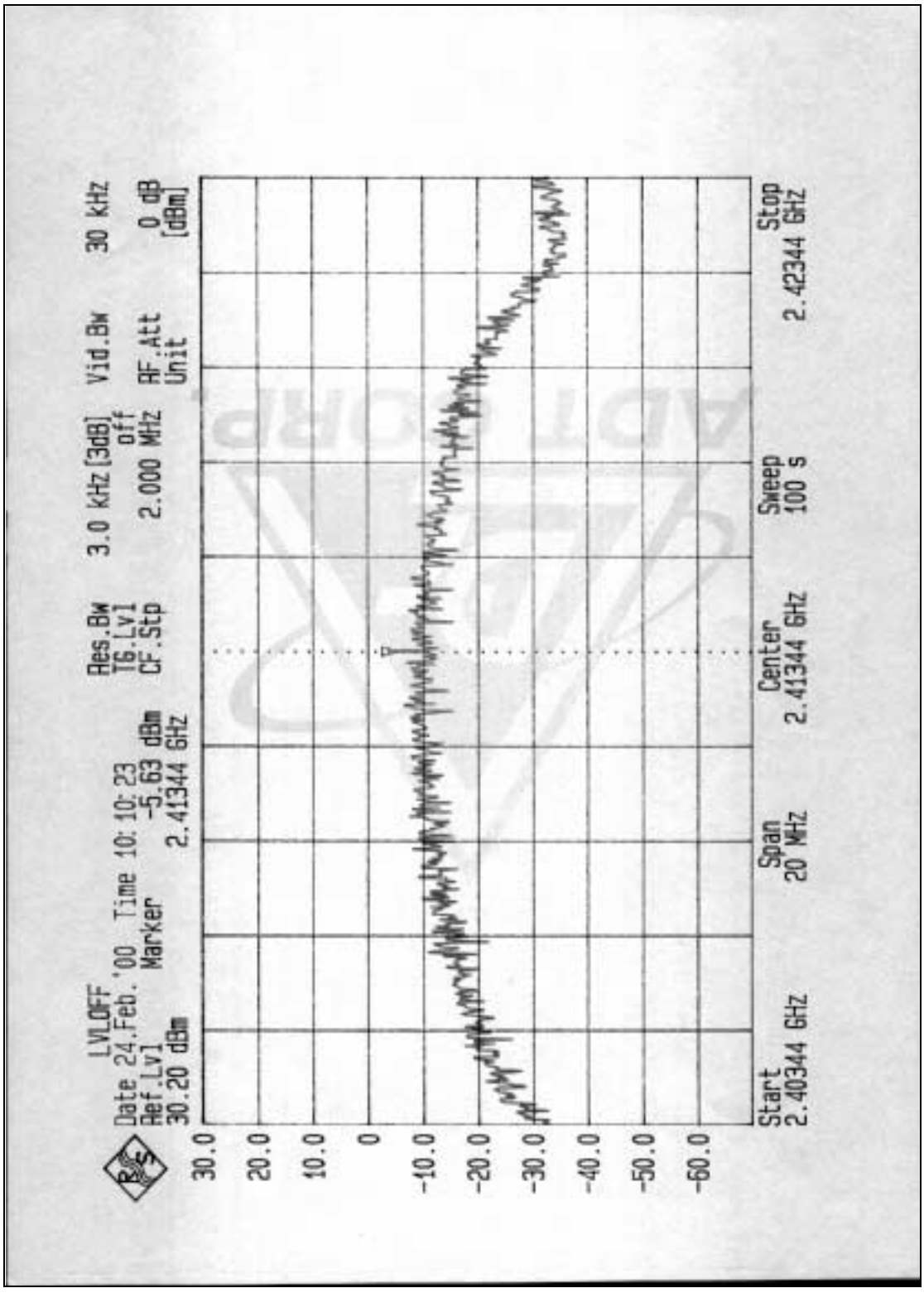
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.6 TEST RESULTS

