



REPORT NO : RF89080208
PRODUCT : MPCI-101 WIRELESS LAN Module
MODEL NO : MPCI-101
SERIAL NO : N/A
APPLICANT : Acer Incorporated
ADDRESS : 21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien 221, Taiwan, R.O.C.
MANUFACTURE : Lucent Technologies Nederland B.V.
ADDRESS : Zadelstede 1-10, 3431 JZ Nieuwegein, the Netherlands
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. 47, 14 Ling, Chia Pau Tsuen, Lin Kou Hsian, Taipei Hsien, Taiwan, R.O.C.
TEST STANDARD : 47CFR Part 15, Subpart C (15.247) & Subpart B
TEST DATE : August 22, 2000
TEST RESULT : Pass

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Accredited Laboratory

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1 CERTIFICATION

Issue Date: August 24, 2000

PRODUCT : MPCI-101 WIRELESS LAN Module
MODEL NO : MPCI-101
FCC ID : HLZMPCI-101
Applicant : Acer Incorporated
TEST STANDARD : FCC 47CFR Part 15, Subpart C (Section 15.247) and 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 EMC characteristics and the energy emitted under the conditions herein specified.

TESTED BY: Ellis Wu **DATE:** Aug. 24, 2000
Ellis Wu
PREPARED BY: Delphine Hsu **DATE:** Aug 24, 2000
Delphine Hsu
APPROVED BY: Alan Lane **DATE:** Aug 24, 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 -8.1 dBuV At 0.549 MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Spec.: min. 500 kHz	Yes	7.80 MHz > 500 kHz
15.247(b)	Maximum Peak Output Power Spec.: max. 30 dBm	Yes	16.21 dBm < 30 dBm
15.247(c)	Transmitter Radiated Emissions Spec.: Table 15.209	Yes	Minimum passing margin is -5.2 dBuV At 365.94 MHz
15.247(d)	Power Spectral Density Spec.: max. 8dBm	Yes	-9.06 dBm < 8 dBm
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 INFORMATION

4.1 General Description of EUT

Product	: MPCI-101 Wireless LAN Module
Model No	: MPCI-101
Power Supply	: 5VDC (from notebook)
Modulation Type	: DBPSK(1Mbps)/DQPSK(2Mbps)/CCK(5.5/11Mbps)
Transfer Rate	: 11/5.5/2/1 Mbps
Operating Frequency	: 2.4 - 2.4835 GHz
Number of Channel	: 11
Channel Spacing	: 5 MHz
Rated RF output power level	: 14 dBm
Associated devices	: N/A

Note:

The Network Interface in the 2.4-2.5GHz ISM band uses the channel center frequencies as defined by the IEEE802.11 PHY standard for DSSS. These channel frequencies and the countries of application are listed in Table below. Note: the min PCI card uses subset channel 1 through 11, which allows usage across the world.

Channel ID	FCC Channel Frequencies (MHz)	ETS Channel Frequencies (MHz)	Japan Channel Frequencies (MHz)	France Channel Frequencies (MHz)
1	2412	2412	-	-
2	2417	2417	-	-
3	2422	2422	-	-
4	2427	2427	-	-
5	2432	2432	-	-
6	2437	2437	-	-
7	2442	2442	-	-
8	2447	2447	-	-
9	2452	2452	-	-
10	2457	2457	-	-
11	2462	2462	-	-

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



4.2 Description of Test mode

The EUT of MPCI-101 Wireless LAN Module provides 11 channel frequencies which were working at 2.4GHz frequency band. The channel 1, 6 and 11 were chosen for final evaluation.

4.3 Test Methodology

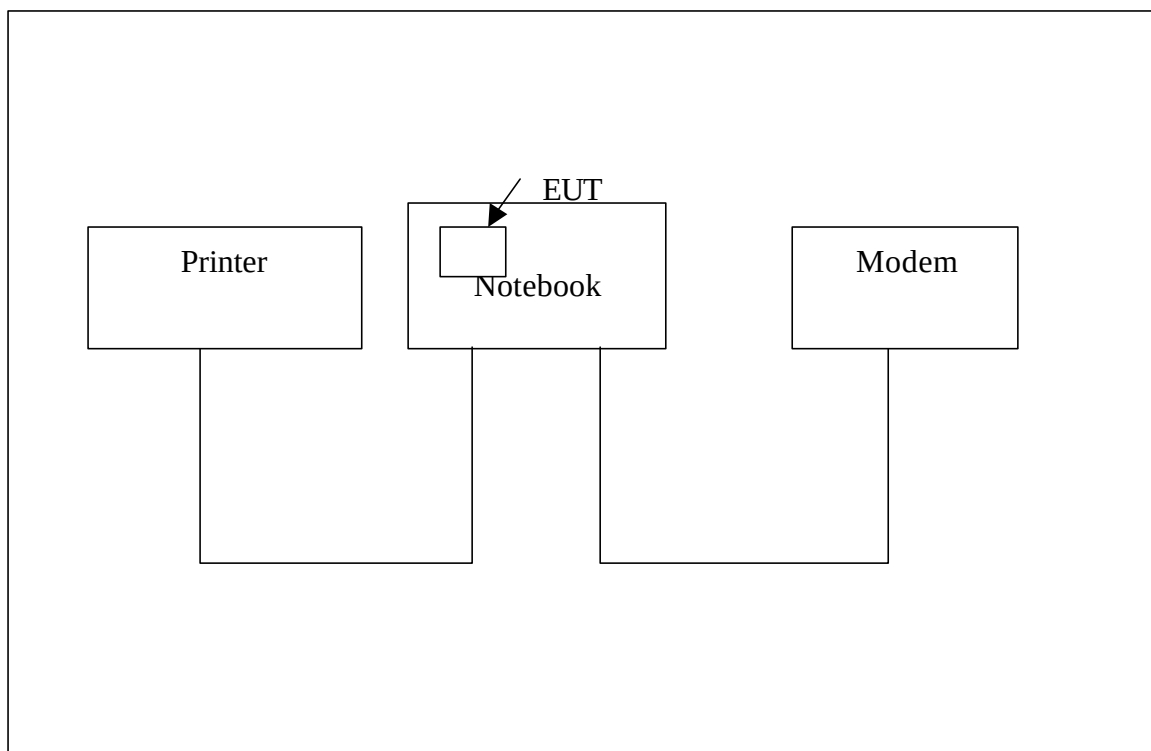
These tests were conducted on a sample of EUT for the evaluation in compliance with FCC CFR47 Part 15, Subpart C. (15.247) & Subpart B.

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

4.4 Support Units List

No	Product	Brand	Model No.	Serial No.	I/O Cable
1.	Note Book	Acer	TM350TE	8145H01S0503000949	Nonshielded(1.8m)
2.	Printer	HP	2225C+	3123S97230	Shielded (1.2m)
3.	Modem	ACEEX	1414	980020508	Shielded(1.2m)

4.5 Configuration of System Under Test





5 GENERAL INFORMATION OF TEST FACILITY

5.1 Test Lab.

Advance Data Technology Corporation (NVLAP accredited)

No. 47, 14 Ling, Chia Pau Tsuen, Lin Kuo Hsiang, Taipei, 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.

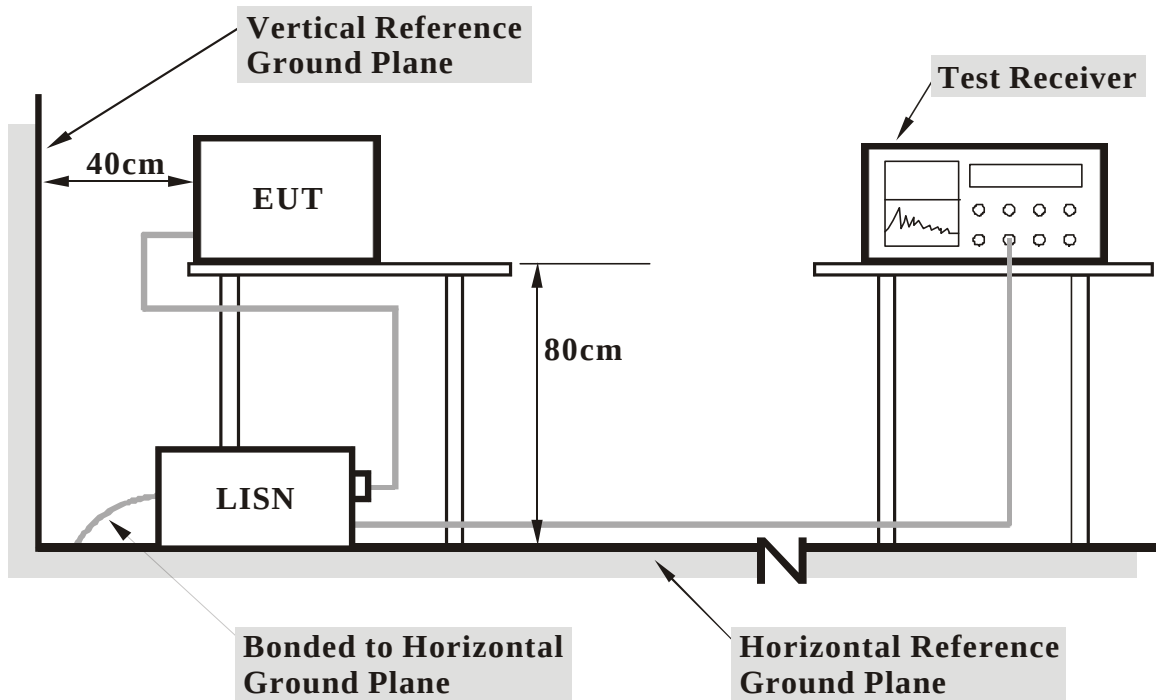
6.1.2 Test Procedure

The EUT was placed 0.4 meter 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 Ω / 50 μ H coupling impedance for the measuring instrument.

Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

The frequency range from 450 kHz to 30 MHz was searched. The emission levels over 10dB under the prescribed limits could not 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 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 Notebook PC to maintain operating condition.

6.1.6 Climate Condition

The temperature and related humidity is 23 °C and 63% respectively.

