



TEST REPORT

Wireless Router

Model Name **WIP-301**

Tested at October 8, 2000

According **47CFR Part 15C (15.247) &15B**

Issued for

Advance Multimedia Internet Technology Inc.

No. 59, Alley 21, Lane 279, Chung Cheng Rd., Yung Kang City,
Tainan Hsien, Taiwan, R.O.C.

PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION



Accredited Laboratory

11F, NO.1, SEC.4, NAN-KING EAST RD.,
TAIPEI, TAIWAN, R.O.C.

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REPORT NO : RF89100302
PRODUCT : Wireless Router
MODEL NO : WIP-301
SERIAL NO : N/A
CLIENT : Advance Multimedia Internet Technology Inc.
ADDRESS : No. 59, Alley 21, Lane 279, Chung Cheng RD.,
Yung Kang City, Tainan Hsien, Taiwan R.O.C.
ISSUED BY : Advance Data Technology Corporation (ADT Corp.)
OFFICE ADDRESS : 11F, No. 1, Sec. 4, Nan-King East Rd., Taipei,
Taiwan, R.O.C.
LABORATORY ADDRESS : No. 13-1, Lane 19, Wen Shan 3rd St., Kweishan,
Taoyuan Hsien, Taiwan, R.O.C.
TEST STANDARD : 47CFR Part 15, Subpart C (15.247) & Subpart B
TEST DATE : October 8, 2000
TEST RESULT : Pass

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1 CERTIFICATION

Issue Date: October 18, 2000

PRODUCT : Wireless Router
MODEL NO : WIP-301
FCC ID : PBLWIP-301
SPEC. : 2.4 ~ 2.4835 MHz, 11 Channels, DSSS Modulation
CLIENT : Advance Multimedia Internet Technology Inc.
TEST STANDARD : FCC 47CFR Part 15, Subpart C(Section 15.247) &Subpart B
ANSI C63.4-1992

We, ADVANCE DATA TECHNOLOGY CORPORATION, hereby certify that one sample of the designated sample has been tested in our facility. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate representation of the measurements of the sample's EMI characteristics and the energy emitted under the conditions herein specified.

TESTED BY: Steven Lu **DATE:** Oct. 18, 2000
Steven Lu
PREPARED BY: Demi Chen **DATE:** Oct. 18, 2000
Demi Chen
APPROVED BY: Alan Lane **DATE:** Oct. 18, 2000
Dr. Alan Lane, Manager



2 SUMMARY OF TEST RESULTS

47 CFR Part 15, Subpart C			
PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)	TEST RESULT
15.107	AC Power Conducted Emissions Spec.: 48 dBuV	Yes	Minimum passing margin is -5.24 dBuV At 2.64991 MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Spec.: min. 500 kHz	Yes	9.58 MHz > 500 kHz
15.247(b)	Maximum Peak Output Power Spec.: max. 30 dBm	Yes	17.65 dBm < 30 dBm
15.247(c)	Transmitter Radiated Emissions Spec.: Table 15.209	Yes	Minimum passing margin is -3.5 dBuV At 420.31 MHz
15.247(d)	Power Spectral Density Spec.: max. 8dBm	Yes	-12.71 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



3 DECLARATION OF COMPLIANCE WITH SUBPART B

The digital circuits and 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.



4 GENERAL DESCRIPTION

4.1 General Description of EUT

Product	: Wireless Router
Model No	: WIP-301
Power Supply	: AC Adapter (DC 5V)
Modulation Type	: DBPSK(1Mbps)/DQPSK(2Mbps)/CCK(5.5/11Mbps)
Data Rate	: 11/5.5/2/1 Mbps
Operating Frequency	: 2.4 - 2.4835 GHz
Number of Channel	: 11
Channel Spacing	: 5 MHz
Transmit Power	: 13 dBm
Antenna Type	: Dual Monopole Antenna
Others	: N/A

Note: The Wireless Router provides a complete SOHO solution for Internet surfing, and it is easy to be configured and operated for even non-technical users.

The other detailed information, please refer to user's manual.

4.2 Description of Test mode

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		

1. Below 1 GHz, the channel 1, 6 and 11 were pre-tested in chamber. The channel 1, worst case one, was chosen for final test.
2. Above 1 GHz, the channel 1,6 and 11 were chosen for evaluation.
3. Both antennas have been tested, the data shown here is the worst case.

4.3 Test Methodology

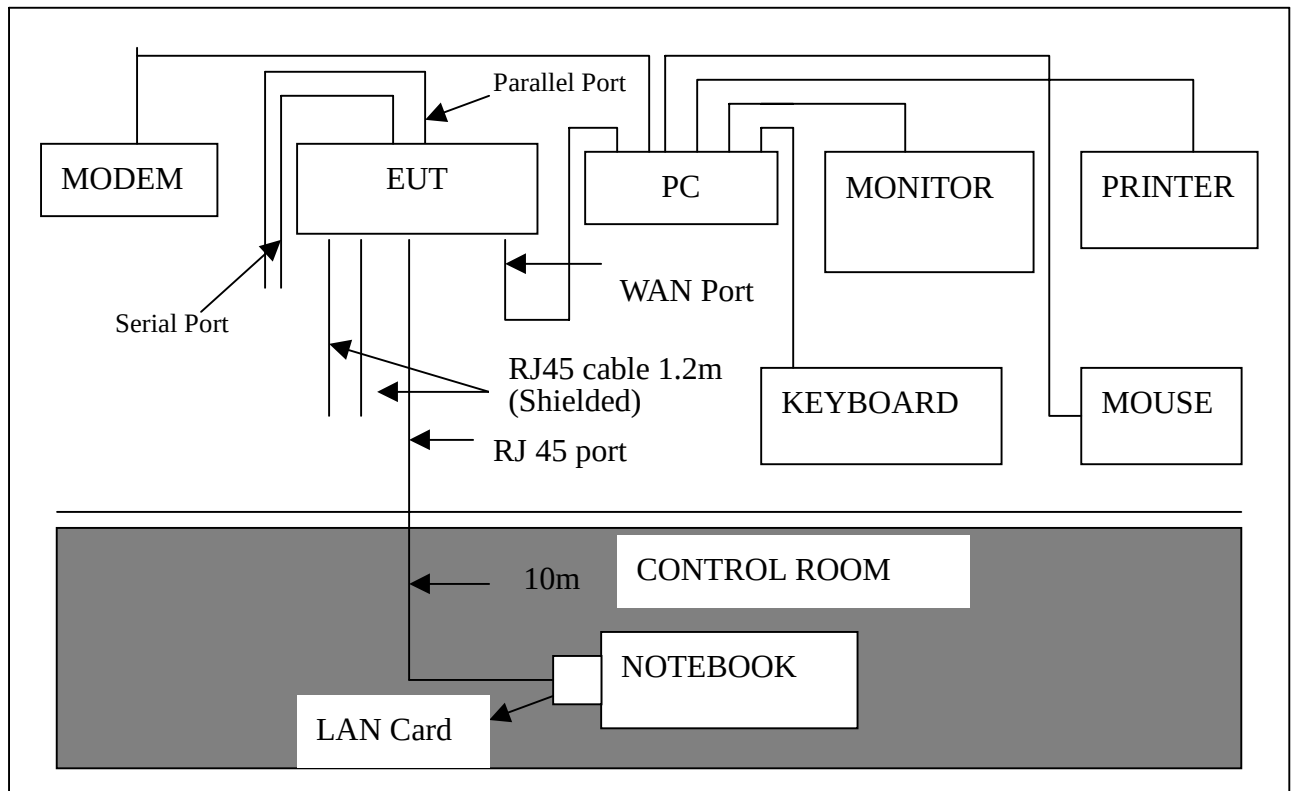
These tests were conducted on a sample of EUT for the evaluation in compliance with FCC CFR47 Part 15, Subpart C (15.247) & Subpart 15 B.

Both conducted and radiated emissions measurements were conducted in accordance with ANSI C63.4:1992.