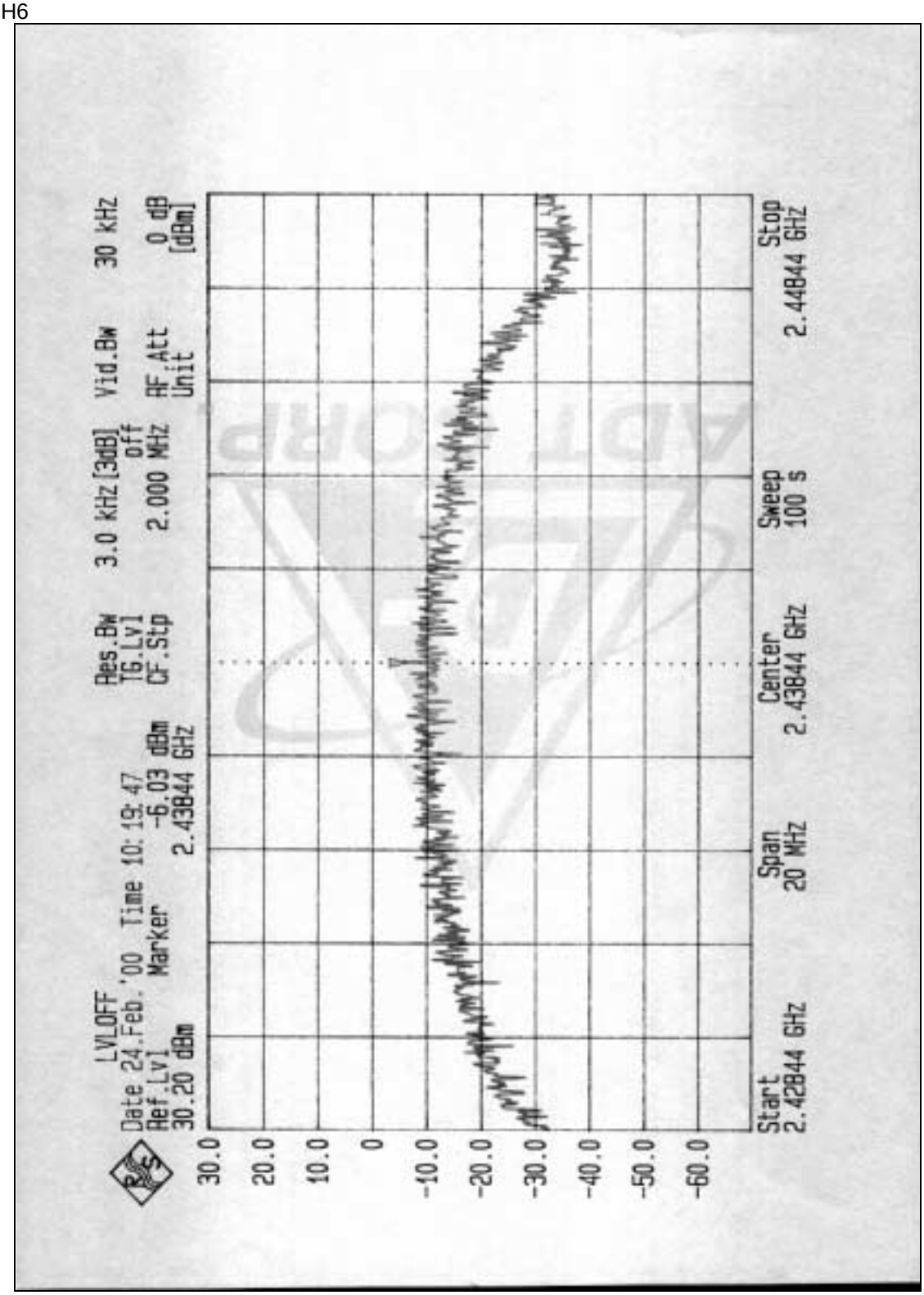
EUT	Wireless Network Card	**Model**	F5D6020
Environmental Conditions	18℃, 73%RH	**Tested By**	Ellis Wu