6.1.7 Test Results

MODE: CH 1		6 dB Bandwidth: 10 kHz				PHASE: LINE (L)			
Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.549	0.2	39.2	-	39.40	-	48	-	-8.6	-
0.774	0.2	33.4	-	33.60	-	48	-	-14.4	-
1.593	0.2	24.3	-	24.50	-	48	-	-23.5	-
3.888	0.3	25.1	-	25.40	-	48	-	-22.6	-
6.593	0.5	28.2	-	28.70	-	48	-	-19.3	-
11.738	0.8	30.8	-	31.60	-	48	-	-16.4	-
24.332	1.3	22.2	-	23.50	-	48	-	-24.5	-

MODE: CH1		6 dB Bandwidth: 10 kHz				PHASE: Neutral(N)			
Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.549	0.2	37.2	-	37.4	-	48	-	-10.6	-
0.774	0.2	32.1	-	32.3	-	48	-	-15.7	-
1.593	0.2	21.9	-	22.1	-	48	-	-25.9	-
3.888	0.3	26.3	-	26.6	-	48	-	-21.4	-
6.593	0.5	22.7	-	23.2	-	48	-	-24.8	-
11.738	0.7	29.6	-	30.3	-	48	-	-17.7	-
24.332	1.2	18.9	-	20.1	-	48	-	-27.9	-

- 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.

MODE: CH 6		6 dB Bandwidth: 10 kHz				PHASE: LINE (L)			
Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.549	0.2	39.6	-	39.8	-	48	-	-8.2	-
0.774	0.2	28.9	-	29.1	-	48	-	-18.9	-
1.269	0.2	35.0	-	35.2	-	48	-	-12.8	-
2.703	0.2	18.9	-	19.1	-	48	-	-28.9	-
4.086	0.5	24.1	-	24.6	-	48	-	-23.4	-
5.273	0.5	25.9	-	26.4	-	48	-	-21.6	-
12.191	0.8	27.4	-	28.2	-	48	-	-19.8	-

MODE: CH6		6 dB Bandwidth: 10 kHz				PHASE: Neutral(N)			
Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.549	0.2	39.7	-	39.9	-	48	-	-8.1	-
0.774	0.2	32.6	-	32.8	-	48	-	-15.2	-
1.269	0.2	28.2	-	28.4	-	48	-	-19.6	-
2.703	0.2	23.4	-	23.6	-	48	-	-24.4	-
4.086	0.4	25.9	-	26.3	-	48	-	-21.7	-
5.273	0.5	26.3	-	26.8	-	48	-	-21.2	-
12.191	0.7	31.7	-	32.4	-	48	-	-15.6	-

- 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.

MODE: CH 11		6 dB Bandwidth: 10 kHz				PHASE: LINE (L)			
Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.549	0.2	33.8	-	34.0	-	48	-	-14.0	-
1.269	0.2	31.4	-	31.6	-	48	-	-16.4	-
2.109	0.2	21.6	-	21.8	-	48	-	-26.2	-
3.951	0.3	25.0	-	25.3	-	48	-	-22.7	-
6.455	0.5	26.2	-	26.7	-	48	-	-21.3	-
11.465	0.8	30.9	-	31.7	-	48	-	-16.3	-
24.047	1.3	24.5	-	25.8	-	48	-	-22.2	-

MODE: CH11		6 dB Bandwidth: 10 kHz				PHASE: Neutral(N)			
Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.549	0.2	36.7	-	36.9	-	48	-	-11.1	-
1.269	0.2	23.8	-	24.0	-	48	-	-24.0	-
2.109	0.2	21.6	-	21.8	-	48	-	-26.2	-
3.951	0.3	23.1	-	23.4	-	48	-	-24.6	-
6.455	0.5	24.1	-	24.6	-	48	-	-23.4	-
11.465	0.7	29.1	-	29.8	-	48	-	-18.2	-
24.047	1.2	22.9	-	24.1	-	48	-	-23.9	-

- 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.

7 6dB Bandwidth Measurement

7.1 Test Instruments

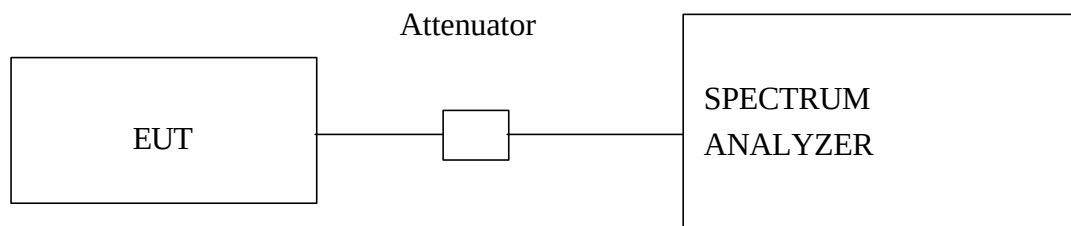
Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP SPECTRUM ANALYZER	8593E	3926A04191	Mar. 03, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

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

7.1.1 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The 6dB bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 100 kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

7.1.2 Test Setup



7.1.3 EUT Operating Condition

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



7.1.4 Climate Condition

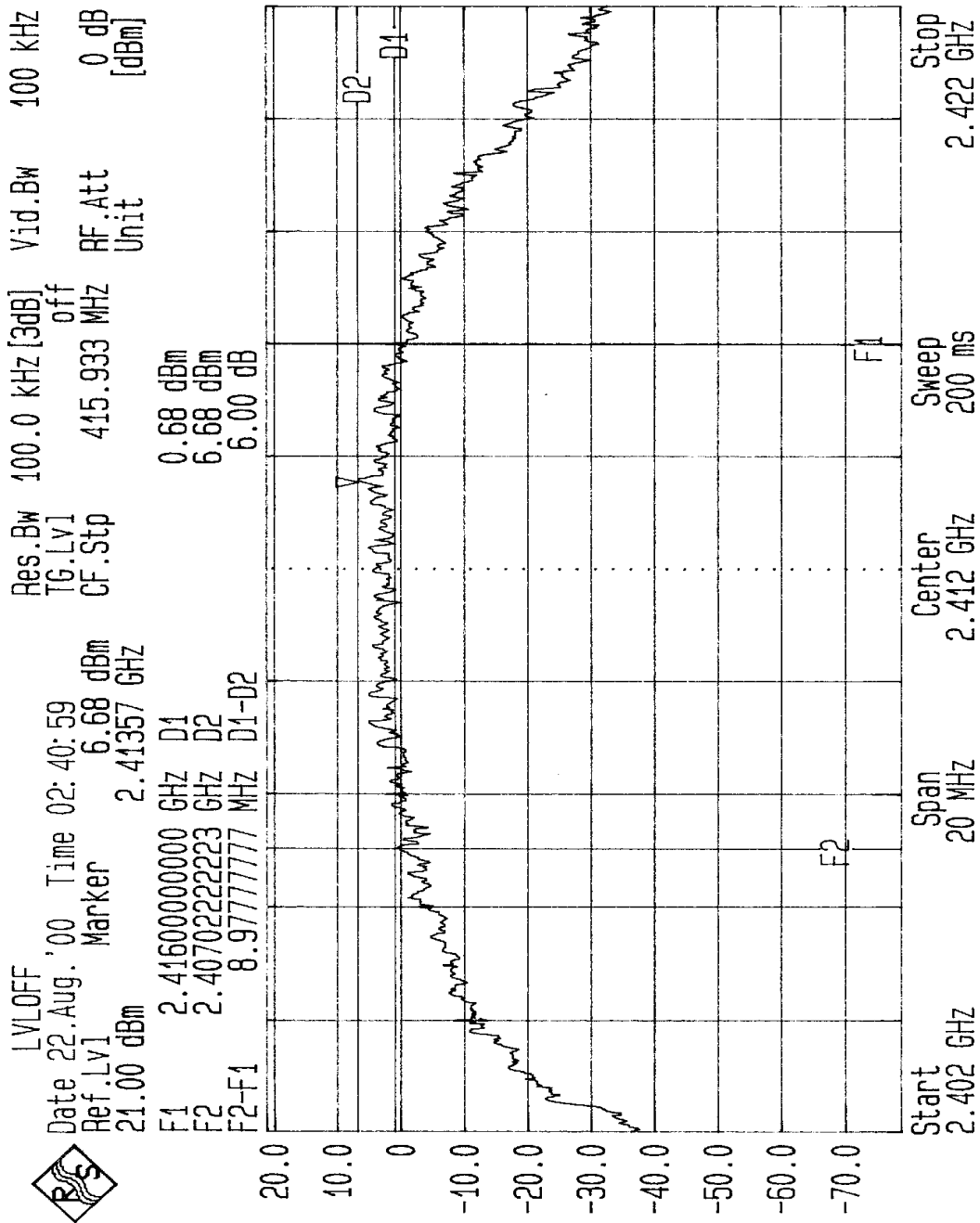
The temperature and related humidity is 28°C and 78% respectively.

7.1.5 Test Results

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	8.98	0.5	PASS
6	2437	8.87	0.5	PASS
11	2462	7.80	0.5	PASS