4.4 Support Units List

No	Product	Brand	Model No.	Serial No.	I/O Cable
1.	PC	IBM	2187-12W	1S218714ABNA000D	N/A
2.	NOTEBOOK	DELL	PPX	99125	Nonshielded Power (1.8m)
3.	MONITOR	HP	D2846	JP74912250	Nonshielded Power (1.8m) Shielded Signal (1.5m)
4.	PRINTER	HP	2225C+	2949563865	Shielded Signal (1.2m)
5.	KEYBOARD	FORWARD	FDA-104GA	FDKB8110128	Shielded Signal (1.6m)
6.	MODEM	ACCEX	1414	980020508	Shielded Signal (1.2m)
7.	MOUSE	LOGITECH	M-S43	LZE00703207	Nonshielded Signal (1.8m)
8.	LAN CARD	3COM	Ethernet 10/100 Base-Tx	N/A	Shielded Signal (10m)

4.5 Configuration of System Under Test





5 GENERAL INFORMATION OF TEST FACILITY

5.1 Test Lab.

Advance Data Technology Corporation (NVLAP accredited)
R&TTE Certification Division

No. 13-1, Lane 19, Wen Shan 3rd St., Kweishan, Taoyuan, Taiwan, R.O.C.

Tel: +886-3-3270910

Fax: +886-3-3270892

5.2 Calibration Interval

All calibration intervals of the test sites and test instruments are 12 months. The calibrations are traceable to NML/ROC and NIST/USA.

6 TEST PROCEDURES AND TEST RESULTS

6.1 Conducted Emission Measurement

6.1.1 Test Instruments

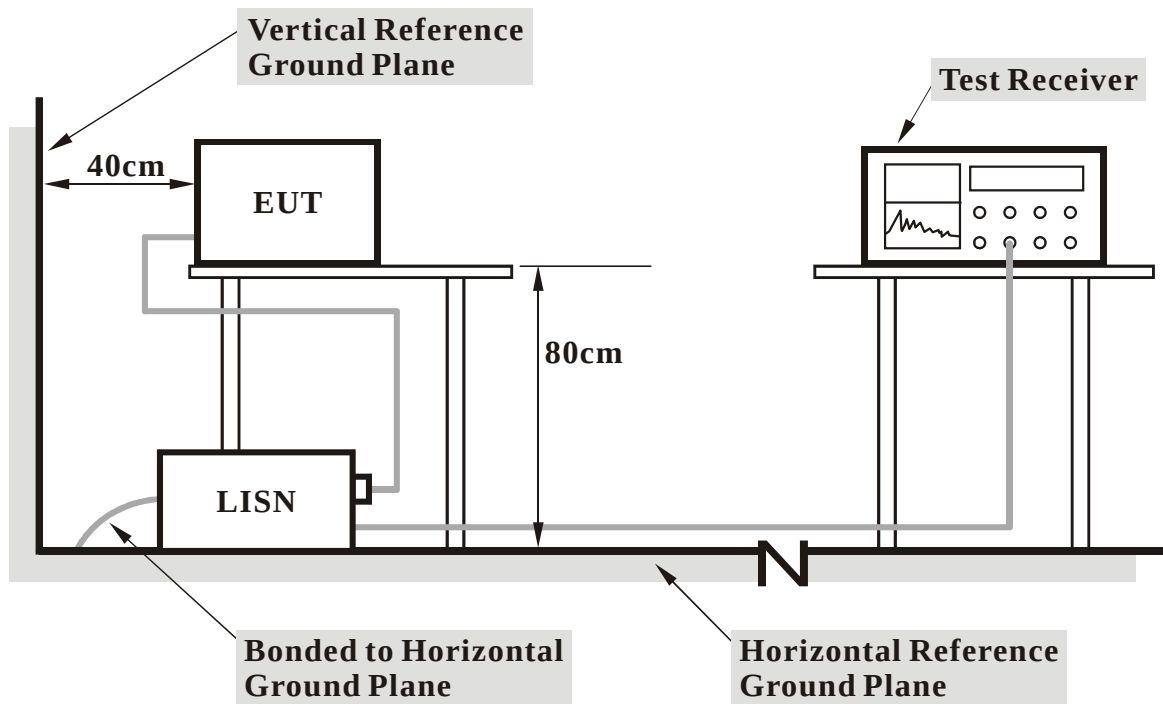
Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESH3	893495/006	July 26, 2001
ROHDE & SCHWARZ Spectrum Monitor	EZM	893787/013	July 14, 2001
ROHDE & SCHWARZ Artificial Mains Network	ESH2-Z5	892107/003	July 11, 2001
EMCO L.I.S.N.	3825/2	9504-2359	July 11, 2001
Shielded Room	Site 3	ADT-C03	NA

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

6.1.2 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 / $50\mu\text{H}$ coupling impedance is provided to the measurement instrument by the LISNs.
5. Measure the maximum conducted interference on both lines of the power mains connected to the EUT, within frequency range 450KHz ~ 30MHz.
6. The emission level under limit by 10dB is not needed to be reported.

6.1.3 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.

6.1.4 Photograph of Test Setup





6.1.5 EUT Operating Condition

The software provided by client enabled the EUT to continuously transmit and receive data at lowest, middle and highest channel frequencies individually. "H" patterns were sent to support units and displayed on the screen of support unit for maintaining the operating condition.

6.1.6 Climate Condition

The temperature and related humidity is 24 degree and 80%.

6.1.7 Test Results

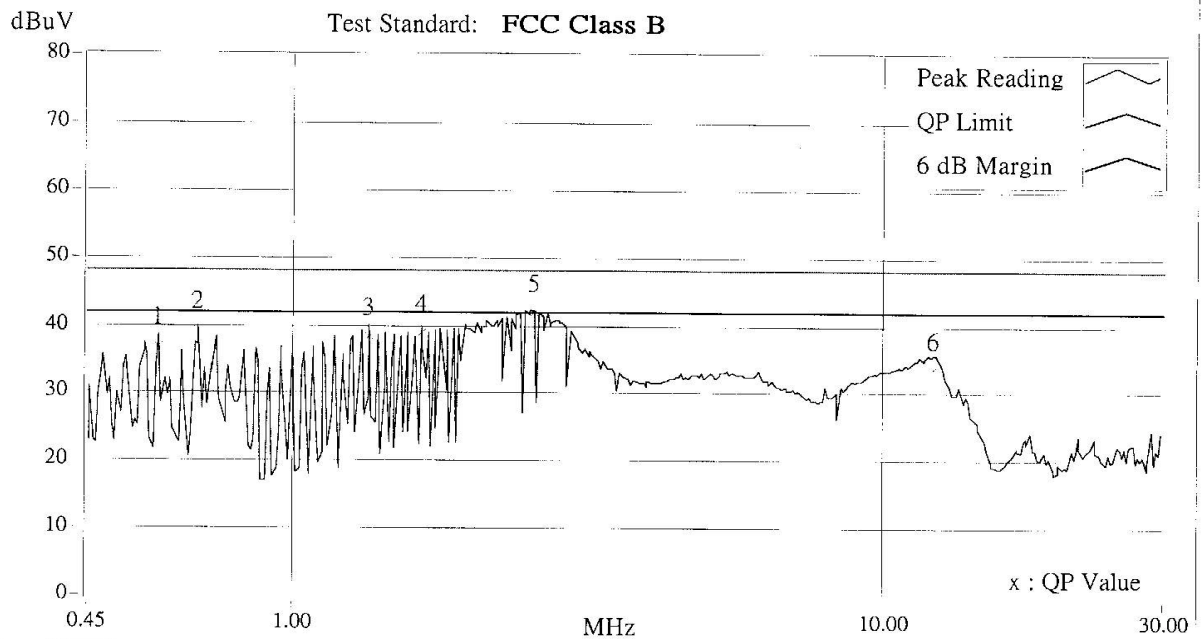
Brand / Model : WIP-301
Remark : CH 1
Tested by : STEVEN

Location: Conduction 3

Date: 2000/10/5

Time: PM 02:48:14

Phase: L1



	Frequency	Corr. Factor	Reading dBuV	Emission dBuV	Limit dBuV	Margins dB
No.	MHz	dB	QP	QP	QP	QP
1X	0.59557	0.23	37.03	37.26	48.00	-10.74
2X	0.69468	0.25	39.37	39.62	48.00	-8.38
3X	1.34929	0.30	38.48	38.78	48.00	-9.22
4X	1.65300	0.30	38.82	39.12	48.00	-8.88
+5X	2.56544	0.33	41.95	42.28	48.00	-5.72
6X	12.21182	0.64	33.58	34.22	48.00	-13.78

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.