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-5.63	8	PASS
6	2437	-6.03	8	PASS
11	2462	-4.79	8	PASS

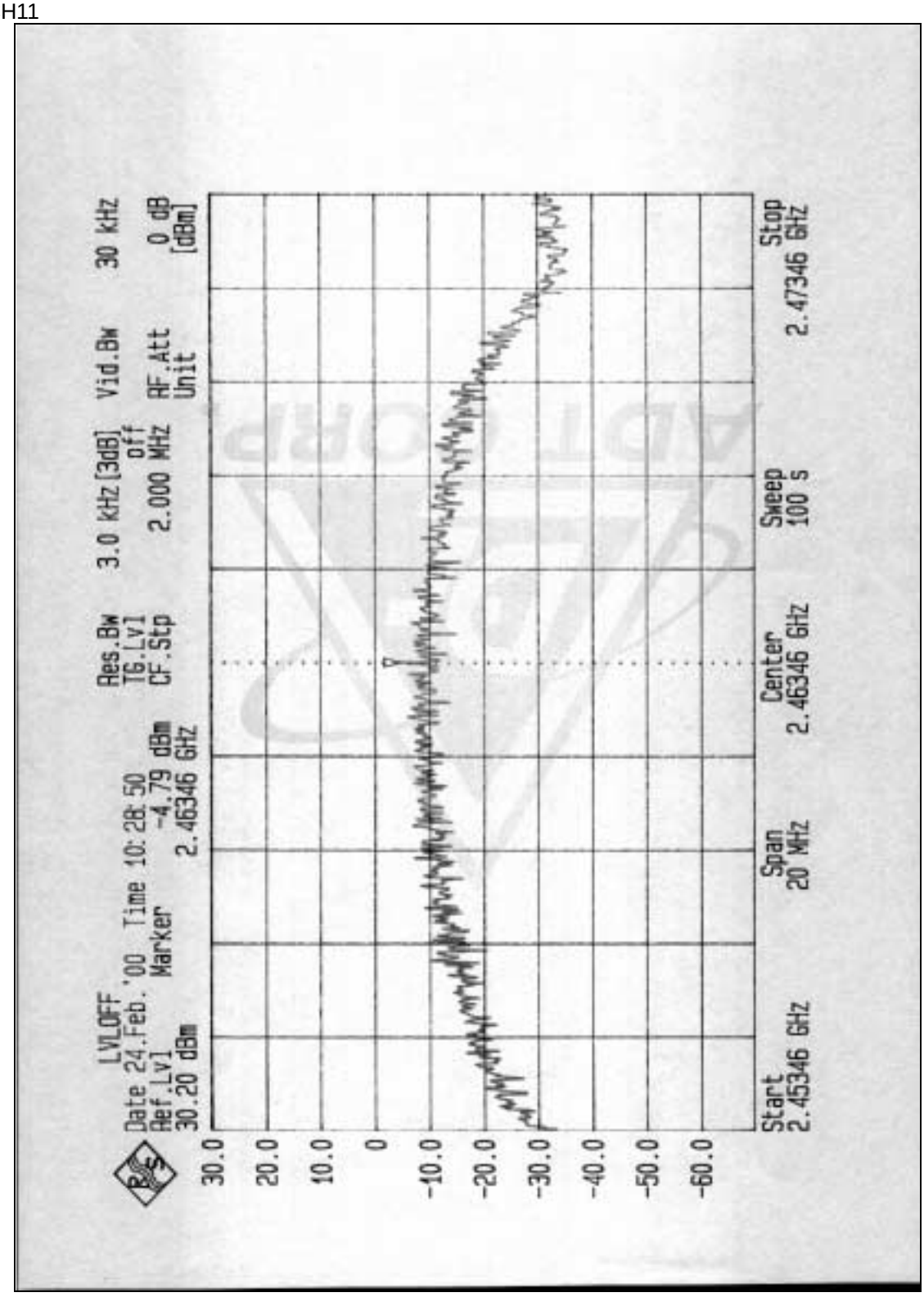
CH1


LVLOFF
Date 24.Feb.'00 Time 10:10:23
Ref.Lvl -5.63 dBm
Marker 2.41344 GHz
30.20 dBm
Res.Bw 3.0 kHz [3dB]
TG.Lvl off
CF.Stp 2.000 MHz
Vid.Bw 30 kHz
RF.Att 0 dB
Unit [dBm]
Start 2.40344 GHz
Span 20 MHz
Center 2.41344 GHz
Sweep 100 s
Stop 2.42344 GHz
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0

CH6


LVLOFF
Date 24.Feb.'00 Time 10:19:47
Ref.Lvl
30.20 dBm
Marker
-6.03 dBm
2.43844 GHz
Res.Bw 3.0 kHz [3dB]
TG.Lvl off
CF.Stp 2.000 MHz
Vid.Bw 30 kHz
RF.Att 0 dB
Unit [dBm]
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Start
2.42844 GHz
Span
20 MHz
Center
2.43844 GHz
Sweep
100 s
Stop
2.44844 GHz