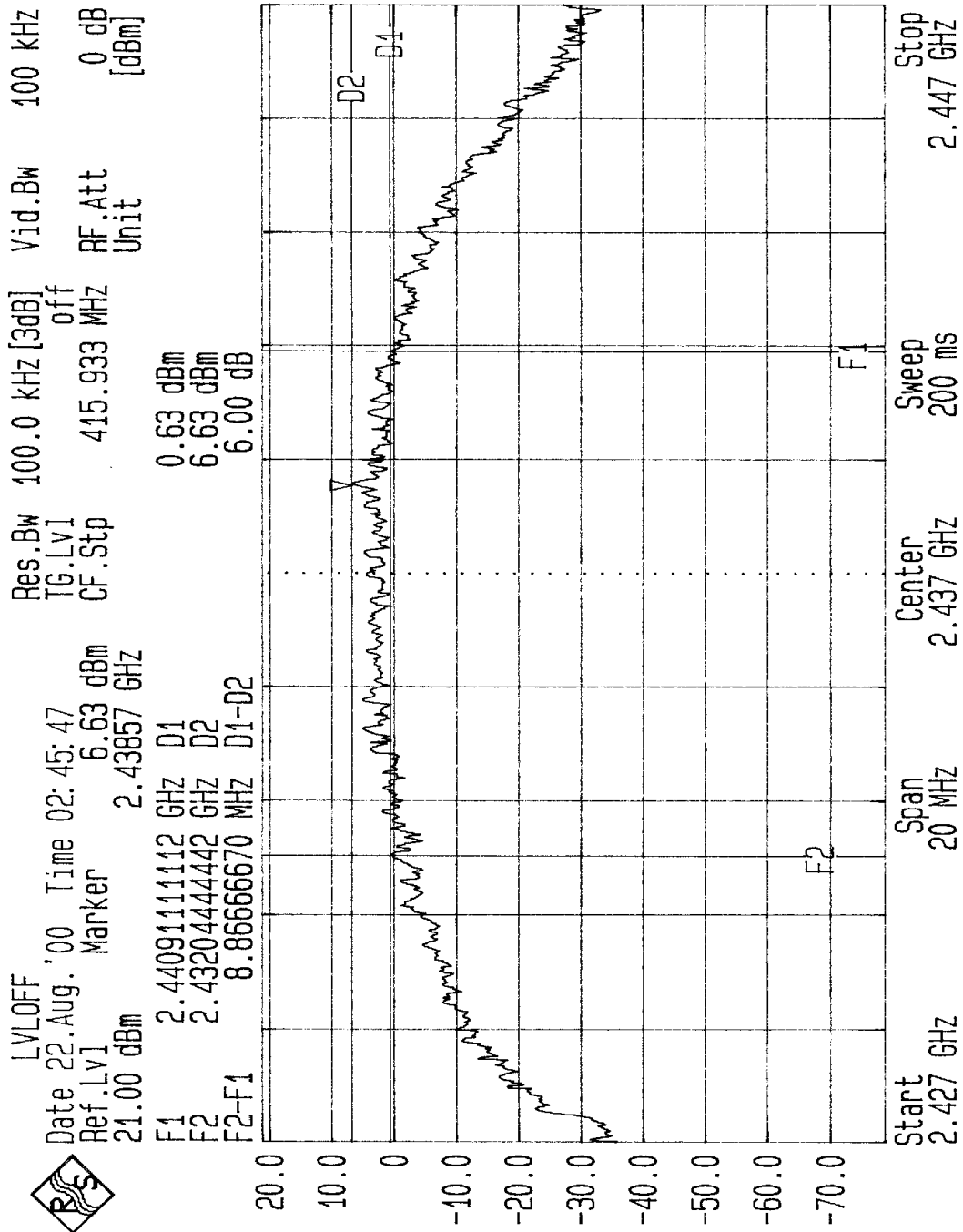


Channel 1

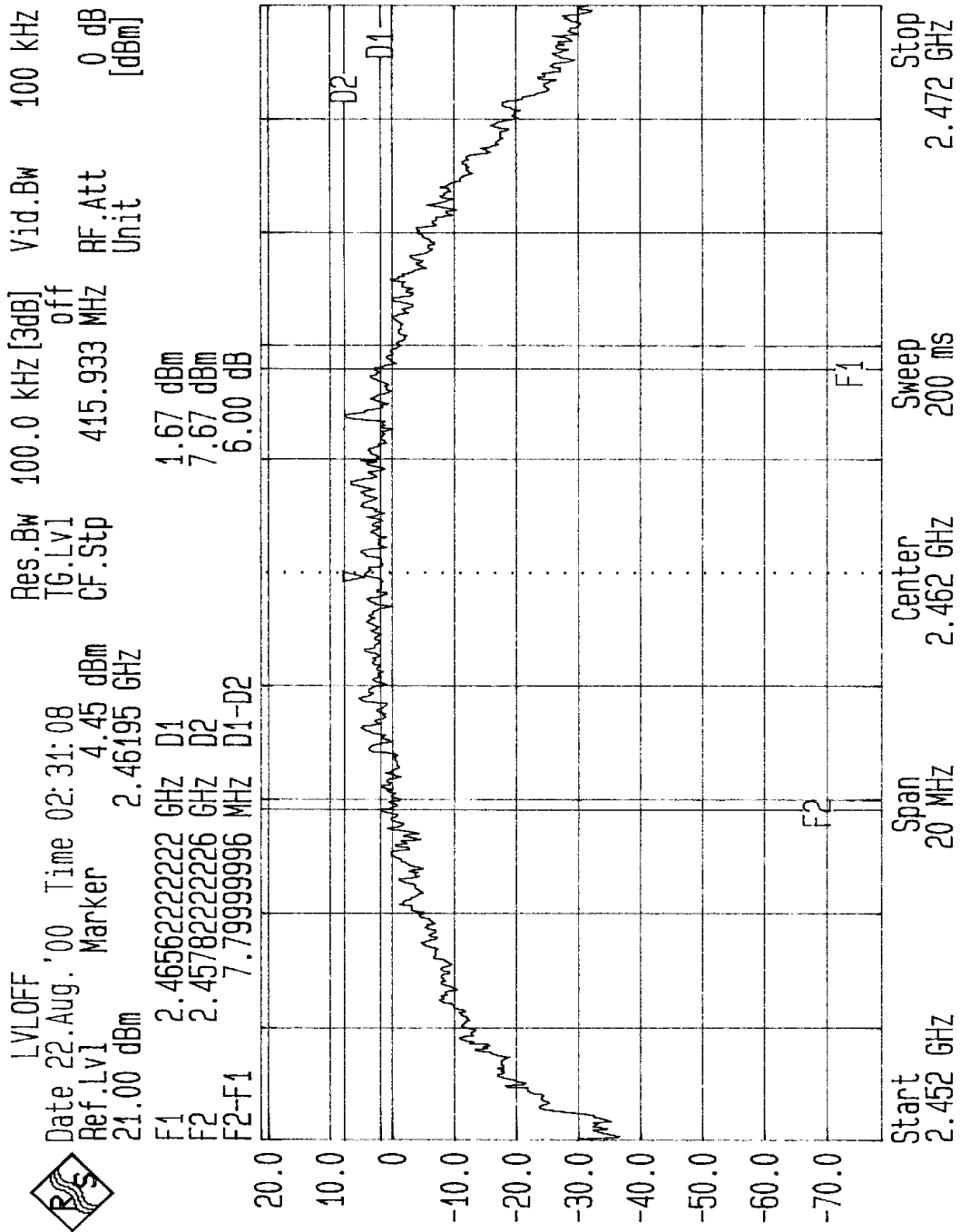




Channel 6



Channel 11



8 Maximum Peak Output Power and RF Exposure

Measurement

8.1 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP SPECTRUM ANALYZER	8593E	3926A04191	Mar. 03, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

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

8.1.1 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).

Alternatively, instead of spectrum analyzer, the power meter can be used in this measurement, but due to the average function, the measured result will be smaller than that from the above mentioned procedures.



8.1.2 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 limit of MPE is reached in a very short distance away from the antenna. Please see the calculation we followed to prove the limited harmfulness of the radiation in this product.

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

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

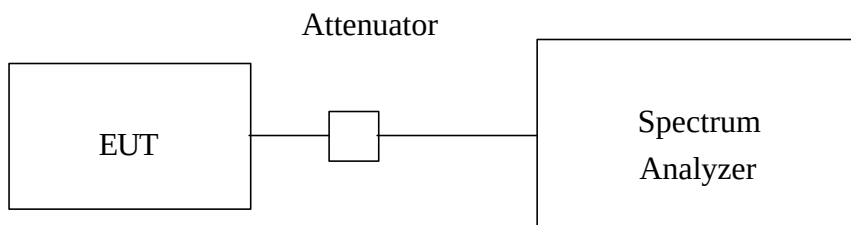
π = 3.1416

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

The limit of MPE here is 1.0 mW/cm² which makes $P_d=1.0$. If the Gain of the antenna and the total output power to the antenna, P_{out} , is known, then the Allowance Minimum Distance r can be calculated.

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

8.1.3 Test Setup



8.1.4 EUT Operating Condition

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

8.1.5 Climate Condition

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

8.1.6 Test Result

8.1.6.1 Output Power Into Antenna :

The maximum antenna Gain measured in Fully Anechoic Chamber is 2.3 dBi or 1.7 (numeric)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	16.10	30	PASS
6	2437	16.03	30	PASS
11	2462	16.21	30	PASS

**8.1.6.2 RF Exposure Distances :**

CHANNEL	CHANNEL FREQUENCY (MHz)	OUTPUT POWER TO ANTENNA (mW)	MINIMUM ALLOWABLE DISTANCE (r) FROM SKIN (Centi-Meter)
1	2412	40.74	2.35
6	2437	40.09	2.39
11	2462	41.78	2.38

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, the RF exposure warning or SAR measurement is not needed.



9 Radiated Emission Measurement

9.1 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. 09, 2000
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Aug. 27, 2000
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 25, 2000
CHASE BILOG Antenna	CBL6112A	2221	Aug. 04, 2001
SCHWARZBECK Horn Antenna	BBHA9120-D	D130	Jul. 09, 2001
SCHWARZBECK Horn Antenna	BBHA9170	123	Jan. 31, 2001
EMCO Turn Table	1060	1115	N/A
SHOSHIN Tower	AP-4701	A6Y005	N/A
Open Field Test Site	Site 5	ADT-R05	July 29, 2001

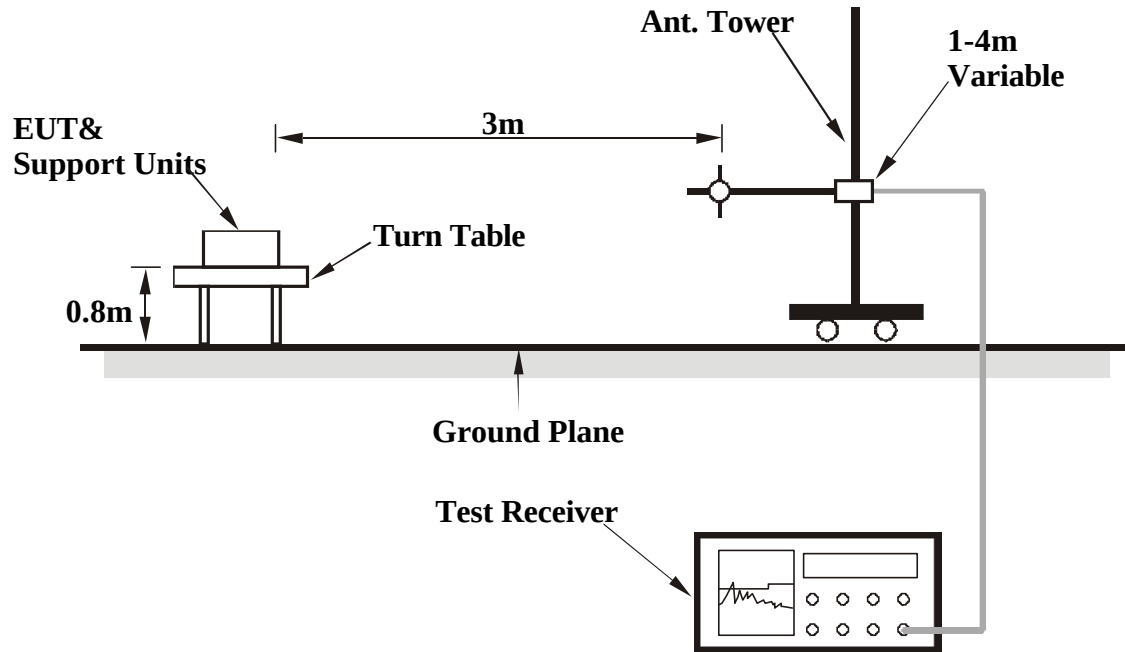
The measurement uncertainty is less than +/- 3dB, which is calculated as per NAMAS document NIS81.