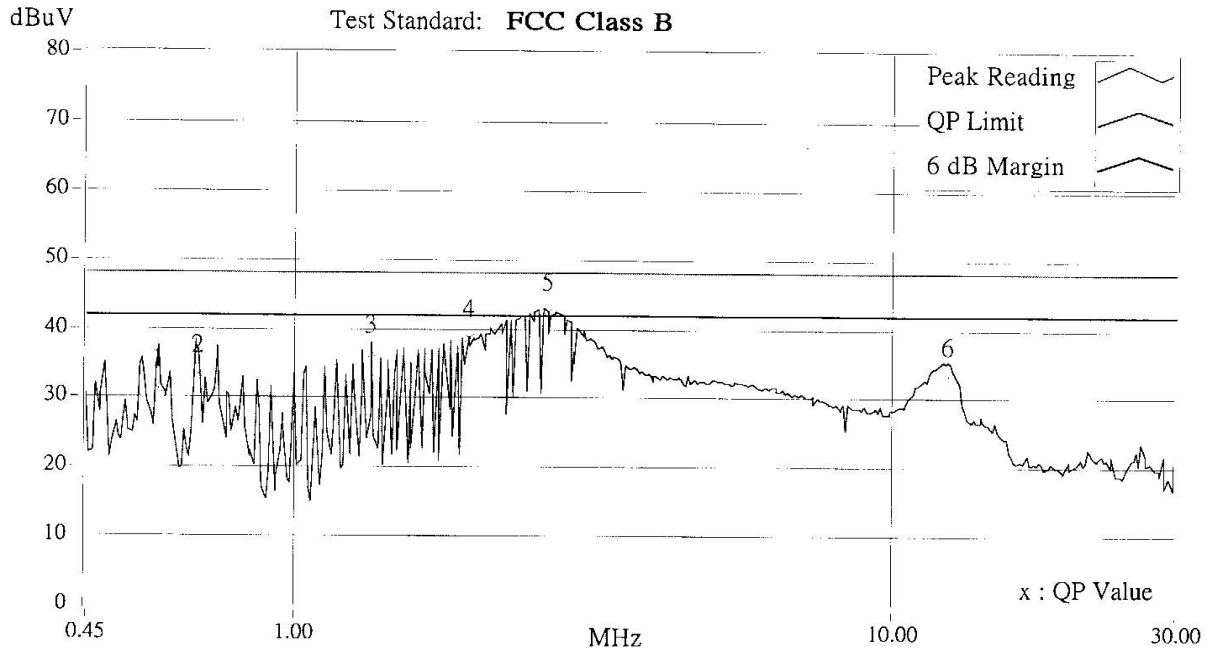
Brand / Model : WIP-301
Remark : CH 1
Tested by : STEVEN

Location: Conduction 3

Date: 2000/10/5

Time: PM 03:02:03

Phase: N



	Frequency	Corr.	Reading	Emission	Limit	Margins
No.	MHz	Factor	dBuV	dBuV	dBuV	dB
1X	0.59445	0.23	31.27	31.50	48.00	-16.50
2X	0.69325	0.25	33.41	33.66	48.00	-14.34
3X	1.34818	0.30	36.39	36.69	48.00	-11.31
4X	1.95587	0.30	38.54	38.84	48.00	-9.16
+5X	2.64991	0.33	42.43	42.76	48.00	-5.24
6X	12.42076	0.50	33.23	33.73	48.00	-14.27

- 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.

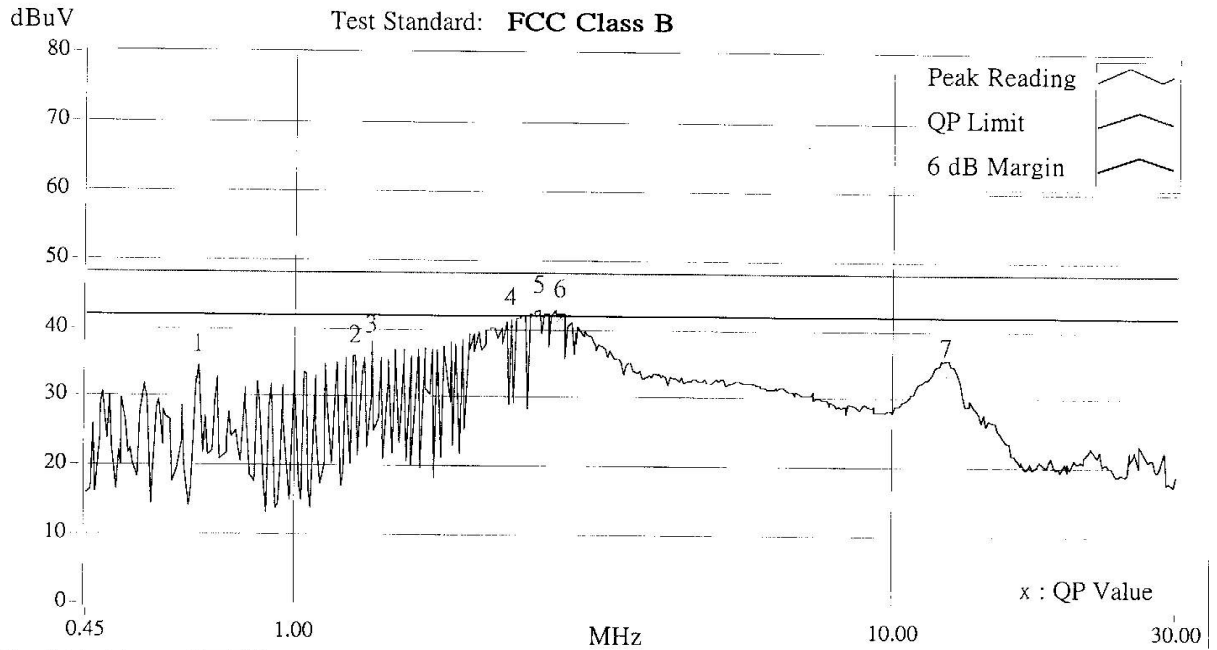
Brand / Model : WIP-301
Remark : CH 6
Tested by : STEVEN

Location: Conduction 3

Date: 2000/10/5

Time: PM 03:08:01

Phase: L1



	Frequency	Corr. Factor	Reading dBuV	Emission dBuV	Limit dBuV	Margins dB
No.	MHz	dB	QP	QP	QP	QP
1X	0.69502	0.25	33.39	33.64	48.00	-14.36
2X	1.25977	0.30	34.77	35.07	48.00	-12.93
3X	1.34802	0.30	36.43	36.73	48.00	-11.27
4X	2.30093	0.32	40.56	40.88	48.00	-7.12
+5X	2.56472	0.33	42.23	42.56	48.00	-5.44
6X	2.77919	0.34	41.74	42.08	48.00	-5.92
7X	12.38041	0.65	33.45	34.10	48.00	-13.90

- 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.

