MEASUREMENT REPORT
of
WIRELESS LAN

Applicant	**:**	Macromate Corp.
Model No.	**:**	MAP-811
EUT	**:**	Wireless Bridge Router
FCC ID	**:**	LZU-MAP-811
Report No.	**:**	MA115118

Test by :

Training Research Co., Ltd.

TEL：886-2-26935155 FAX：886-2-26934440

2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, Taiwan, R.O.C.

CERTIFICATION

We here by verify that:

The test data, data evaluation, test procedures and equipment configurations shown in this report were made mainly in accordance with the procedures given in ANSI C63.4 (1992) as a reference. All test were conducted by ***Training Research Co., Ltd.***, 2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, Taiwan, R.O.C. Also, we attest to the accuracy of each.

We further submit that the energy emitted by the sample EUT tested as described in the report is **in compliance with** the technical requirements set forth in the FCC Rules Part 15 Subpart C Section 15.247.

Applicant : Macromate Corp.

Model No. : MAP-811

EUT : Wireless Bridge Router

FCC ID : LZU-MAP-811

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Test Date : February 22, 2001

Prepared by: Miro Chueh *Miro Chueh*

Approved by: Frank Tsai *Frank Tsai*

Test by :

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Tables of Contents

Ⅰ. GENERAL

1.1 Introduction

The following measurement report is submitted on behalf of Applicant in support of a wireless lan certification in accordance with Part 2 Subpart J and Part 15 Subpart A and C of the Commission's Rules and Regulations.

1.2 Description of EUT

EUT	**:**	Wireless Bridge Router
Model No.	**:**	MAP-811
Granted FCC ID	**:**	LZU-MAP-811
Frequency Range	**:**	2.412 GHz ~ 2.462GHz
Support Channel	**:**	11 Channel
Modulation Skill	**:**	DBPSK, DQPSK, CCK
Power Type	**:**	(1)By AC Power Source or (2)AC to DC Switching Adapter
Power Cable	**:**	Non-shielded, 195cm long, No bead
Data Cable	**:**	RS-232: Shielded, 150cm long, No ferrite bead RJ45: Non-shielded, 10 meter , No ferrite bead
Applicant	**:**	Macromate Corp. 8F, Universal Center, No. 179, Sec. 1, Ta-Tung Road, Hsi-Chih, Taipei Hsien 221, Taiwan, R.O.C.

1.3 Description of Support Equipment

In order to construct the minimum testing, following equipment were used as the support units.

Notebook	**:**	**IBM Think Pad X20**
Type No.	:	2662-11T
Serial No.	:	FX-11922 00/09
FCC ID	:	Doc Approved
檢磁		:3892B565

AC Adaptor	**:**	**IBM**
Model No.	:	PA2450U
Serial No.	:	02K6654
FCC ID	:	Doc Approved
Power Core	:	Non-shielded, 180cm long, Plastic hoods, with ferrite bead
Power type	:	100 ~ 240VAC, 50 ~ 60Hz, 0.5A ~ 1.2A / 16Vdc, 4.5A

HUB	**:**	**Cameo Communications, Inc.**
Model No.	:	SOHO-SW16A
Serial No.	:	N/A
Power Type	:	Switch
FCC ID	:	N/A, DOC Approved
Power cord	:	Non-shielded, 1.95m long, Plastic, No ferrite core

USB Ethernet Lan	**:**	**Netgear**
Model No.	:	FA101
Serial No.	:	N/A
Power Type	:	By PC
FCC ID	:	N/A, DOC Approved