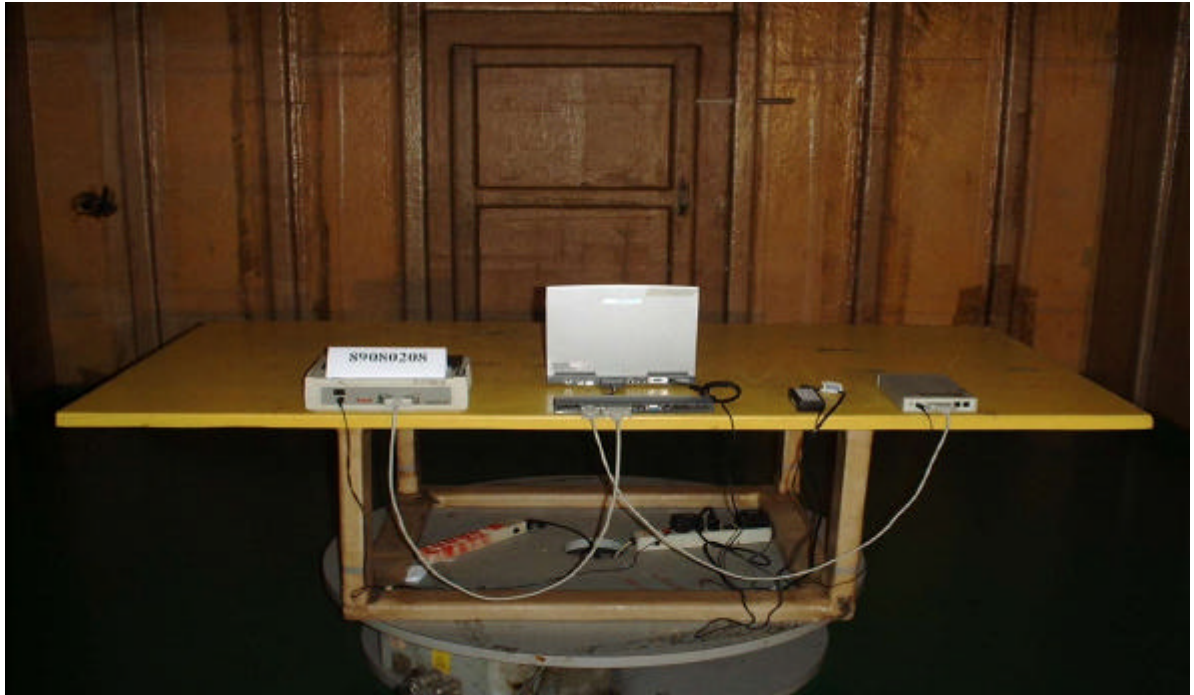
9.1.1 Test Procedure

- 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.

9.1.2 Test Setup



9.1.3 Photograph of Test Setup





9.1.4 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually. “H” patterns were sent to support units and displayed on the screen of Notebook PC to maintain operating condition.

9.1.5 Climate Condition

The temperature and related humidity is 25°C and 65%.

9.1.6 Test Results

ANTENNA POLARITY: Vertical Channel 1		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)
398.73	18.8	14.2	33.0	46.0	-13.0	128	-6
432.14	19.1	18.9	38.0	46.0	-8.0	138	356
458.19	19.5	9.5	29.0	46.0	-17.0	105	362
499.20	20.6	19.8	40.4	46.0	-5.6	100	166
528.08	20.7	16.1	36.8	46.0	-9.2	113	351
599.22	21.2	15.7	36.9	46.0	-9.1	100	26
695.75	22.4	16.8	39.2	46.0	-6.8	162	332
795.11	23.2	8.7	31.9	46.0	-14.1	165	9
898.85	24.4	9.7	34.1	46.0	-11.9	167	340
959.63	25.6	7.2	32.8	46.0	-13.2	112	352

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

ANTENNA POLARITY: Horizontal Channel 1		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)
397.60	18.7	16.8	35.5	46.0	-10.5	100	362
430.76	19.1	19.9	39.0	46.0	-7.0	100	-3
458.19	19.5	6.0	25.5	46.0	-20.5	100	70
496.98	20.6	20.1	40.7	46.0	-5.3	100	128
528.09	20.7	13.2	33.9	46.0	-12.1	100	240
595.94	21.2	3.8	25.0	46.0	-21.0	131	362
695.80	22.4	7.1	29.5	46.0	-16.5	129	61
795.21	23.2	7.8	31.0	46.0	-15.0	145	270
894.52	24.3	13.8	38.1	46.0	-7.9	129	252
959.85	25.6	7.3	32.9	46.0	-13.1	134	36

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



ANTENNA POLARITY: Vertical Channel 6		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)
398.78	18.8	22.6	41.4	46.0	-4.6	142	285
432.74	19.1	19.8	38.9	46.0	-7.1	155	363
499.34	20.6	18.2	38.8	46.0	-7.2	118	69
528.08	20.7	17.3	38.0	46.0	-8.0	111	191
565.89	20.9	15.2	36.1	46.0	-9.9	102	181
599.20	21.2	18.2	39.4	46.0	-6.6	129	182
795.12	23.2	10.8	34.0	46.0	-12.0	100	18
898.77	24.4	11.4	35.8	46.0	-10.2	102	313
959.84	25.6	12.1	37.7	46.0	-8.3	118	37

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

ANTENNA POLARITY: Horizontal Channel 6		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)
365.94	17.7	23.1	40.8	46.0	-5.2	104	179
399.56	18.8	21.2	40.0	46.0	-6.0	142	166
432.75	19.1	18.8	37.9	46.0	-8.1	105	42
499.36	20.6	18.7	39.3	46.0	-6.7	100	47
528.08	20.7	14.2	34.9	46.0	-11.1	116	303
599.22	21.2	8.1	29.3	46.0	-16.7	128	142
695.78	22.4	16.2	38.6	46.0	-7.4	132	54
765.63	23.1	8.8	31.9	46.0	-14.1	161	67
798.38	23.2	6.9	30.1	46.0	-15.9	110	262
832.26	23.6	10.2	33.8	46.0	-12.2	121	320

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



ANTENNA POLARITY: Vertical Channel 11		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)
432.76	19.1	13.2	32.3	46.0	-13.7	150	92
499.27	20.6	17.2	37.8	46.0	-8.2	140	296
528.08	20.7	17.5	38.2	46.0	-7.8	109	189
565.88	20.9	14.3	35.2	46.0	-10.6	112	27
599.26	21.2	17.6	38.8	46.0	-7.2	140	179
624.11	21.3	7.7	29.0	46.0	-17.0	105	314
695.86	22.4	14.8	37.2	46.0	-8.8	106	111
798.87	23.2	10.2	33.4	46.0	-12.6	108	188
832.31	23.6	8.8	32.4	46.0	-13.6	126	64
898.94	24.4	10.9	35.3	46.0	-10.7	140	355

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

ANTENNA POLARITY: Horizontal Channel 11		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)
366.19	17.7	21.0	38.7	46.0	-7.3	101	347
399.50	18.8	20.6	39.4	46.0	-6.6	103	250
432.69	19.1	20.3	39.4	46.0	-6.6	108	40
499.32	20.6	19.8	40.4	46.0	-5.6	102	45
528.09	20.7	13.6	34.3	46.0	-11.7	107	295
599.17	21.2	13.1	34.3	46.0	-11.7	194	63
695.85	22.4	13.7	36.1	46.0	-9.9	182	225
795.15	23.2	6.9	30.1	46.0	-15.9	147	232
832.24	23.6	10.0	33.6	46.0	-12.4	103	314
898.96	24.4	10.7	35.1	46.0	-10.9	114	169

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: 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.		
1296.41	30.7	19.0	-	49.7	-	74.0	54.0	-24.3	-	102	31
*2413.37	36.1	69.0	62.0	105.1	98.1	-	-	-	-	136	193
2059.77	34.8	16.7	-	51.5	-	74.0	54.0	-22.5	-	130	220
4824.00	8.1	43.8	-	51.9	-	74.0	54.0	-22.1	-	133	259
7236.00	39.7	21.0	7.8	60.7	47.5	74.0	54.0	-13.3	-6.5	102	162

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.		
1295.40	30.7	19.1	-	49.8	-	74.0	54.0	-24.2	-	153	44
2060.00	34.8	13.8	-	48.6	-	74.0	54.0	-25.4	-	120	180
*2412.93	36.1	65.7	58.2	101.8	94.3				-	119	158
4823.83	43.8	12.1	1.0	55.9	44.8	74.0	54.0	-18.1	-9.2	105	284
7236.00	39.7	17.9	4.8	57.6	44.5	74.0	54.0	-16.4	-9.5	144	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
 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.		
1296.47	30.7	18.1	-	48.8	-	74.0	54.0	-25.2	-	116	30
2085.14	35.0	16.3	-	51.3	-	74.0	54.0	-22.7	-	100	261
*2438.36	36.4	69.6	62.5	106.0	98.9	-	-	-	-	111	161
4875.45	43.6	5.8	-	49.4	-	74.0	54.0	-24.6	-	133	165
7311.00	39.7	24.4	10.8	64.1	50.5	74.0	54.0	-9.9	-3.5	169	185

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.		
1296.47	30.7	17.6	-	48.3	-	74.0	54.0	-25.7	-	130	362
2085.08	35.0	14.2	-	49.2	-	74.0	54.0	-24.8	-	119	54
*2437.00	36.3	66.4	58.5	102.7	94.8	-	-	-	-	154	125
4876.56	43.5	15.8	2.1	59.3	45.6	74.0	54.0	-14.7	-8.4	155	223
7311.00	39.7	20.4	7.4	60.1	47.1	74.0	54.0	-13.9	-6.9	144	203

- 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.		
1296.11	30.7	19.5	-	50.2	-	74.0	54.0	23.8	-	100	27
2110.11	35.2	15.6	-	50.8	-	74.0	54.0	-23.2	-	101	257
*2462.00	36.4	70.9	63.7	107.3	100.1	-	-	-	-	101	167
4924.00	43.4	8.1	-	51.5	-	74.0	54.0	-22.5	-	101	-2
7386.00	39.7	19.1	10.1	58.8	49.8	74.0	54.0	-15.2	-4.2	169	181

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.		
1296.12	30.7	20.2	-	50.9	-	74.0	54.0	-23.1	-	153	42
2110.17	35.2	13.1	-	48.3	-	74.0	54.0	-25.7	-	169	144
*2463.36	36.4	67.4	60.0	103.8	96.4	-	-	-	-	153	64
4924.00	43.4	8.0	-	51.4	-	74.0	54.0	-22.6	-	168	306
7386.00	39.7	16.7	4.6	56.4	44.3	74.0	54.0	-17.6	-9.7	143	208

- 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

10 Power Spectral Density Measurement

10.1 Test Instruments

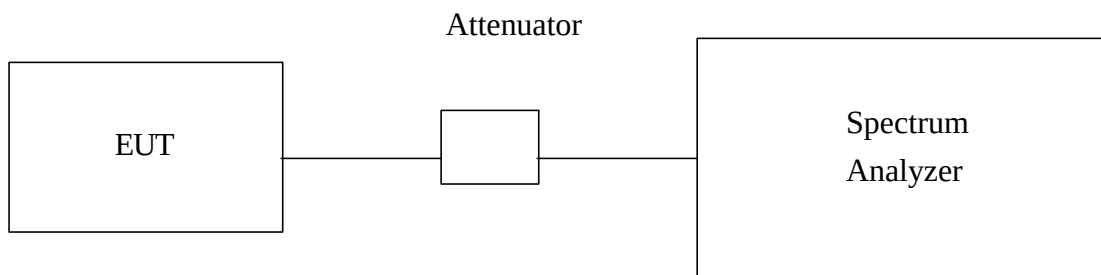
Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP SPECTRUM ANALYZER	8593E	3926A04191	Mar. 03, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

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

10.1.1 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 longer sweep time is allowed for the detection of the maximum radiation through each 3KHz filter.