Brand / Model : WIP-301

Remark : CH 6

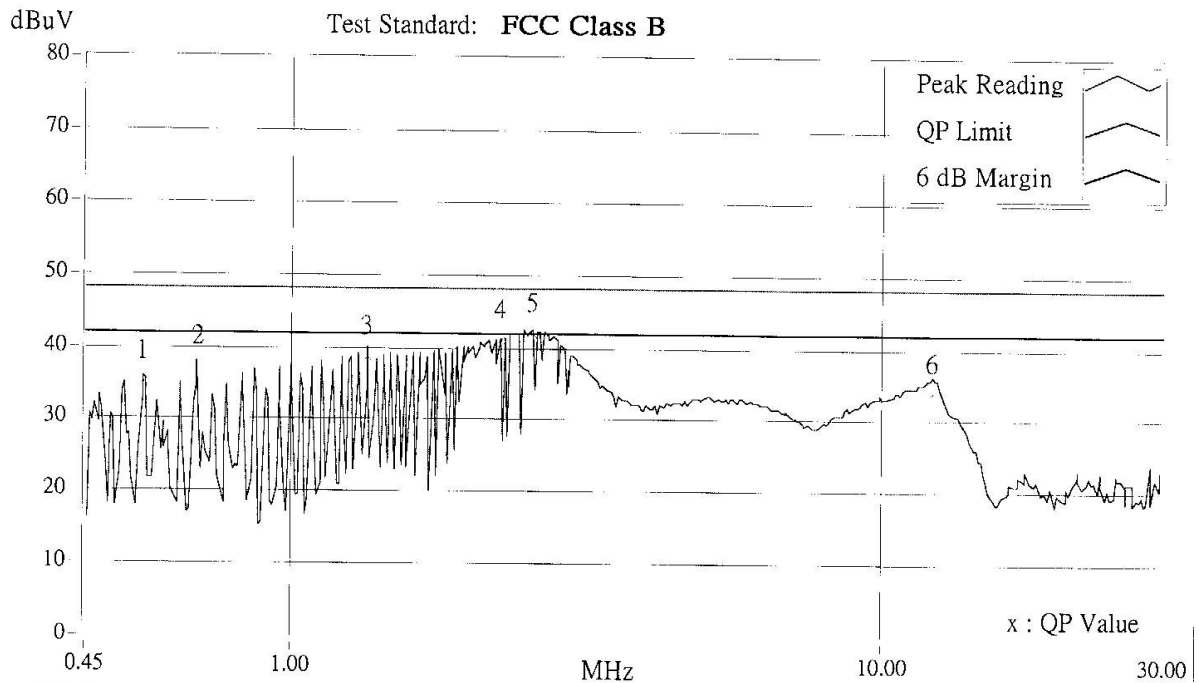
Tested by : STEVEN

Location: Conduction 3

Date: 2000/10/5

Time: PM 03:12:18

Phase: N



	Frequency	Corr. Factor	Reading dBuV	Emission dBuV	Limit dBuV	Margins dB
No.	MHz	dB	QP	QP	QP	QP
1X	0.56489	0.23	35.11	35.34	48.00	-12.66
2X	0.69607	0.25	37.26	37.51	48.00	-10.49
3X	1.34714	0.30	38.70	39.00	48.00	-9.00
4X	2.25933	0.31	41.17	41.48	48.00	-6.52
+5X	2.56269	0.33	42.03	42.36	48.00	-5.64
6X	12.25057	0.50	33.85	34.35	48.00	-13.65

- 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.

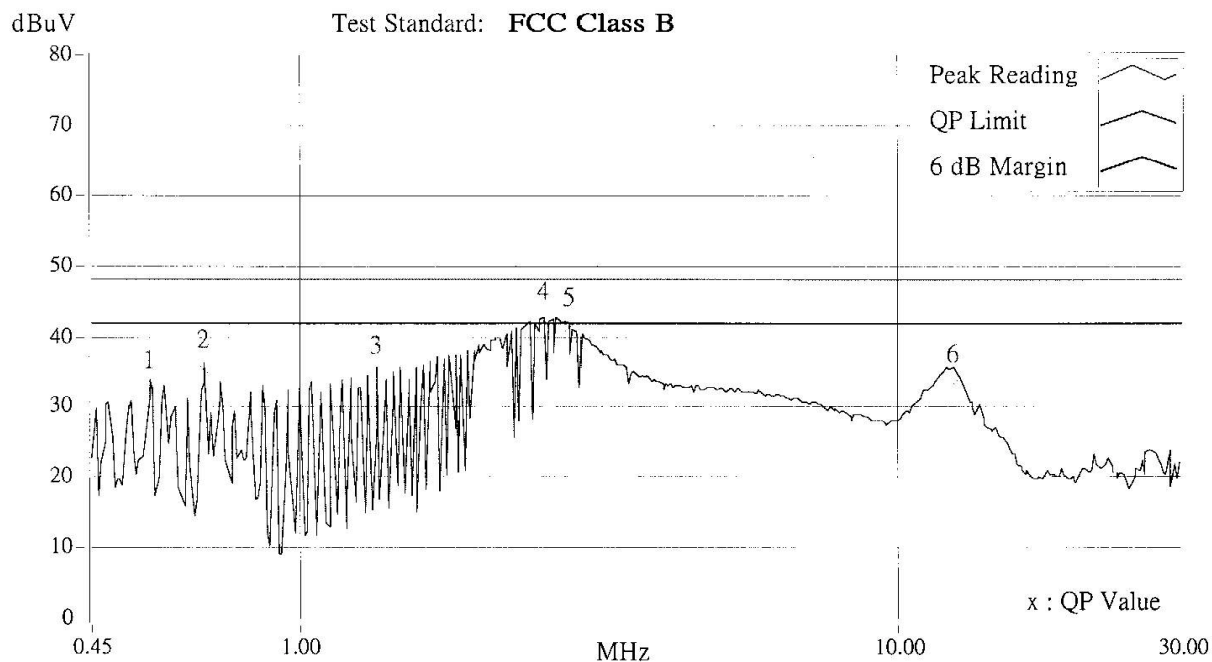
Brand / Model : WIP-301
Remark : CH 11
Tested by : STEVEN

Location: Conduction 3

Date: 2000/10/5

Time: PM 03:24:43

Phase: L1



	Frequency	Corr. Factor	Reading dBuV	Emission dBuV	Limit dBuV	Margins dB
No.	MHz	dB	QP	QP	QP	QP
1X	0.56491	0.23	32.54	32.77	48.00	-15.23
2X	0.69405	0.25	35.38	35.63	48.00	-12.37
3X	1.34851	0.30	34.61	34.91	48.00	-13.09
+4X	2.56321	0.33	42.23	42.56	48.00	-5.44
5X	2.82316	0.34	41.28	41.62	48.00	-6.38
6X	12.42469	0.65	33.35	34.00	48.00	-14.00

- 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.

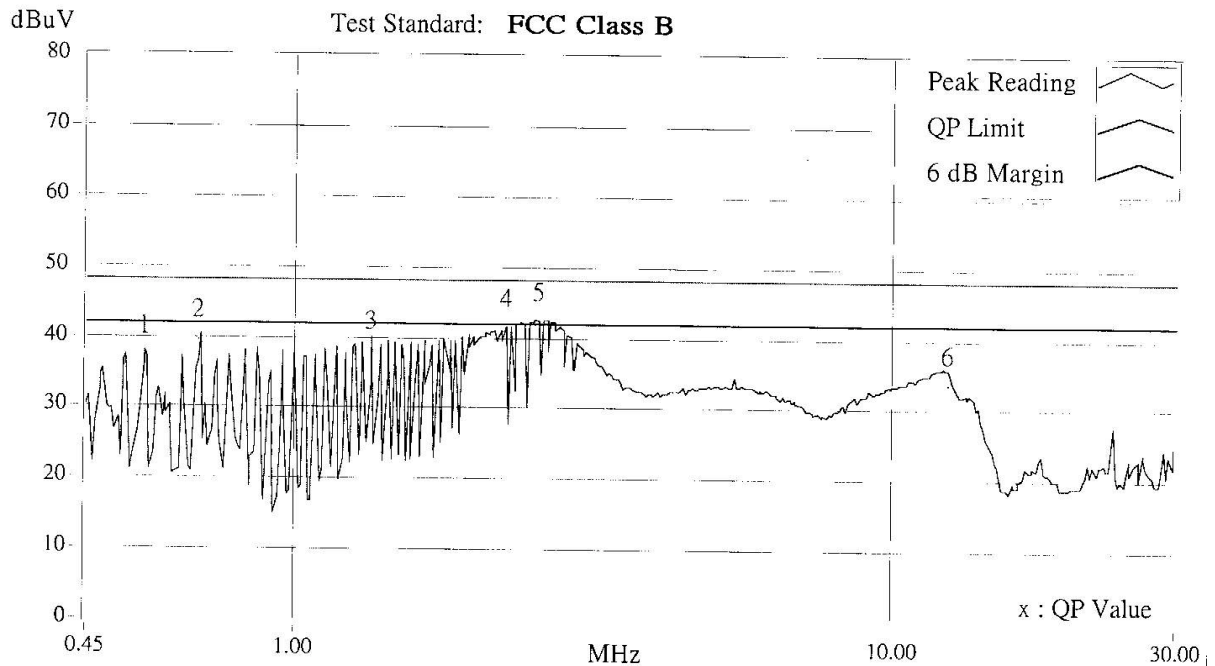
Brand / Model : WIP-301
Remark : CH 11
Tested by : STEVEN