1.4 Configuration of System Under Test

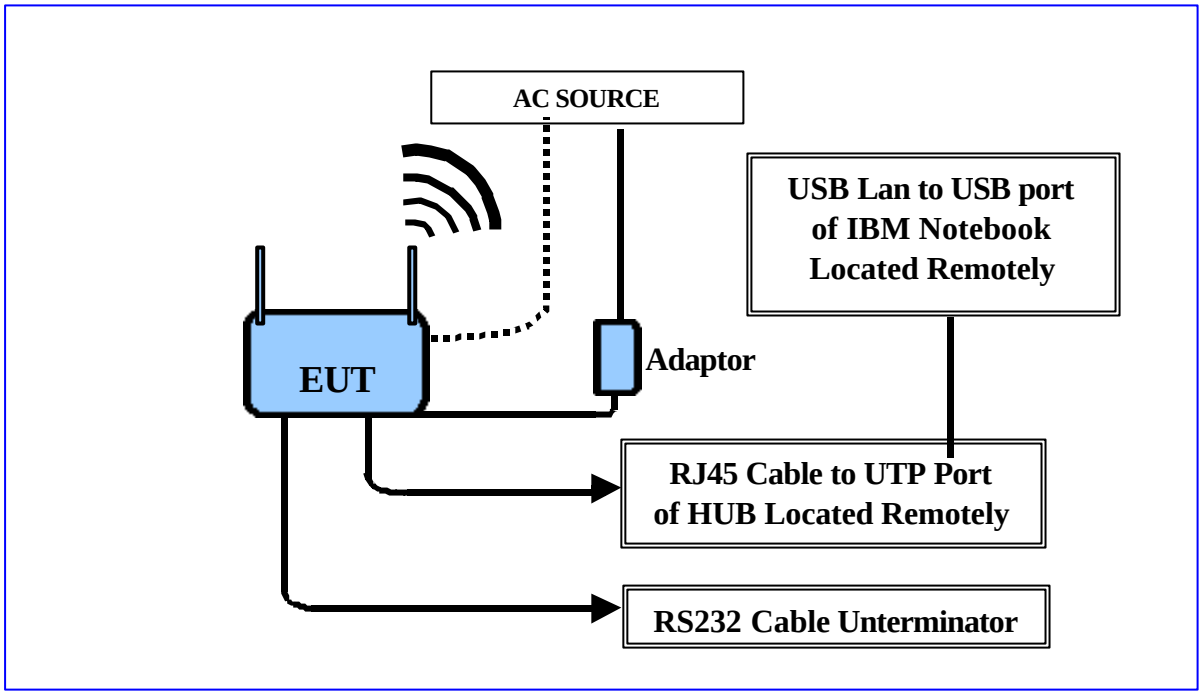


Fig. 1 Configuration of system under test

The tests below are run with the EUT transmitter set at high power in TDD mode. A USB lan from a USB port of notebook computer to the ethernet hub then UTP port of hub connected to UTP port of EUT by RJ45 cable. The EUT is needed to force selection of output power level and channel number by notebook computer.

The setting up procedure was recorded in Appendix A.

1.5 Verify the Frequency and Channel

1.5.1 Verify the Frequency Pairs

Channel	Frequency (GHz)
1	2.412
2	2.417
3	2.422
4	2.427
5	2.432
6	2.437
7	2.442
8	2.447
9	2.452
10	2.457
11	2.462

Note:

1. This is for sure that all frequencies are in 2.412GHz to 2.462GHz.
2. Section 15.31(m): Measurements on intentional radiators or receivers shall be performed at three frequencies for operating frequency range over 10 MHz.
   (The locations of these frequencies one near the top, one near the middle and one near the bottom.)
3. After test, the EUT operating frequencies are in 2.412GHz to 2.462GHz. So all the items as followed in testing report are need to test these three frequencies:
   top: channel 01; middle: channel 06; bottom: channel 11.

1.6 Test Procedure

All measurements contained in this report were performed mainly according to the techniques described in ANSI C63.4 (1992) and the pre-setup was written on Appendix A, the detail setup was written on each test item.

1.7 Location of the Test Site

The radiated emissions measurements required by the rules were performed on the **three-meter**, **Anechoic Chamber (Registration Number: 93906)** maintained by *Training Research Co., Ltd.* 1F., No. 2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, Taiwan, R.O.C. Complete description and measurement data have been placed on file with the commission. The conducted power line emissions tests and other test items were performed in a anechoic chamber also located at Training Research Co., Ltd.

No. 2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, Taiwan, R.O.C. *Training Research Co., Ltd.* is listed by the FCC as a facility available to do measurement work for others on a contract basis.