10.1.2 Test Setup



10.1.3 EUT Operating Condition

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

**10.1.4 Climate Condition**

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

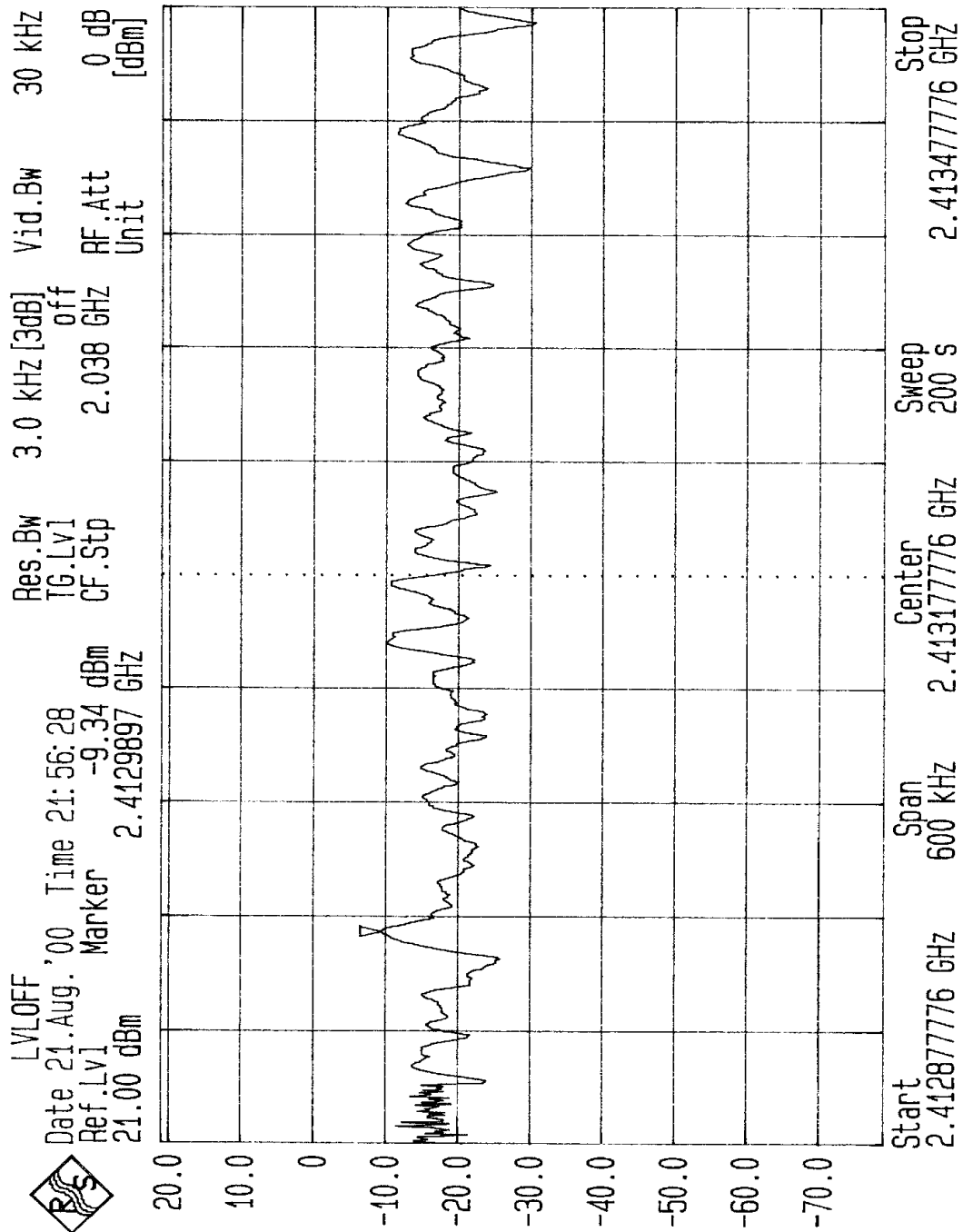
10.1.5 Test Result

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 KHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-9.34	8	PASS
6	2437	-9.87	8	PASS
11	2462	-9.06	8	PASS

The spectrum plots of test result are attached as below.