Location: Conduction 3

Date: 2000/10/5

Time: PM 03:20:00

Phase: N



	Frequency	Corr. Factor	Reading dBuV	Emission dBuV	Limit dBuV	Margins dB
No.	MHz	dB	QP	QP	QP	QP
1X	0.56397	0.23	37.21	37.44	48.00	-10.56
2X	0.69466	0.25	39.51	39.76	48.00	-8.24
3X	1.34613	0.30	38.08	38.38	48.00	-9.62
4X	2.25926	0.31	41.23	41.54	48.00	-6.46
+5X	2.56333	0.33	42.29	42.62	48.00	-5.38
6X	12.42432	0.50	33.53	34.03	48.00	-13.97

- 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.



6.2 Radiated Emission Measurement

6.2.1 Test instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP Spectrum Analyzer	8590L	3544A01176	Apr 18, 2001
HP Preamplifier	8447D	2944A08485	Oct. 23, 2000
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	Nov. 25, 2000
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

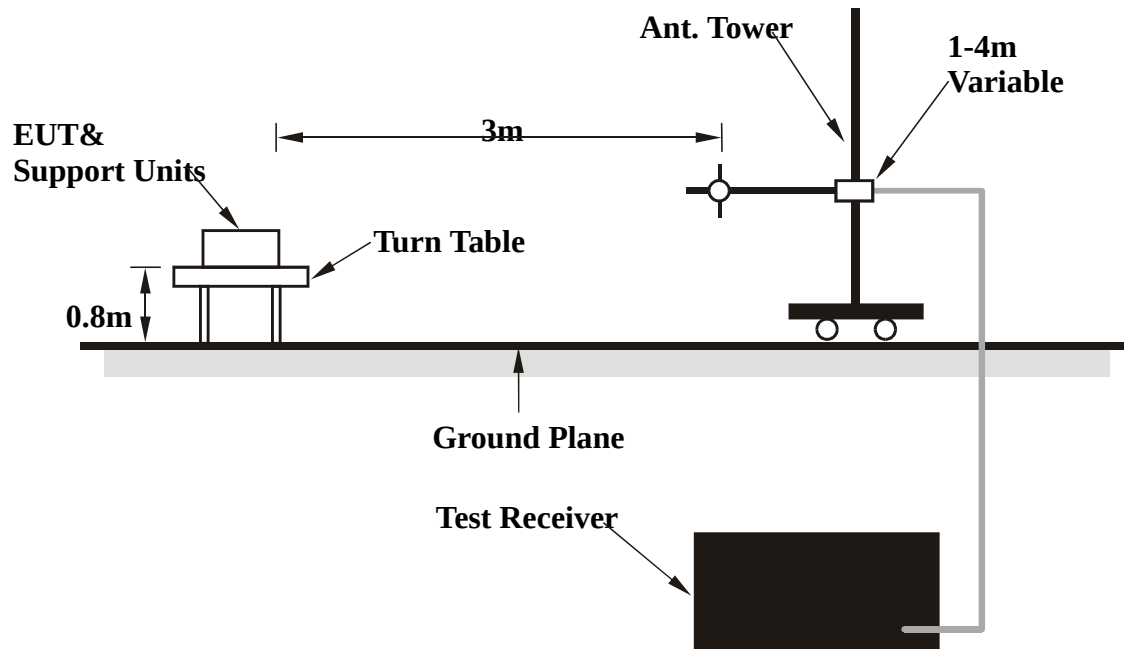
The measurement uncertainty is less than +/- 3dB, which is calculated as per NAMAS document NIS81.



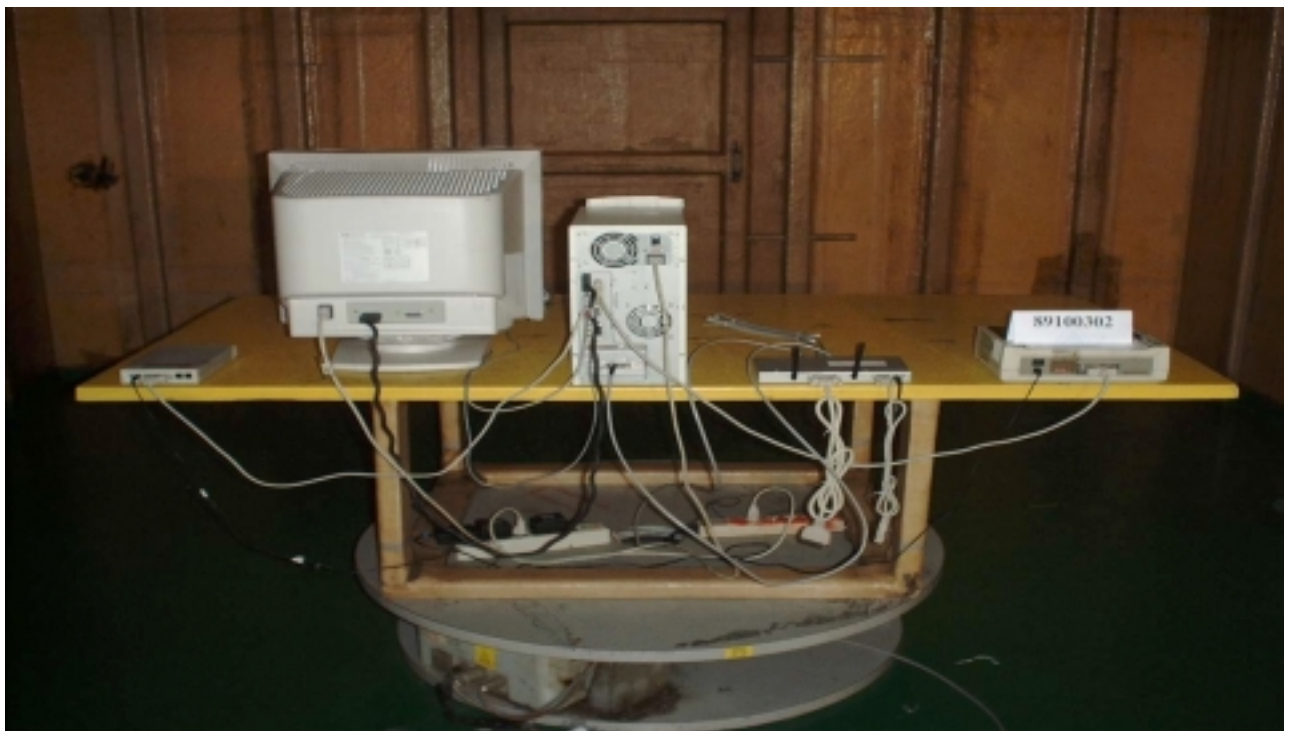
6.2.2 Test Procedures

- a. The EUT was placed on the turn table 0.8 meter above ground in 3 meter open area test site.
- b. Set the resolution bandwidth to 120KHz in the test receiver and select Peak function to scan the frequency below 1 GHz.
- c. 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.
- d. Locate the interference-receiving antenna at the position where the local peak reach the maximum emission.
- e. Rotate the turn table and stop at the angle where the measurement device has maximum reading
- f. Shift the interference-receiving antenna again to detect the maximum emission of the local peak
- g. 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.
- h. 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.
- i. 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.

6.2.3 Test Setup



6.2.4 Photograph of Test Setup





6.2.5 EUT Operating Condition

1. Place the EUT on the turn table.
2. Connect antenna with antenna port.
3. Use RJ45 cable to connect PC and EUT.
4. Power on.
5. Prepare the same setup as above, but place it outside testing area.
6. Send data to EUT (on the turn table) by command "PIN".
7. The linkage of these two PC have been established when the address of the other PC is shown on the monitor.
8. Rotate the turn table and scan the antenna mast to detect the maximum emission.