1.8 General Test Condition

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests was chosen as that which produced the highest emission levels. However, only those conditions, which the EUT was considered likely to encounter in normal use were investigated.

In test, they were set in high power and continuously transmitting mode that controlled by notebook computer. The ch01, ch06 and ch11 of EUT were all tested. The setting up procedure is recorded on Appendix A.

Ⅱ. Section 15.207: Power Line Conducted Emissions for AC Powered Units

2.1 Test Condition & Setup

The power line conducted emission measurements were performed in an anechoic chamber. The EUT was assembled on a wooden table, which is 80 centimeters high, was placed 40 centimeters from the backwall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and Line Impedance Stabilization Networks (LISNs). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer (or EMI receiver) was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPER quasi-peak detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 450 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 2.4.

There is a test condition apply in this test item, the test procedure description as the following:

1. EUT transmit only:
   Using the USB lan to USB port of Notebook PC and software to control the EUT through ethernet hub. Then making access to the mode of continuous transmission and set testing channel. Three channels were tested, one in the top (CH01), one in the middle (CH06) and the other in bottom (CH11).
2. Idle state (Rx mode)

The setting up procedure is recorded on Appendix A.

2.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	10/18/00	10/18/01
RF Filter Section	85460A	H P	3448A00217	10/18/00	10/18/01
LISN (EUT)	LISN-01	TRC	9912-03,04	12/09/00	12/09/01
LISN (Support E.)	LISN-01	TRC	9912-05	01/04/00	01/04/01
Switch/Control Unit (< 30MHz)	3488A	HP	N/A	11/20/00	11/20/01
Auto Switch Box (< 30MHz)	ASB-01	TRC	9904-01	11/20/00	11/20/01

2.3 Test configuration

Conducted Emissions Test Placement (Power by AC Source)

Conducted Emissions Test Placement (Power by AC/DC Adaptor)

2.4 Test Result of Conducted Emissions

2.4.1 EUT station transmit only

The following table shows a summary of the highest emissions of power line conducted emissions on the HOT and NATURAL conductors of the EUT power cord.

Table 1 Power Line Conducted Emissions (Power by AC Source, Channel 1)

Power Connected Emissions			*FCC Class B*	
Conductor	***Frequency (KHz)***	***Peak Amplitude (dB μV)***	***Limit (dB μV)***	***Margin (dB)***
Line 1	493.00	39.72	48.00	-8.28
	586.00	39.71	48.00	-8.29
	684.00	36.91	48.00	-11.09
	880.00	37.89	48.00	-10.11
	16260.00	36.41	48.00	-11.59
	19750.00	34.93	48.00	-13.07
	20260.00	35.37	48.00	-12.63
	20810.00	36.07	48.00	-11.93
	23050.00	40.32	48.00	-7.68
	29390.00	35.39	48.00	-12.61
LINE 2	489.00	39.91	48.00	-8.09
	586.00	40.60	48.00	-7.40
	874.00	37.88	48.00	-10.12
	16260.00	38.00	48.00	-10.00
	19750.00	35.88	48.00	-12.12
	20810.00	37.56	48.00	-10.44
	21560.00	38.15	48.00	-9.85
	23050.00	42.48	48.00	-5.52
	26570.00	36.89	48.00	-11.11
	27090.00	36.15	48.00	-11.85

NOTE:

1. Margin = Peak Amplitude - Limit
2. A "+" sign in the margin column means the emission is OVER the Class B Limit and "–" sign of means UNDER the Class B limit.

Table 2 Power Line Conducted Emissions (Power by AC Source, Channel 6)

Power Connected Emissions			*FCC Class B*	
Conductor	***Frequency (KHz)***	***Peak Amplitude (dB μV)***	***Limit (dB μV)***	***Margin (dB)***
Line 1	486.00	39.08	48.00	-8.92
	590.00	39.86	48.00	-8.14
	684.00	36.45	48.00	-11.55
	783.00	35.97	48.00	-12.03
	880.00	36.77	48.00	-11.23
	16150.00	35.16	48.00	-12.84
	20260.00	35.07	48.00	-12.93
	20810.00	35.45	48.00	-12.55
	21560.00	37.47	48.00	-10.53
	23050.00	36.05	48.00	-11.95
LINE 2	486.00	39.96	48.00	-8.04
	586.00	40.95	48.00	-7.05
	684.00	37.60	48.00	-10.40
	783.00	38.33	48.00	-9.67
	16260.00	35.78	48.00	-12.22
	19750.00	36.33	48.00	-11.67
	21110.00	36.39	48.00	-11.61
	21560.00	39.03	48.00	-8.97
	23050.00	42.31	48.00	-5.69
	26570.00	37.28	48.00	-10.72