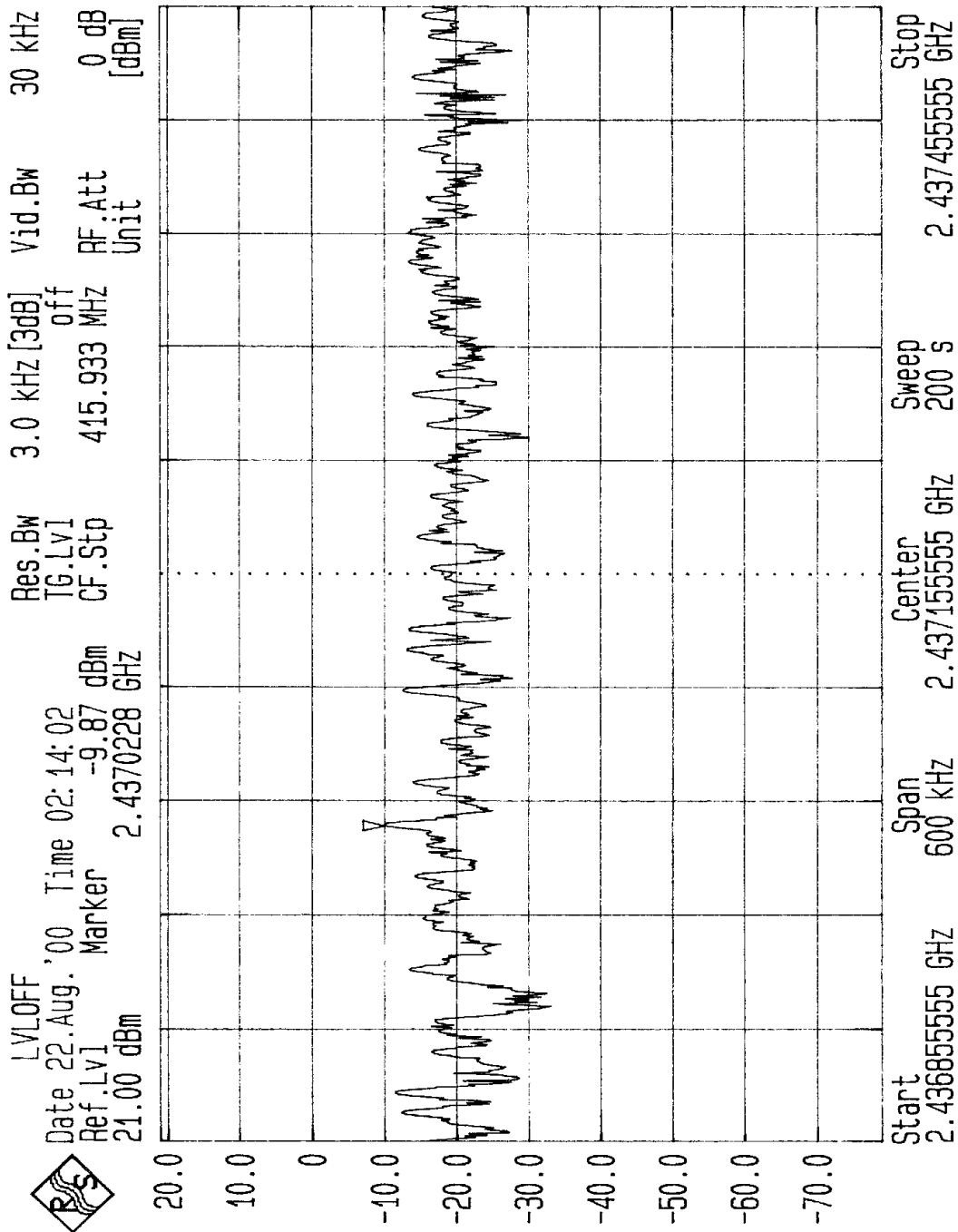


Channel 1



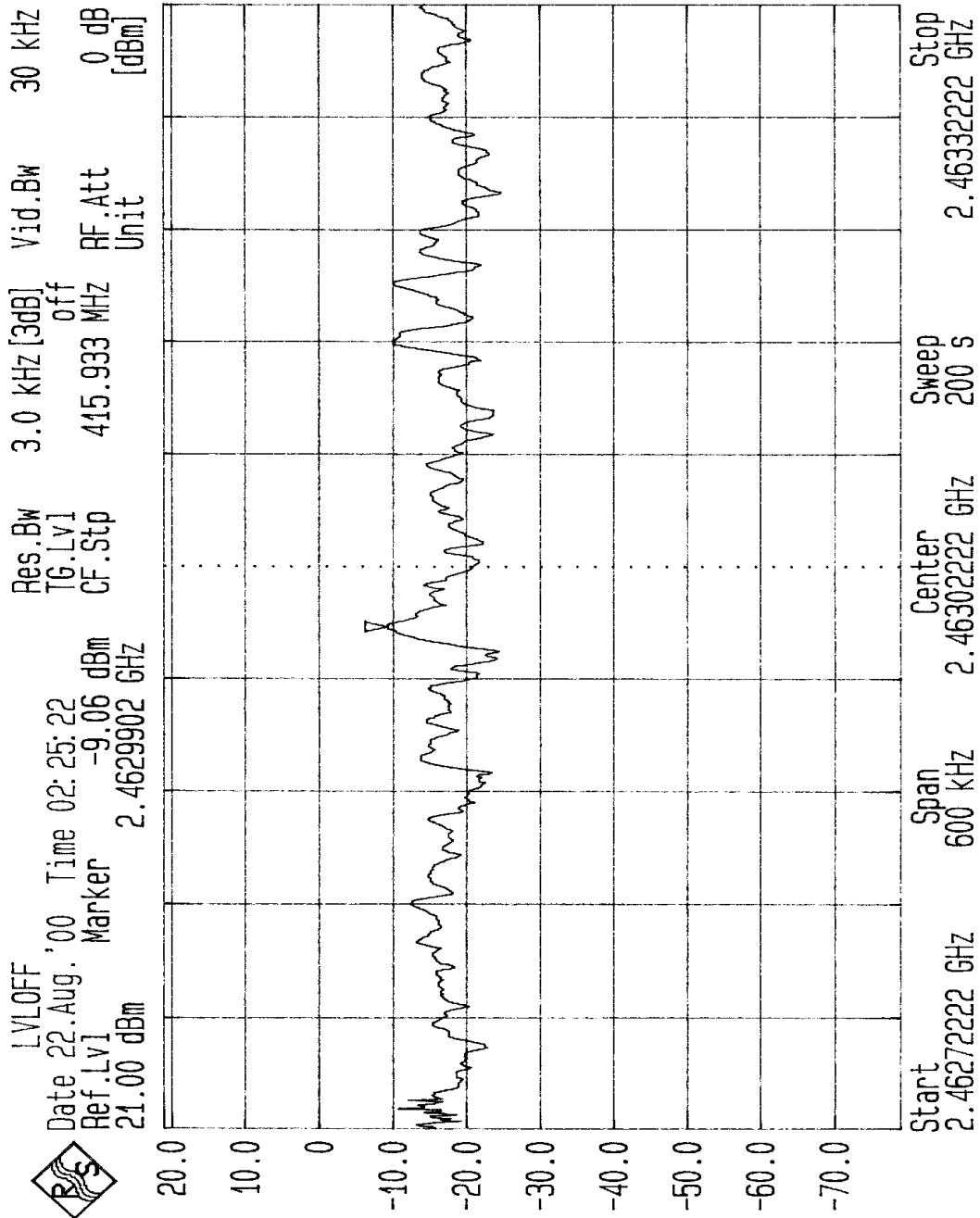


Channel 6





Channel 11





11 ANTENNA REQUIREMENT

11.1 Standard Applicable

For intentional device, according to § 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 § 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

11.2 Antenna Connected Construction

The antenna connector used here in this product is OSMT, and the antenna is used to connected with the PCB inside the product. The user is not possible to change the antenna unless the product is destroyed.

12 Processing Gain of a Direct Sequence Spread Spectrum

12.1 Test Instruments and Support Units

Description & Manufacturer	Model No.	Serial No.
Portable PC (Zenith)	Z-lite	3GSAZW000061
Portable PC (NCR)	3150	17-26106224
PC + IEEE interface card (NCR)	PC6	17-17039925
Power supply (HP)	HP9592B	SN 3009U00102
Power Meter (R&S)	URV5	893430/070
Power Sensor (R&S)	NRV-Z2 828218.02	860925/005
CW Generator (Gigatronics)	7200	746604
Variable Attenuator (Midwest)	1044	NA
Fixed Attenuator (Inmet)	18AH-10	NA
RF Power Splitter (ARRA)	3-9200-2	2001

12.1.1 Method of Measurement

The processing gain may be measured using the CW jamming margin method. Figure 1 shows the test configuration.

The test takes place at the product Functional Specification (Ref.[2], Ref.[5]) specified conditions for BER rate measurements, specifying a BER equal or better than 10^{-8} at a receiver input level of -55 dBm. For practical reasons these test are performed at -55 dBm or -53 dBm. This small deviation from the Functional Specification should not cause any deviation from the specified Bit Error Rate, since the received levels are well above the thermal noise.

The test criteria for meeting the minimal processing gain is such that it takes the theoretical calculated SNR for the applied modulation technique and specified BER as a reference. From this given SNR the processing gain is subtracted, yielding the CW Jammer to Signal ratio J/S. From Ref. [4], likewise as Ref.[3] consulted in Ref. [1], it is determined that for a BER of 10^{-8} the SNR (S/N) equals:



13 dB @ 1 Mbit/s,
15 dB @ 2 Mbit/s,
15 dB @ 5.5 Mbit/s,
18 dB @ 11 Mbit/s.

Thus the J/S ratio for a processing gain of 10 dB that must be met is calculated as:

-13 + 10 = -3 dB @ 1 Mbit/s (DBPSK),
-15 + 10 = -5 dB @ 2 Mbit/s (DQPSK),
-15 + 10 = -5 dB @ 5.5 Mbit/s (CCK),
-18 + 10 = -8 dB @ 11 Mbit/s (CCK).

Two types of measurement corrections are allowed for as described in Ref.[1]. The first, taking into account 2 dB implementation losses, thus increasing the absolute J/S ratio by 2 dB. The second correction allows for deleting the 20% worst-case frequencies in the processing gain test that causes the test at that CW interference to fail. This implies that for the considered 14 MHz wide measurement interval, the worst case 57 CW jammer frequencies can be ignored, being those that result in received data errors/missing frames (20% of 14 MHz *(1 MHz/50 KHz) + 1 = (20% * 281) + 1 = 57).

The measurements are performed at a 50 KHz CW jammer raster. For each CW jammer frequency 10^8 bits are transmitted by the reference transmitter, and received by the product under test. For practical reasons 50.000 messages are transmitted. After blanking out frame overhead 1927 bits per frame are monitored. This results in $50.000 * 1927 = 9650000$ transmitted bits for a BER test, which is a mere 1.4% less than the targeted 10^8 bits. Though it would be more elegant to show BER compliance for at least say ten times 10^8 transmitted/received bits, the time involved with this grows significantly. Since the CW interferer is stepped in a 50 KHz raster, covering the receiver bandwidth of 14 MHz, it is considered that the BER requirement is sufficiently met since such a multitude of measurements are taken.

Consider the implementation losses, we have the following J/S:

-3 - 2 = -5 dB @ 1 Mbit/s (DBPSK),
-5 - 0 = -5 dB @ 2 Mbit/s (DQPSK),
-5 - 1 = -6 dB @ 5.5 Mbit/s (CCK),



-8 - 1 = -9 dB @ 11 Mbit/s (CCK).

In this test report, we are going to prove that the percentage of worst case is smaller than 20%. Only channel 2, the worst case, is shown here in this test report.

12.1.2 Applicable Reference Documents:

1. Document FCC 97-114, Appendix C, Guidance on Measurements for Direct Sequence Spread Spectrum Systems.
2. Hardware Functional Specification for WaveLAN-II Embedded, High Speed, Doc. No. 011735, Rev. A, Source Organization Lucent Technologies WCND Utrecht.
3. Viterbi, A. J., Principles of Coherent Communications, New York, McGraw-Hill 1966.
4. Proakis, J.G., Digital Communications, New York, McGraw-Hill 1989, page 270.
5. Hardware Functional Specification for the Lucent Technologies ORiNOCO Mini PCI, Doc. No. 015143, Source Organization Lucent Technologies WCND Utrecht.

12.2 Test Setup

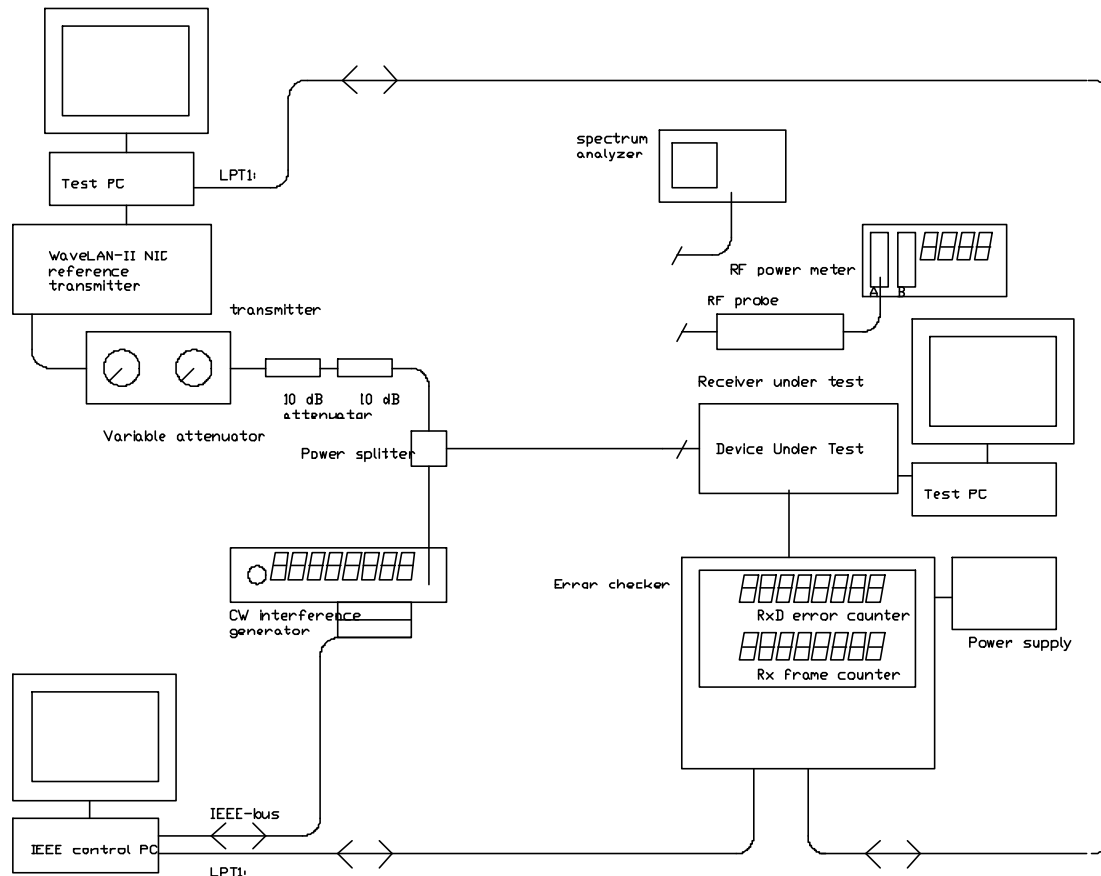


Fig. 1 Test Setup

12.2.1 Test Procedures

Obtain the simplex link shown in Fig. 1. Perform all independent instrumentation calibrations prior to this procedure.