6.2.6 Climate Condition

The temperature and related humidity is 24°C and 80%.

6.2.7 Test Results

6.2.7.1 Digital Portion

Channel:1 ANTENNA POLARITY: Vertical		Detector Function : Quasi-Peak		6dB Bandwidth : 120 kHz.		Distance : 3 M Frequency Range : 30 – 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)
300.00	15.7	8.6	24.3	46.0	-21.7	103	186
360.00	17.5	15.0	32.5	46.0	-13.5	123	6
400.02	18.8	12.8	31.6	46.0	-14.4	159	99
420.30	19.0	14.4	33.4	46.0	-12.6	159	219
440.04	19.2	14.8	34.0	46.0	-12.0	118	68
480.01	20.1	15.1	35.2	46.0	-10.8	123	346
500.02	20.6	10.7	31.3	46.0	-14.7	182	358
520.02	20.7	12.9	33.6	46.0	-12.4	145	104
600.01	21.3	12.0	33.3	46.0	-12.7	124	342
631.04	21.3	11.7	33.0	46.0	-13.0	181	351
699.72	22.5	18.8	41.3	46.0	-4.7	137	175
720.04	22.7	16.5	39.2	46.0	-6.8	133	59
798.92	23.2	14.2	37.4	46.0	-8.6	136	362
819.20	23.5	9.6	33.1	46.0	-12.9	145	209
840.02	23.7	6.2	29.9	46.0	-16.1	154	104
858.04	23.9	10.0	33.9	46.0	-12.1	120	200

- Remarks:** 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

Channel:1 ANTENNA POLARITY: Horizontal		Detector Function : Quasi-Peak		6dB Bandwidth : 120 kHz.		Distance : 3 M Frequency Range : 30 – 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)
225.94	12.8	11.0	23.8	46.0	-22.2	107	363
240.02	13.7	25.7	39.4	46.0	-6.6	154	19
420.00	19.0	22.8	41.8	46.0	-4.2	105	114
420.31	19.0	23.5	42.5	46.0	-3.5	105	114
440.04	19.2	17.5	36.7	46.0	-9.3	114	310
480.01	20.1	14.3	34.4	46.0	-11.6	117	28
520.03	20.7	14.2	34.9	46.0	-11.1	107	327
580.31	21.1	15.1	36.2	46.0	-9.8	160	114
600.02	21.3	15.2	36.5	46.0	-9.5	99	311
720.02	22.7	13.8	36.5	46.0	-9.5	107	180
800.03	23.2	13.4	36.6	46.0	-9.4	131	104

Remarks: 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

6.2.7.2 RF Portion

Channel 1 ANTENNA POLARITY: Vertical		Detector Function : Peak Average				6dB Bandwidth : 1 MHz.				Distance : 3 M Frequency Range : 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.		
1496.00	32.5	8.0	-	40.5	-	74.0	54.0	-33.5	-	100	271
2038.00	34.5	11.7	-	46.2	-	74.0	54.0	-27.8	-	100	172
*2412.00	36.1	70.0	62.6	106.1	98.7	-	-	-	-	100	260
4824.00	43.8	8.0	-	51.8	-	74.0	54.0	-22.2	-	100	117
7236.00	39.5	-	-	-	-	74.0	54.0	-	-	-	-

Channel 1 ANTENNA POLARITY: Horizontal		Detector Function : Peak Average				6dB Bandwidth : 1 MHz.				Distance : 3 M Frequency Range : 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.		
1496.00	32.5	10.9	-	43.4	-	74.0	54.0	-30.6	-	100	146
2038.00	34.5	12.0	-	46.5	-	74.0	54.0	-27.5	-	100	299
*2412.00	36.1	66.6	59.6	102.7	95.7	-	-	-	-	100	96
4824.00	43.8	7.8	-	51.6	-	74.0	54.0	-22.4	-	100	157
7236.00	39.5	-	-	-	-	74.0	54.0	-	-	-	-

- Remarks:**
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

Channel 6 ANTENNA POLARITY: Vertical		Detector Function : Peak Average				6dB Bandwidth : 1 MHz.				Distance : 3 M Frequency Range : 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.		
1496.00	32.5	11.2	-	43.7	-	74.0	54.0	-30.3	-	100	222
2063.40	34.8	10.8	-	45.6	-	74.0	54.0	-28.4	-	100	82
*2437.00	36.3	67.9	60.5	104.2	96.8	-	-	-	-	100	89
4876.00	43.6	8.3	-	51.9	-	74.0	54.0	-22.1	-	100	327
7311.00	39.7	-	-	-	-	74.0	54.0	-	-	-	-

Channel 6 ANTENNA POLARITY: Horizontal		Detector Function : Peak Average				6dB Bandwidth : 1 MHz.				Distance : 3 M Frequency Range : 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.		
1496.00	32.5	11.7	-	44.2	-	74.0	54.0	-29.8	-	104	312
2063.00	34.8	11.4	-	46.2	-	74.0	54.0	-27.8	-	103	301
*2438.80	36.4	63.7	55.7	100.1	92.1	-	-	-	-	103	98
4874.00	43.6	8.1	-	51.7	-	74.0	54.0	-22.3	-	104	-4
7311.00	39.7	-	-	-	-	74.0	54.0	-	-	-	-

- Remarks:** 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

Channel 11 ANTENNA POLARITY: Vertical		Detector Function : Peak Average				6dB Bandwidth : 1 MHz.				Distance : 3 M Frequency Range : 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.		
1496.00	32.5	10.4	-	42.9	-	74.0	54.0	-31.1	-	100	349
2088.00	35.1	12.4	-	47.5	-	74.0	54.0	-26.5	-	113	291
*2462.00	36.4	69.3	61.6	105.7	98.0	-	-	-	-	110	9
4924.00	43.4	8.0	-	51.4	-	74.0	54.0	-22.6	-	100	183
7386.00	39.7	-	-	-	-	74.0	54.0	-	-	-	-

Channel 11 ANTENNA POLARITY: Horizontal		Detector Function : Peak Average				6dB Bandwidth : 1 MHz.				Distance : 3 M Frequency Range : 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.		
1496.00	32.5	11.1	-	43.6	-	74.0	54.0	-30.4	-	104	317
2088.15	35.1	12.9	-	48.0	-	74.0	54.0	-26.0	-	100	244
*2462.00	36.4	62.4	54.7	98.8	91.1	-	-	-	-	103	98
4924.00	43.4	8.0	-	51.4	-	74.0	54.0	-22.6	-	100	183
7386.00	39.7	-	-	-	-	74.0	54.0	-	-	-	-

- Remarks:**
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

6.3 6dB Bandwidth Measurement

6.3.1 Test Instruments

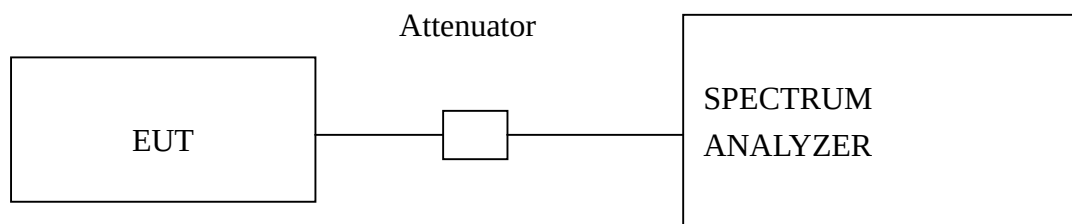
Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	846839/018 848926/005	Mar. 03, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

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

6.3.2 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 100 kHz RBW and 100 kHz VBW. The 6 dB bandwidth is defined as the total spectrum whose power is larger than peak power minus 6 dB.