Table 3 Power Line Conducted Emissions (Power by AC, Channel 11)

Power Connected Emissions			*FCC Class B*	
Conductor	*Frequency (KHz)*	*Peak Amplitude (dB μV)*	*Limit (dB μV)*	*Margin (dB)*
Line 1	493.00	39.17	48.00	-8.83
	590.00	40.30	48.00	-7.70
	688.00	36.08	48.00	-11.92
	788.00	35.00	48.00	-13.00
	880.00	37.89	48.00	-10.11
	16260.00	34.86	48.00	-13.14
	20260.00	35.46	48.00	-12.54
	21560.00	35.70	48.00	-12.30
	23050.00	40.88	48.00	-7.12
	26570.00	35.31	48.00	-12.69
LINE 2	489.00	38.63	48.00	-9.37
	590.00	39.41	48.00	-8.59
	684.00	36.67	48.00	-11.33
	16150.00	36.08	48.00	-11.92
	20260.00	37.18	48.00	-10.82
	20810.00	36.39	48.00	-11.61
	21560.00	36.65	48.00	-11.35
	23050.00	39.54	48.00	-8.46
	26570.00	36.98	48.00	-11.02
	29390.00	35.52	48.00	-12.48

Table 4 Power Line Conducted Emissions (Power by AC/DC Adaptor, Channel 1)

Power Connected Emissions				*FCC Class B*	
Conductor	*Frequency (KHz)*	*Peak Amplitude (dB μV)*	*QP Amplitude (dB μV)*	*Limit (dB μV)*	*Margin (dB)*
Line 1	590.00	45.45	###.##	48.00	-2.55
	1419.00	45.98	###.##	48.00	-2.02
	2580.00	45.82	###.##	48.00	-2.18
	2710.00	46.14	###.##	48.00	-1.86
	2870.00	46.31	###.##	48.00	-1.69
	2950.00	45.59	###.##	48.00	-2.41
	3030.00	49.68	43.70	48.00	-4.30
	3190.00	45.08	###.##	48.00	-2.92
	3380.00	45.85	###.##	48.00	-2.15
	3520.00	46.14	###.##	48.00	-1.86
Line 2	590.00	47.02	###.##	48.00	-0.98
	1055.00	45.70	###.##	48.00	-2.30
	1419.00	46.22	###.##	48.00	-1.78
	2590.00	46.65	###.##	48.00	-1.35
	2680.00	47.43	###.##	48.00	-0.57
	2910.00	49.59	39.22	48.00	-8.78
	3050.00	53.67	43.84	48.00	-4.16
	3150.00	50.14	39.47	48.00	-8.53
	3400.00	45.35	###.##	48.00	-2.65
	3860.00	45.07	###.##	48.00	-2.93

****The reading amplitudes are all under limit.***

Table 5 Power Line Conducted Emissions (Power by AC/DC Adaptor, Channel 6)