1. Issue a request to the transmitter for 1000 frames to be transmitted by computer.
2. The computer reads the number of received frames and number of erroneous received frames.
3. If no missing frames or received data errors detected, ask the computer to increase the CW jamming level by 1 dB, and repeat (1) and (2).



4. Repeat this sequence until error data or missing frames are detected, or required J/S is reached.
5. If the J/S is smaller than required one, then this frequency point fail the test. Denote "1" on the record.
6. Issue a request to the transmitter for 50,000 frames to be transmitted by the computer.
7. If error data is detected, then the limit of BER is not met, denote "1" on the record.
8. Raise the CW jamming frequency by 50KHz, and repeat (1) ~ (7)

12.2.2 Climate Condition

The temperature and related humidity: 25° C and 50%



12.3 Test Results

Channel	Bit Rate	Error Percentage	Limit	Result
2	11 Mbps	52/280 = 18.57%	20%	Pass

S/N (dB)	J/S (dB)	Lsys (dB)	Jammer (dBm)
18	-9	1	-62

Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error
2.41000	0	2.41150	0	2.41295	0	2.41440	1
2.41005	0	2.41155	0	2.41300	0	2.41445	1
2.41010	0	2.41160	0	2.41305	0	2.41450	0
2.41015	1	2.41165	0	2.41310	0	2.41455	0
2.41020	0	2.41170	0	2.41315	0	2.41460	0
2.41025	0	2.41175	0	2.41320	0	2.41465	1
2.41030	0	2.41180	0	2.41325	0	2.41470	0
2.41035	0	2.41185	0	2.41330	0	2.41475	0
2.41040	0	2.41190	0	2.41335	0	2.41480	1
2.41045	0	2.41195	0	2.41340	0	2.41485	1
2.41050	0	2.41200	0	2.41345	0	2.41490	1
2.41055	0	2.41205	0	2.41350	0	2.41495	0
2.41060	0	2.41210	0	2.41355	0	2.41500	0
2.41065	0	2.41215	1	2.41360	0	2.41505	0
2.41070	0	2.41220	1	2.41365	0	2.41510	0
2.41075	0	2.41225	0	2.41370	0	2.41515	0
2.41080	0	2.41230	0	2.41375	0	2.41520	0
2.41085	0	2.41235	0	2.41380	0	2.41525	0
2.41090	0	2.41240	0	2.41385	0	2.41530	0
2.41095	0	2.41245	0	2.41390	0	2.41535	0
2.41100	0	2.41250	0	2.41395	0	2.41540	0
2.41105	1	2.41255	0	2.41400	0	2.41545	0
2.41115	1	2.41260	0	2.41405	0	2.41550	0
2.41120	1	2.41265	0	2.41410	0	2.41555	0
2.41125	1	2.41270	0	2.41415	0	2.41560	0
2.41130	1	2.41275	0	2.41420	0	2.41565	0
2.41135	0	2.41280	0	2.41425	0	2.41570	0
2.41140	0	2.41285	0	2.41430	0	2.41575	1
2.41145	0	2.41290	0	2.41435	1	2.41580	1



Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error
2.41585	0	2.41790	1	2.41995	0	2.42205	0
2.41590	0	2.41795	0	2.42000	0	2.42210	1
2.41595	1	2.41800	0	2.42005	0	2.42215	1
2.41600	0	2.41805	0	2.42010	0	2.42220	1
2.41605	1	2.41810	1	2.42015	1	2.42225	0
2.41610	0	2.41815	0	2.42020	0	2.42230	0
2.41615	0	2.41820	1	2.42025	0	2.42235	0
2.41620	0	2.41825	0	2.42030	0	2.42240	0
2.41625	0	2.41830	0	2.42035	1	2.42245	0
2.41630	0	2.41835	0	2.42040	1	2.42250	0
2.41635	0	2.41840	0	2.42045	0	2.42255	0
2.41640	0	2.41845	0	2.42050	0	2.42260	0
2.41645	0	2.41850	0	2.42055	0	2.42265	1
2.41650	1	2.41855	1	2.42060	0	2.42270	1
2.41655	0	2.41860	0	2.42065	0	2.42275	0
2.41660	0	2.41865	0	2.42070	0	2.42280	0
2.41665	0	2.41870	0	2.42075	0	2.42290	0
2.41670	0	2.41875	0	2.42080	0	2.42295	0
2.41675	0	2.41880	0	2.42085	0	2.42300	0
2.41680	1	2.41885	0	2.42090	0	2.42305	0
2.41685	0	2.41890	0	2.42100	0	2.42310	0
2.41690	1	2.41895	1	2.42105	0	2.42315	0
2.41695	0	2.41900	1	2.42110	0	2.42320	0
2.41700	0	2.41905	1	2.42115	0	2.42325	1
2.41705	0	2.41910	0	2.42120	0	2.42330	0
2.41710	1	2.41915	0	2.42125	0	2.42335	0
2.41715	0	2.41920	1	2.42130	0	2.42340	0
2.41720	0	2.41925	0	2.42135	0	2.42345	1
2.41725	0	2.41930	0	2.42140	0	2.42350	0
2.41730	1	2.41935	1	2.42145	0	2.42355	0
2.41735	1	2.41940	0	2.42150	0	2.42360	0
2.41740	0	2.41945	1	2.42155	0	2.42365	1
2.41745	1	2.41950	0	2.42160	0	2.42370	0
2.41750	1	2.41955	0	2.42165	0	2.42375	0
2.41755	0	2.41960	0	2.42170	0	2.42380	0
2.41760	0	2.41965	0	2.42175	0	2.42385	1
2.41765	1	2.41970	0	2.42180	0	2.42390	0
2.41770	0	2.41975	0	2.42185	0	2.42395	0
2.41775	0	2.41980	0	2.42190	0	2.42390	0
2.41780	0	2.41985	0	2.42195	1	2.42395	0
2.41785	0	2.41990	0	2.42200	0	2.42400	1



Channel	Bit Rate	Error Percentage	Limit	Result
2	5.5 Mbps	45/280 = 16.07%	20%	Pass

S/N (dB)	J/S (dB)	Lsys (dB)	Jammer (dBm)
15	-6	1	-59

Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error
2.41000	0	2.41150	0	2.41295	0	2.41440	0
2.41005	0	2.41155	0	2.41300	0	2.41445	0
2.41010	0	2.41160	0	2.41305	0	2.41450	0
2.41015	0	2.41165	0	2.41310	0	2.41455	0
2.41020	0	2.41170	0	2.41315	0	2.41460	0
2.41025	0	2.41175	0	2.41320	0	2.41465	1
2.41030	0	2.41180	0	2.41325	0	2.41470	0
2.41035	0	2.41185	0	2.41330	0	2.41475	0
2.41040	0	2.41190	0	2.41335	0	2.41480	0
2.41045	0	2.41195	0	2.41340	0	2.41485	0
2.41050	0	2.41200	0	2.41345	0	2.41490	0
2.41055	0	2.41205	0	2.41350	0	2.41495	0
2.41060	0	2.41210	0	2.41355	0	2.41500	0
2.41065	0	2.41215	0	2.41360	0	2.41505	0
2.41070	0	2.41220	0	2.41365	0	2.41510	0
2.41075	0	2.41225	0	2.41370	0	2.41515	0
2.41080	0	2.41230	0	2.41375	0	2.41520	0
2.41085	0	2.41235	0	2.41380	0	2.41525	1
2.41090	0	2.41240	0	2.41385	0	2.41530	0
2.41095	0	2.41245	0	2.41390	0	2.41535	0
2.41100	0	2.41250	0	2.41395	0	2.41540	1
2.41105	0	2.41255	0	2.41400	1	2.41545	0
2.41115	0	2.41260	0	2.41405	0	2.41550	0
2.41120	0	2.41265	0	2.41410	1	2.41555	0
2.41125	0	2.41270	0	2.41415	1	2.41560	0
2.41130	0	2.41275	0	2.41420	1	2.41565	0
2.41135	0	2.41280	0	2.41425	0	2.41570	0
2.41140	0	2.41285	0	2.41430	0	2.41575	0
2.41145	0	2.41290	0	2.41435	1	2.41580	0



Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error
2.41585	0	2.41790	1	2.41995	0	2.42205	0
2.41590	0	2.41795	0	2.42000	0	2.42210	0
2.41595	0	2.41800	0	2.42005	0	2.42215	0
2.41600	0	2.41805	0	2.42010	0	2.42220	0
2.41605	0	2.41810	0	2.42015	0	2.42225	0
2.41610	1	2.41815	0	2.42020	0	2.42230	0
2.41615	1	2.41820	0	2.42025	0	2.42235	0
2.41620	1	2.41825	0	2.42030	0	2.42240	0
2.41625	1	2.41830	0	2.42035	0	2.42245	0
2.41630	1	2.41835	1	2.42040	0	2.42250	0
2.41635	1	2.41840	0	2.42045	0	2.42255	0
2.41640	1	2.41845	1	2.42050	0	2.42260	0
2.41645	1	2.41850	0	2.42055	0	2.42265	0
2.41650	1	2.41855	0	2.42060	0	2.42270	0
2.41655	1	2.41860	1	2.42065	0	2.42275	0
2.41660	1	2.41865	0	2.42070	0	2.42280	0
2.41665	1	2.41870	0	2.42075	0	2.42290	0
2.41670	1	2.41875	0	2.42080	0	2.42295	0
2.41675	1	2.41880	0	2.42085	0	2.42300	0
2.41680	0	2.41885	0	2.42090	0	2.42305	0
2.41685	0	2.41890	0	2.42100	0	2.42310	0
2.41690	0	2.41895	0	2.42105	0	2.42315	0
2.41695	0	2.41900	0	2.42110	0	2.42320	0
2.41700	0	2.41905	0	2.42115	1	2.42325	0
2.41705	0	2.41910	0	2.42120	0	2.42330	0
2.41710	0	2.41915	0	2.42125	0	2.42335	0
2.41715	0	2.41920	0	2.42130	0	2.42340	0
2.41720	1	2.41925	0	2.42135	0	2.42345	0
2.41725	1	2.41930	0	2.42140	0	2.42350	0
2.41730	1	2.41935	0	2.42145	0	2.42355	0
2.41735	1	2.41940	0	2.42150	0	2.42360	0
2.41740	1	2.41945	0	2.42155	0	2.42365	0
2.41745	1	2.41950	0	2.42160	0	2.42370	0
2.41750	1	2.41955	1	2.42165	0	2.42375	0
2.41755	1	2.41960	0	2.42170	0	2.42380	0
2.41760	1	2.41965	1	2.42175	0	2.42385	0
2.41765	1	2.41970	1	2.42180	0	2.42390	0
2.41770	1	2.41975	0	2.42185	0	2.42395	0
2.41775	1	2.41980	0	2.42190	0	2.42390	0
2.41780	1	2.41985	0	2.42195	0	2.42395	0
2.41785	1	2.41990	0	2.42200	0	2.42400	0