6.3.3 Test Setup



6.3.4 EUT Operating Condition

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



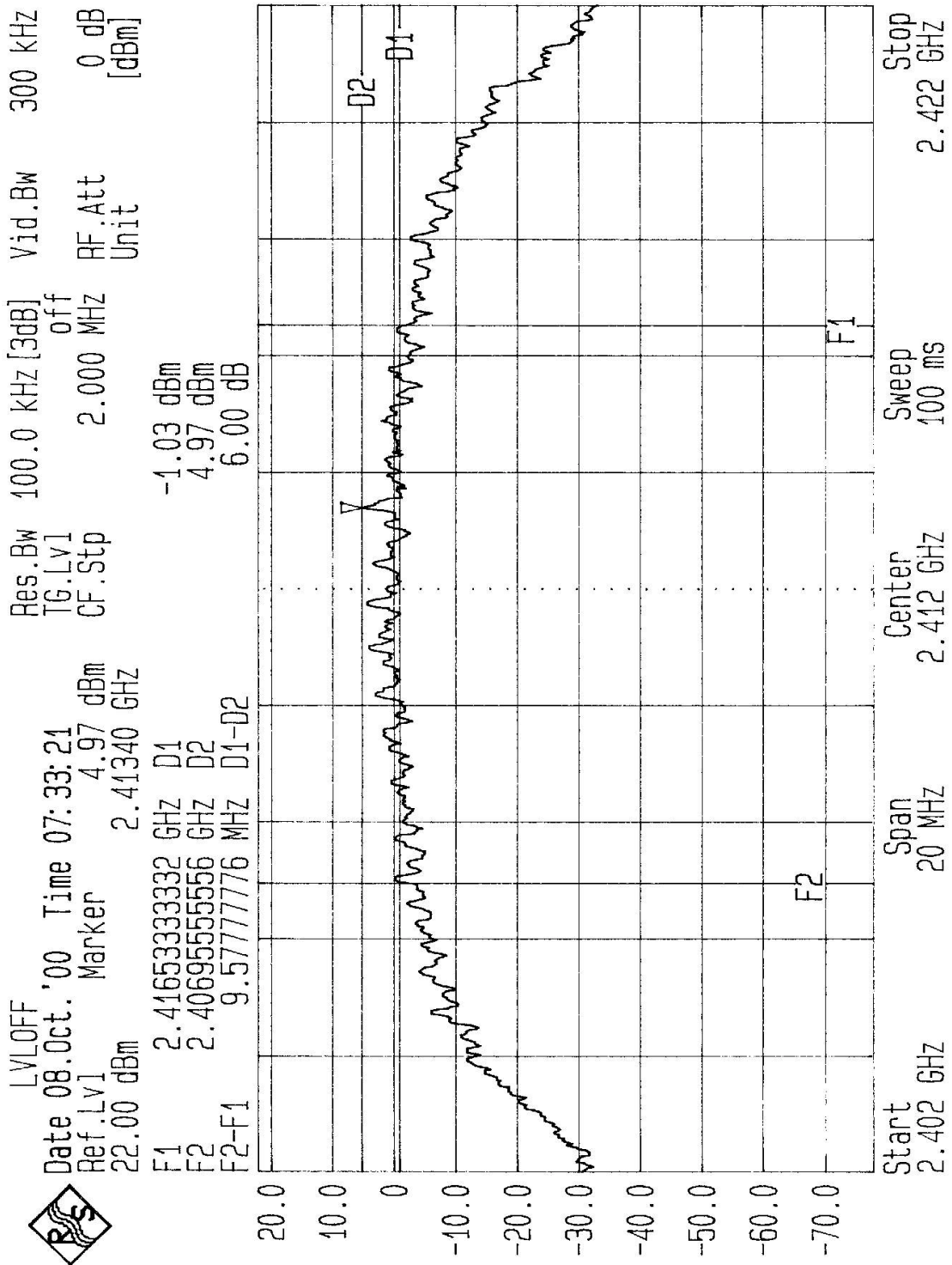
6.3.5 Climate Condition

The temperature and related humidity is 18°C and 78%.

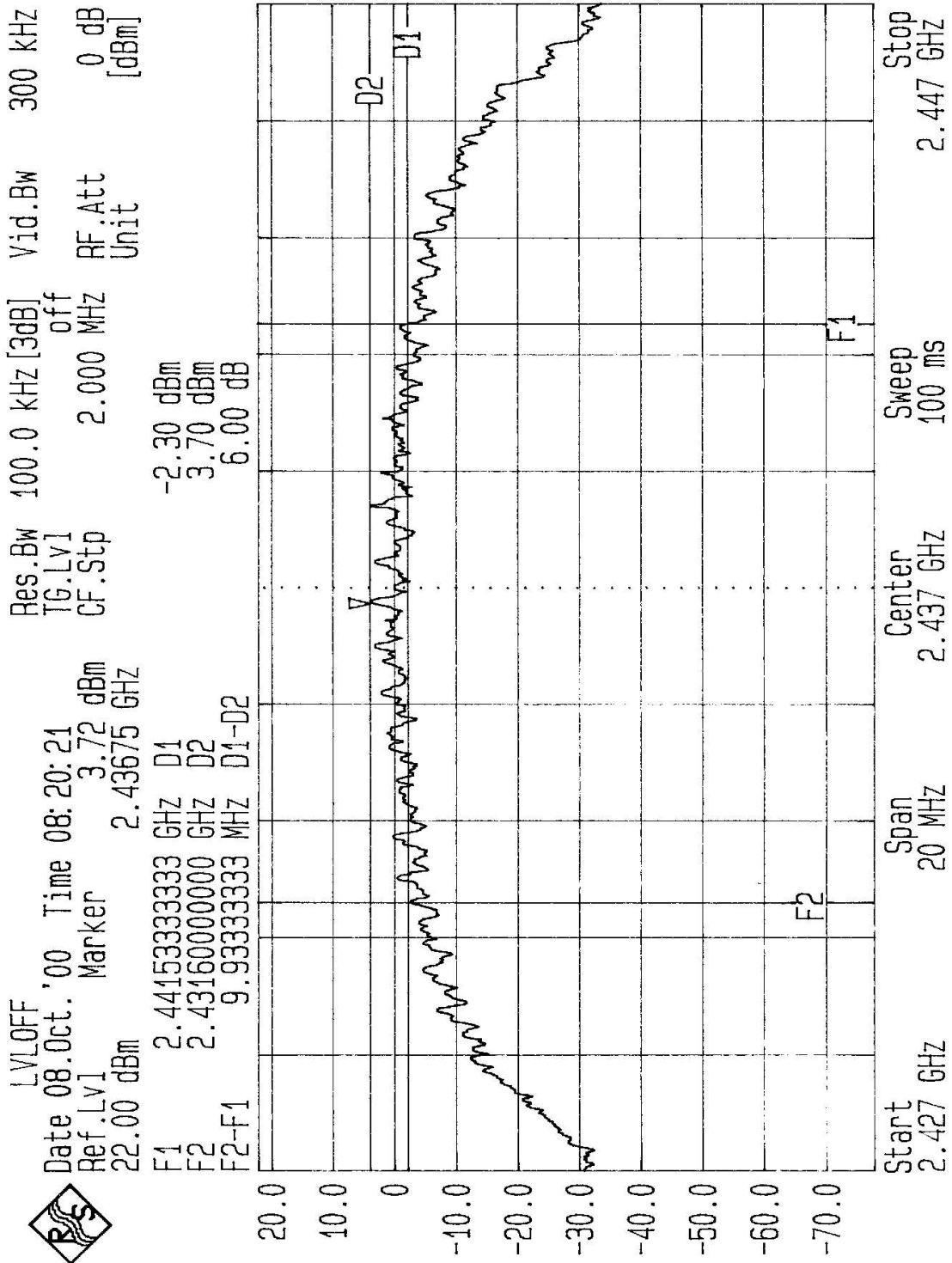
6.3.6 Test Results

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	9.58	0.5	PASS
6	2437	9.93	0.5	PASS
11	2462	9.91	0.5	PASS