Power Connected Emissions				*FCC Class B*	
Conductor	*Frequency (KHz)*	*Peak Amplitude (dB μV)*	*QP Amplitude (dB μV)*	*Limit (dB μV)*	*Margin (dB)*
Line 1	593.00	45.07	###.##	48.00	-2.93
	1419.00	45.54	###.##	48.00	-2.46
	2580.00	44.22	###.##	48.00	-3.78
	2700.00	47.29	###.##	48.00	-0.71
	2870.00	45.75	###.##	48.00	-2.25
	2930.00	46.73	###.##	48.00	-1.27
	3030.00	52.89	45.55	48.00	-2.45
	3090.00	49.44	38.44	48.00	-9.56
	3400.00	46.04	###.##	48.00	-1.96
	3490.00	47.40	###.##	48.00	-0.60
Line 2	586.00	46.68	###.##	48.00	-1.32
	1410.00	46.64	###.##	48.00	-1.36
	2560.00	45.93	###.##	48.00	-2.07
	2660.00	47.18	###.##	48.00	-0.82
	2730.00	50.40	36.85	48.00	-11.15
	2890.00	48.89	42.23	48.00	-5.77
	3030.00	54.23	45.80	48.00	-2.20
	3170.00	46.93	###.##	48.00	-1.07
	3350.00	49.28	41.20	48.00	-6.80
	3490.00	47.63	###.##	48.00	-0.37

The reading amplitudes are all under limit.

Table 6 Power Line Conducted Emissions (Power by AC/DC Adaptor, Channel 11)

Power Connected Emissions				*FCC Class B*	
Conductor	***Frequency (KHz)***	***Peak Amplitude (dB μV)***	***QP Amplitude (dB μV)***	***Limit (dB μV)***	***Margin (dB)***
Line 1	586.00	45.06	###.##	48.00	-2.94
	929.00	44.16	###.##	48.00	-3.84
	1048.00	43.47	###.##	48.00	-4.53
	1400.00	45.33	###.##	48.00	-2.67
	2530.00	43.74	###.##	48.00	-4.26
	2660.00	47.19	###.##	48.00	-0.81
	2890.00	49.31	41.12	48.00	-6.88
	3010.00	52.85	44.04	48.00	-3.96
	3110.00	46.67	###.##	48.00	-1.33
	3330.00	48.34	39.37	48.00	-8.63
Line 2	586.00	46.17	###.##	48.00	-1.83
	929.00	45.22	###.##	48.00	-2.78
	1400.00	46.66	###.##	48.00	-1.34
	2510.00	46.18	###.##	48.00	-1.82
	2850.00	51.58	38.70	48.00	-9.30
	2970.00	52.96	36.93	48.00	-11.07
	3190.00	47.38	###.##	48.00	-0.62
	3350.00	49.24	39.08	48.00	-8.92
	3470.00	47.21	###.##	48.00	-0.79
	3680.00	46.71	###.##	48.00	-1.29

****The reading amplitudes are all under limit.***

Ⅲ. Section 15.247(a)(2): Bandwidth for Direct Sequence System.