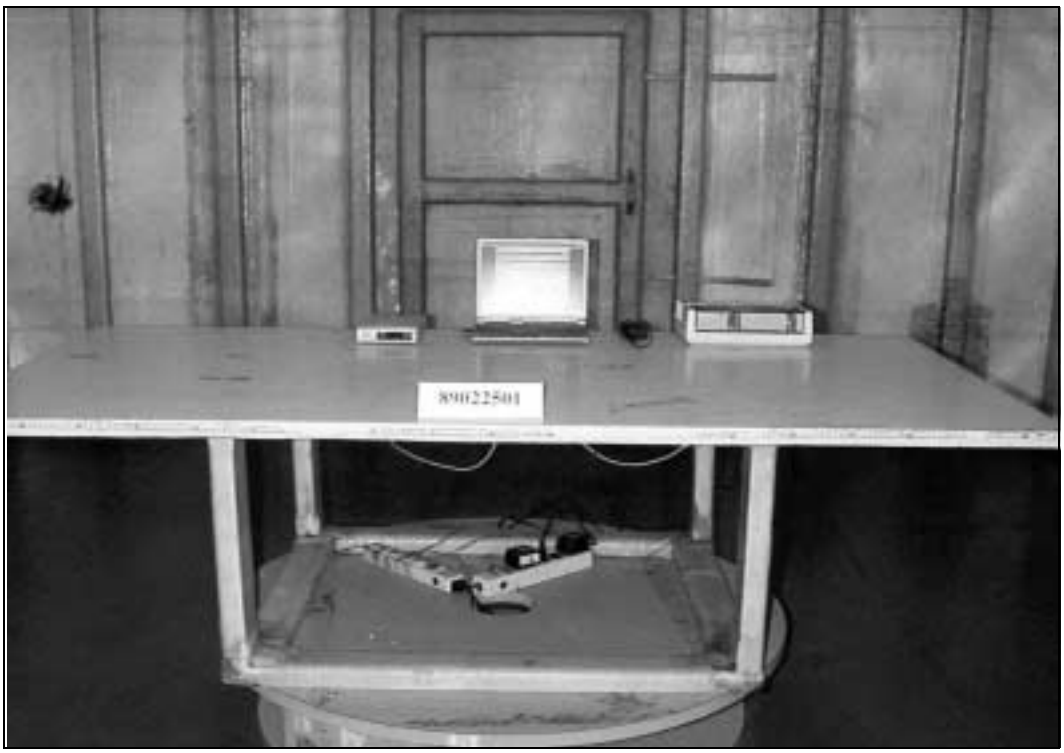
CH11

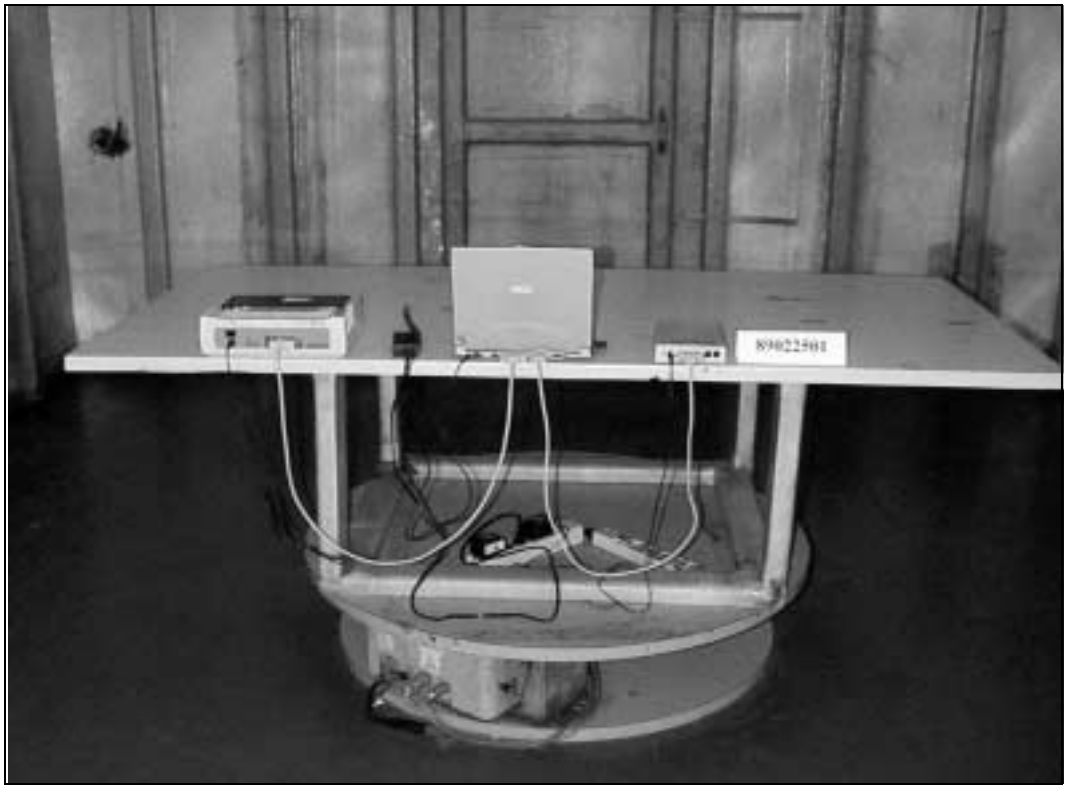

LVLOFF
Date 24.Feb. '00 Time 10:28:50
Ref.Lvl -4.79 dBm
Marker 2.46346 GHz
30.20 dBm
Res.Bw 3.0 kHz [3dB]
TG.Lvl off
CF.Stp 2.000 MHz
Vid.Bw 30 kHz
RF.Att 0 dB
Unit [dBm]
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Start 2.45346 GHz
Span 20 MHz
Center 2.46346 GHz
Sweep 100 s
Stop 2.47346 GHz

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:

USA	FCC, NVLAP, UL
Germany	TUV Rheinland
Japan	VCCI
New Zealand	MoC
Norway	NEMKO
R.O.C.	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.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC Lab:
Tel: 886-35-935343
Fax: 886-35-935342

Lin Kou Safety Lab:
Tel: 886-2-26093195
Fax: 886-2-26093184

Lin Kou RF&Telecom Lab
Tel: 886-3-3270910
Fax: 886-3-3270892

Email: service@mail.adt.com.tw
Web Site: www.adt.com.tw

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