Channel	Bit Rate	Error Percentage	Limit	Result
2	2 Mbps	52/280 = 18.57%	20%	Pass

S/N (dB)	J/S (dB)	Lsys (dB)	Jammer (dBm)
15	-5	0	-60

Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error
2.41000	0	2.41150	0	2.41295	0	2.41440	0
2.41005	0	2.41155	0	2.41300	0	2.41445	0
2.41010	0	2.41160	0	2.41305	0	2.41450	0
2.41015	0	2.41165	0	2.41310	0	2.41455	0
2.41020	0	2.41170	0	2.41315	0	2.41460	0
2.41025	0	2.41175	0	2.41320	0	2.41465	0
2.41030	0	2.41180	0	2.41325	0	2.41470	0
2.41035	0	2.41185	0	2.41330	0	2.41475	0
2.41040	0	2.41190	0	2.41335	0	2.41480	0
2.41045	0	2.41195	0	2.41340	0	2.41485	0
2.41050	0	2.41200	0	2.41345	0	2.41490	0
2.41055	0	2.41205	0	2.41350	0	2.41495	0
2.41060	0	2.41210	0	2.41355	0	2.41500	0
2.41065	0	2.41215	0	2.41360	0	2.41505	0
2.41070	0	2.41220	0	2.41365	0	2.41510	0
2.41075	0	2.41225	0	2.41370	0	2.41515	0
2.41080	0	2.41230	0	2.41375	0	2.41520	0
2.41085	0	2.41235	0	2.41380	0	2.41525	0
2.41090	0	2.41240	0	2.41385	0	2.41530	0
2.41095	0	2.41245	0	2.41390	0	2.41535	0
2.41100	0	2.41250	0	2.41395	0	2.41540	0
2.41105	0	2.41255	0	2.41400	0	2.41545	0
2.41115	0	2.41260	0	2.41405	0	2.41550	0
2.41120	0	2.41265	0	2.41410	0	2.41555	0
2.41125	0	2.41270	0	2.41415	0	2.41560	0
2.41130	0	2.41275	0	2.41420	0	2.41565	0
2.41135	0	2.41280	0	2.41425	0	2.41570	0
2.41140	0	2.41285	0	2.41430	0	2.41575	0
2.41145	0	2.41290	0	2.41435	0	2.41580	0



Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error
2.41585	0	2.41790	0	2.41995	0	2.42205	0
2.41590	0	2.41795	0	2.42000	0	2.42210	0
2.41595	0	2.41800	1	2.42005	0	2.42215	0
2.41600	1	2.41805	0	2.42010	0	2.42220	0
2.41605	0	2.41810	0	2.42015	0	2.42225	0
2.41610	0	2.41815	0	2.42020	0	2.42230	0
2.41615	0	2.41820	0	2.42025	0	2.42235	0
2.41620	0	2.41825	0	2.42030	0	2.42240	0
2.41625	1	2.41830	0	2.42035	0	2.42245	0
2.41630	0	2.41835	0	2.42040	0	2.42250	0
2.41635	0	2.41840	0	2.42045	0	2.42255	0
2.41640	0	2.41845	0	2.42050	0	2.42260	0
2.41645	0	2.41850	0	2.42055	0	2.42265	0
2.41650	1	2.41855	0	2.42060	0	2.42270	0
2.41655	0	2.41860	0	2.42065	0	2.42275	0
2.41660	0	2.41865	0	2.42070	0	2.42280	0
2.41665	0	2.41870	0	2.42075	0	2.42290	0
2.41670	0	2.41875	0	2.42080	0	2.42295	0
2.41675	0	2.41880	0	2.42085	0	2.42300	0
2.41680	0	2.41885	0	2.42090	0	2.42305	0
2.41685	0	2.41890	0	2.42100	0	2.42310	0
2.41690	0	2.41895	0	2.42105	0	2.42315	0
2.41695	1	2.41900	0	2.42110	0	2.42320	0
2.41700	1	2.41905	0	2.42115	0	2.42325	0
2.41705	1	2.41910	0	2.42120	0	2.42330	0
2.41710	0	2.41915	0	2.42125	0	2.42335	0
2.41715	0	2.41920	0	2.42130	0	2.42340	0
2.41720	0	2.41925	0	2.42135	0	2.42345	0
2.41725	0	2.41930	0	2.42140	0	2.42350	0
2.41730	0	2.41935	0	2.42145	0	2.42355	0
2.41735	0	2.41940	0	2.42150	0	2.42360	0
2.41740	0	2.41945	0	2.42155	0	2.42365	0
2.41745	0	2.41950	0	2.42160	0	2.42370	0
2.41750	1	2.41955	0	2.42165	0	2.42375	0
2.41755	0	2.41960	0	2.42170	0	2.42380	0
2.41760	0	2.41965	0	2.42175	0	2.42385	0
2.41765	0	2.41970	0	2.42180	0	2.42390	0
2.41770	0	2.41975	0	2.42185	0	2.42395	0
2.41775	1	2.41980	0	2.42190	0	2.42390	0
2.41780	0	2.41985	0	2.42195	0	2.42395	0
2.41785	0	2.41990	0	2.42200	0	2.42400	0



Channel	Bit Rate	Error Percentage	Limit	Result
2	1 Mbps	52/280 = 18.57%	20%	Pass

S/N (dB)	J/S (dB)	Lsys (dB)	Jammer (dBm)
13	-5	2	-60

Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error
2.41000	0	2.41150	0	2.41295	0	2.41440	0
2.41005	0	2.41155	0	2.41300	0	2.41445	0
2.41010	0	2.41160	0	2.41305	0	2.41450	0
2.41015	0	2.41165	0	2.41310	0	2.41455	0
2.41020	1	2.41170	0	2.41315	0	2.41460	0
2.41025	0	2.41175	0	2.41320	0	2.41465	0
2.41030	0	2.41180	0	2.41325	0	2.41470	0
2.41035	1	2.41185	0	2.41330	0	2.41475	0
2.41040	0	2.41190	0	2.41335	0	2.41480	0
2.41045	0	2.41195	0	2.41340	0	2.41485	0
2.41050	0	2.41200	0	2.41345	0	2.41490	0
2.41055	0	2.41205	0	2.41350	0	2.41495	0
2.41060	0	2.41210	0	2.41355	0	2.41500	0
2.41065	1	2.41215	0	2.41360	0	2.41505	0
2.41070	0	2.41220	0	2.41365	0	2.41510	0
2.41075	0	2.41225	0	2.41370	0	2.41515	0
2.41080	1	2.41230	0	2.41375	0	2.41520	0
2.41085	0	2.41235	0	2.41380	0	2.41525	0
2.41090	0	2.41240	0	2.41385	0	2.41530	0
2.41095	0	2.41245	0	2.41390	0	2.41535	0
2.41100	0	2.41250	0	2.41395	0	2.41540	0
2.41105	0	2.41255	0	2.41400	0	2.41545	0
2.41115	0	2.41260	0	2.41405	0	2.41550	0
2.41120	0	2.41265	0	2.41410	0	2.41555	0
2.41125	0	2.41270	0	2.41415	0	2.41560	0
2.41130	0	2.41275	0	2.41420	0	2.41565	0
2.41135	0	2.41280	0	2.41425	0	2.41570	0
2.41140	0	2.41285	0	2.41430	0	2.41575	0
2.41145	0	2.41290	0	2.41435	0	2.41580	0



Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error	Freq. (GHz)	Detected Error
2.41585	0	2.41790	0	2.41995	0	2.42205	0
2.41590	0	2.41795	0	2.42000	0	2.42210	0
2.41595	0	2.41800	1	2.42005	0	2.42215	0
2.41600	1	2.41805	0	2.42010	0	2.42220	0
2.41605	0	2.41810	0	2.42015	1	2.42225	0
2.41610	0	2.41815	0	2.42020	0	2.42230	0
2.41615	0	2.41820	0	2.42025	0	2.42235	0
2.41620	0	2.41825	0	2.42030	1	2.42240	0
2.41625	1	2.41830	0	2.42035	0	2.42245	0
2.41630	0	2.41835	0	2.42040	0	2.42250	0
2.41635	0	2.41840	1	2.42045	1	2.42255	1
2.41640	0	2.41845	0	2.42050	0	2.42260	1
2.41645	1	2.41850	0	2.42055	0	2.42265	0
2.41650	1	2.41855	0	2.42060	1	2.42270	0
2.41655	0	2.41860	0	2.42065	0	2.42275	0
2.41660	0	2.41865	0	2.42070	0	2.42280	0
2.41665	1	2.41870	0	2.42075	0	2.42290	0
2.41670	1	2.41875	0	2.42080	0	2.42295	0
2.41675	1	2.41880	0	2.42085	0	2.42300	0
2.41680	1	2.41885	0	2.42090	0	2.42305	0
2.41685	1	2.41890	0	2.42100	0	2.42310	0
2.41690	1	2.41895	0	2.42105	0	2.42315	0
2.41695	1	2.41900	1	2.42110	0	2.42320	0
2.41700	1	2.41905	0	2.42115	0	2.42325	0
2.41705	1	2.41910	0	2.42120	0	2.42330	0
2.41710	1	2.41915	0	2.42125	0	2.42335	0
2.41715	1	2.41920	0	2.42130	0	2.42340	0
2.41720	1	2.41925	0	2.42135	0	2.42345	0
2.41725	1	2.41930	0	2.42140	0	2.42350	0
2.41730	1	2.41935	0	2.42145	0	2.42355	0
2.41735	1	2.41940	0	2.42150	0	2.42360	0
2.41740	1	2.41945	0	2.42155	0	2.42365	0
2.41745	1	2.41950	0	2.42160	0	2.42370	0
2.41750	1	2.41955	0	2.42165	0	2.42375	0
2.41755	1	2.41960	0	2.42170	1	2.42380	0
2.41760	1	2.41965	0	2.42175	0	2.42385	0
2.41765	1	2.41970	1	2.42180	0	2.42390	0
2.41770	0	2.41975	0	2.42185	0	2.42395	0
2.41775	1	2.41980	0	2.42190	0	2.42390	0
2.41780	0	2.41985	0	2.42195	0	2.42395	0
2.41785	0	2.41990	1	2.42200	0	2.42400	1

13 EUT PHOTOS