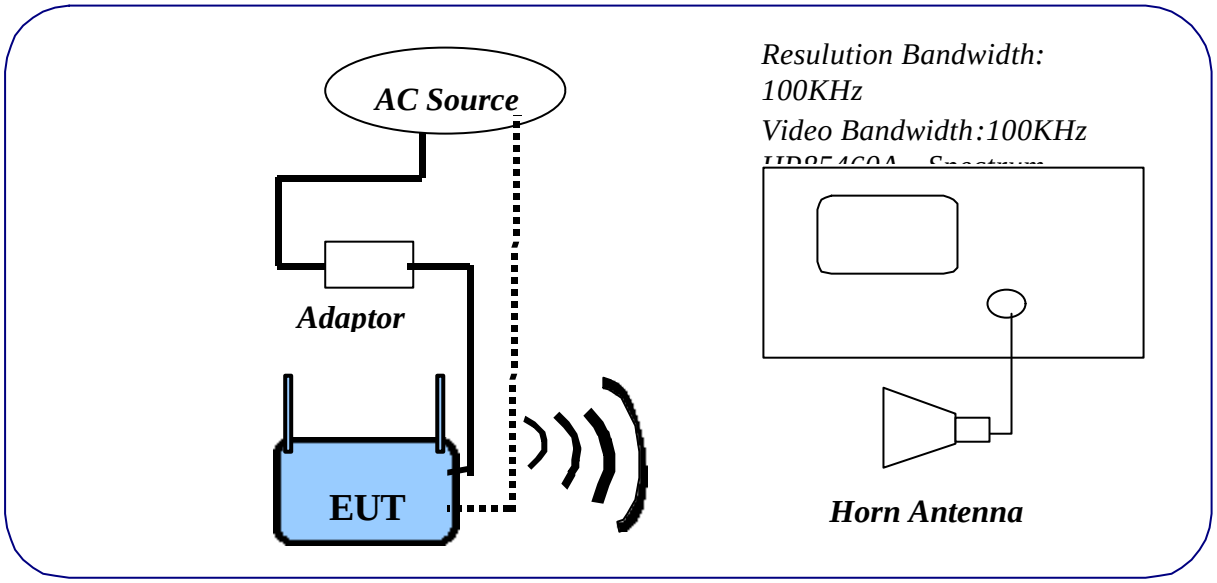
3.1 Test Condition & Setup

The transmitter bandwidth measurements were performed in an anechoic chamber. The EUT was placed on a wooded table, which is 0.8 meters height. The EUT was set to transmit continuously. Various channels were also investigated to find the maximum occupied bandwidth. The minimum 6 dB bandwidth shall be at least 500 KHz.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 KHz. Set the span>> RBW. The detector function was set to peak and hold mode to clearly observe the components.

Setting up procedure is written on Appendix A.

3.2 Test Instruments Configuration



P.S. A USB lan to USB port from notebook computer to control the EUT at maximal power output and channel Number.

Fig 10. Test Configuration of bandwidth for direct sequence system

3.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	10/18/00	10/18/01
RF Filter Section	85460A	H P	3448A00217	10/18/00	10/18/01
Horn Antenna	3115	EMCO	9704 – 5178	08/15/00	08/15/01

3.4 Test Result of Bandwidth

Bandwidth of Channel 1

Power by AC Source: 10.13 MHz
Power by AC/DC Adaptor: 10.00 MHz
The min. 6 dB BW at least : 500 KHz

Bandwidth of Channel 6

Power by AC Source: 10.00 MHz
Power by AC/DC Adaptor: 10.38 MHz
The min. 6 dB BW at least : 500 KHz