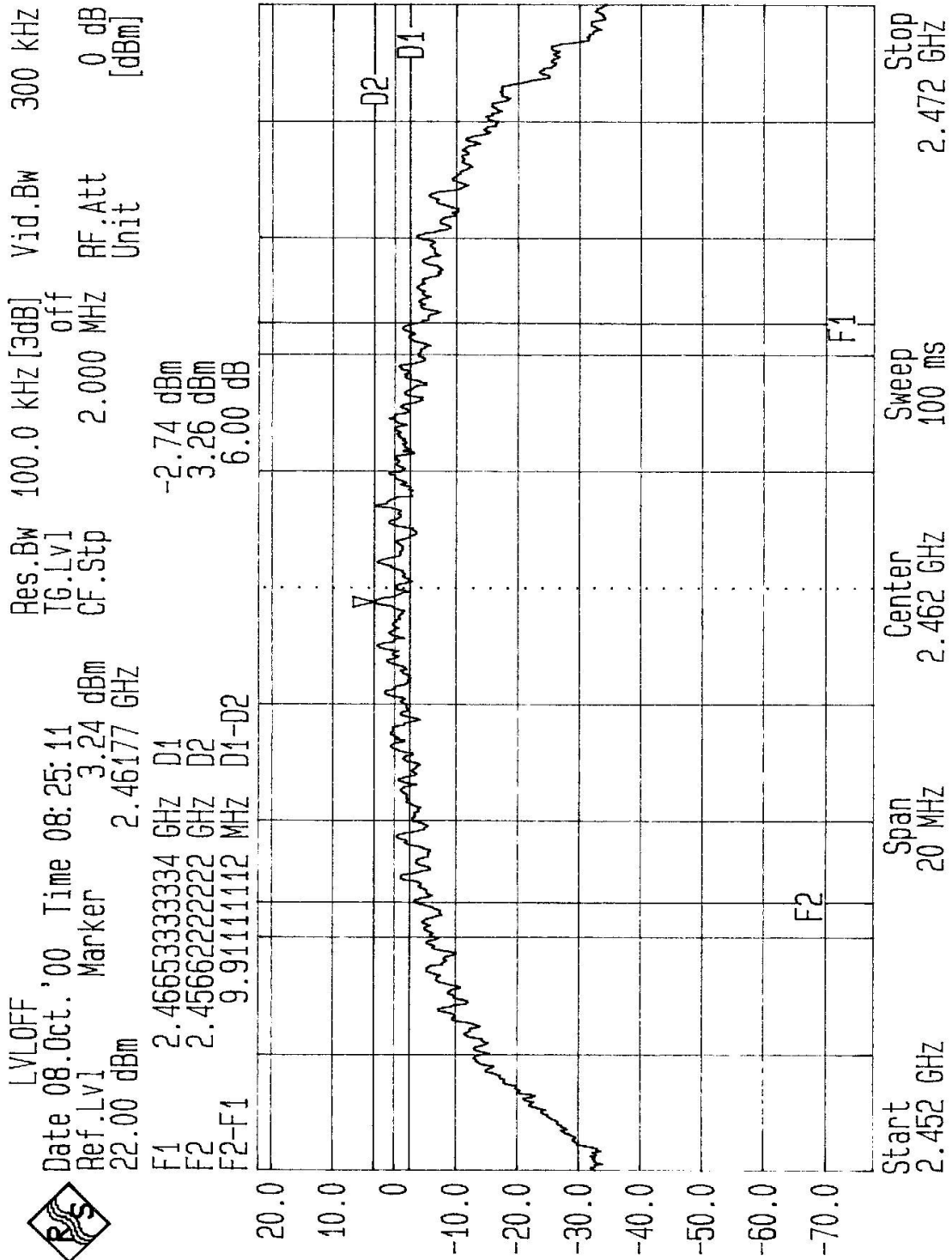
CH1



CH6



CH11



6.4 Maximum Peak Output Power

6.4.1 6.4.1 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	846839/018 848926/005	Dec. 03, 2000
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

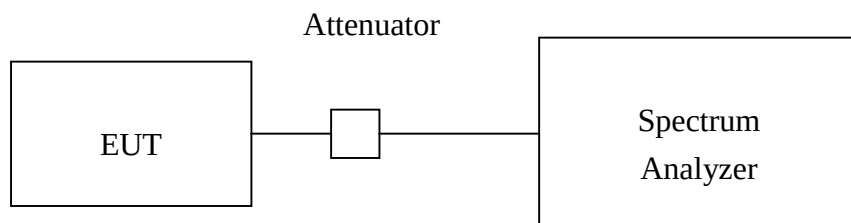
The measurement uncertainty is less than +/- 2.6dB, which is calculated as per NAMAS document NIS81.

6.4.2 6.4.2 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.

6.4.3 Test Setup



6.4.4 EUT Operating Condition

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

6.4.5 Climate Condition

The temperature and related humidity is 24°C and 80% respectively.

6.4.6 Test Result

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	17.65	30	PASS
6	2437	16.86	30	PASS
11	2462	16.53	30	PASS



6.5 RF Exposure

6.5.1 Test Instrument

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
FULLY ANECHOIC CHAUSTR	N/A	N/A	July 01, 2000

6.5.2 Classification

This wireless router is allowed to be re-located in the place where is at least 20cm away from the body of the user. Statement of 20cm separation distance warning has been printed on the User's Manual. So, this product is classified as **Mobile Device**.

6.5.3 RF exposure limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
(A)Limits For Occupational / Control Exposures				
300-1500	...	...	F/300	6
1500-100,000	...	...	5	6
(B)Limits For General Population / Uncontrolled Exposure				
300-1500	...	...	F/1500	6
1500-100,000	...	...	1.0	30

F = Frequency in MHz

The 20cm separation requirement listed in section 2.1091 is met because the output power and the antenna gain is very low. Please see the calculation below.

6.5.4 Calculation Procedures

Friis transmission formula : $P_d = (P_{out} * G) / (4 * \pi * r^2)$

where

P_d = power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

$\pi = 3.1416$

R = distance between observation point and center of the radiator in cm

Through the calculation, we know the distance r where the MPE limit is reached.

Ref. : David K. Cheng, *Field and Wave Electromagnetics*, Second Edition,
Page 640, Eq. (11-133).

6.5.5 RF Exposure Distances

The Gain of the antenna measured in Fully Anechoic Chamber is 0dBi.

CHANNEL	CHANNEL FREQUENCY (MHz)	OUTPUT POWER TO ANTENNA (mW)	MINIMUM ALLOWABLE DISTANCE (r) FROM SKIN (Centi-Meter)
1	2412	58.21	1.71
6	2437	48.53	1.56
11	2462	44.98	1.50

The minimum allowable distance is very close to the enclosure of the antenna and also very far away from the human being under normal use condition. So, harmfulness to human being is very limited.

6.6 Power Spectral Density Measurement

6.6.1 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	846839/018 848926/005	Dec. 03, 2000
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

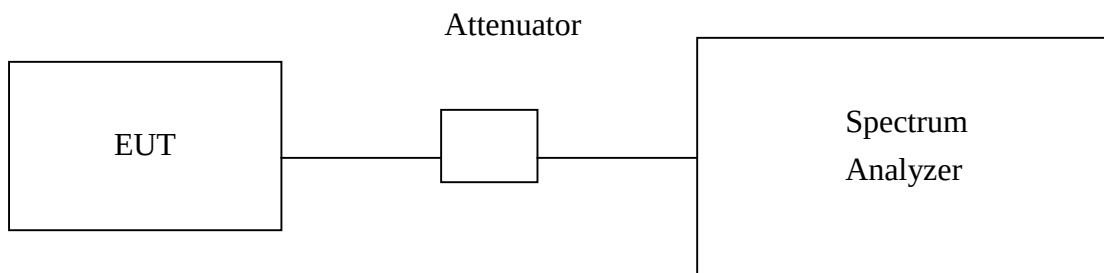
The measurement uncertainty is less than +/- 2.6dB, which is calculated as per NAMAS document NIS81.

6.6.2 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.

6.6.3 Test Setup



6.6.4 EUT Operating Condition

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



6.6.5 Climate Condition

The temperature and related humidity is 24°C and 80%.

6.6.6 Test Result

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 KHz BW	MAXIMUM LIMIT (MHz)	PASS/FAIL
1	2412	-12.71dBm	8dBm	PASS
6	2437	-13.29dBm	8dBm	PASS
11	2462	-13.04dBm	8dBm	PASS

The spectrum plots of test result are attached as below.