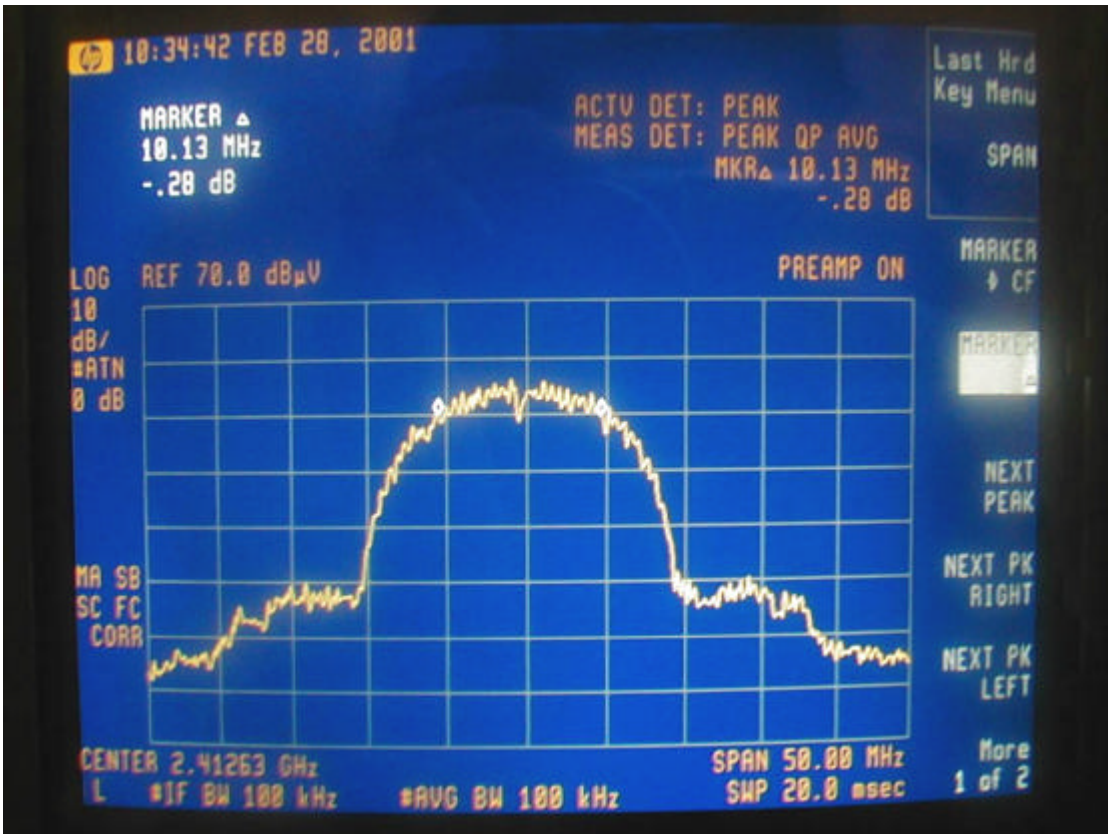
Bandwidth of Channel 11

Power by AC Source: 10.50 MHz
Power by AC/DC Adaptor: 10.05 MHz
The min. 6 dB BW at least : 500 KHz

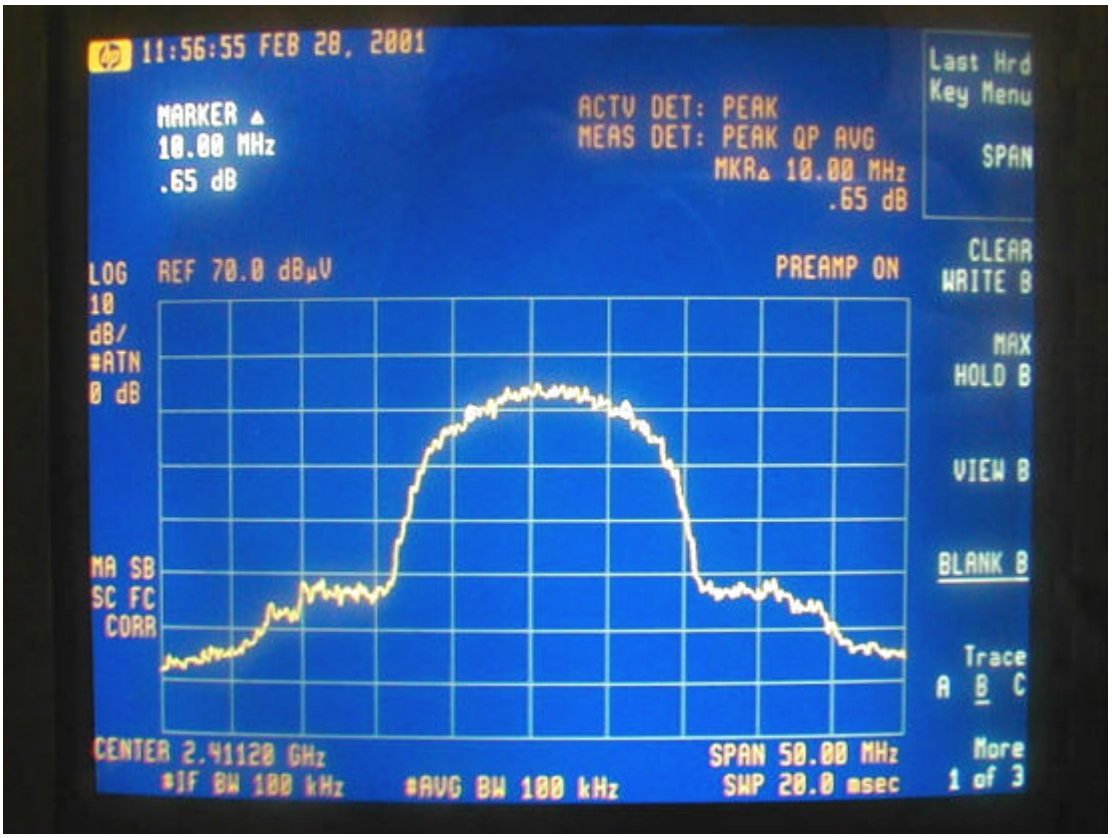
Note:

1. The data in the above table are summarizing the following attachment spectrum analyzer hard copy.
2. The attachments follow page.

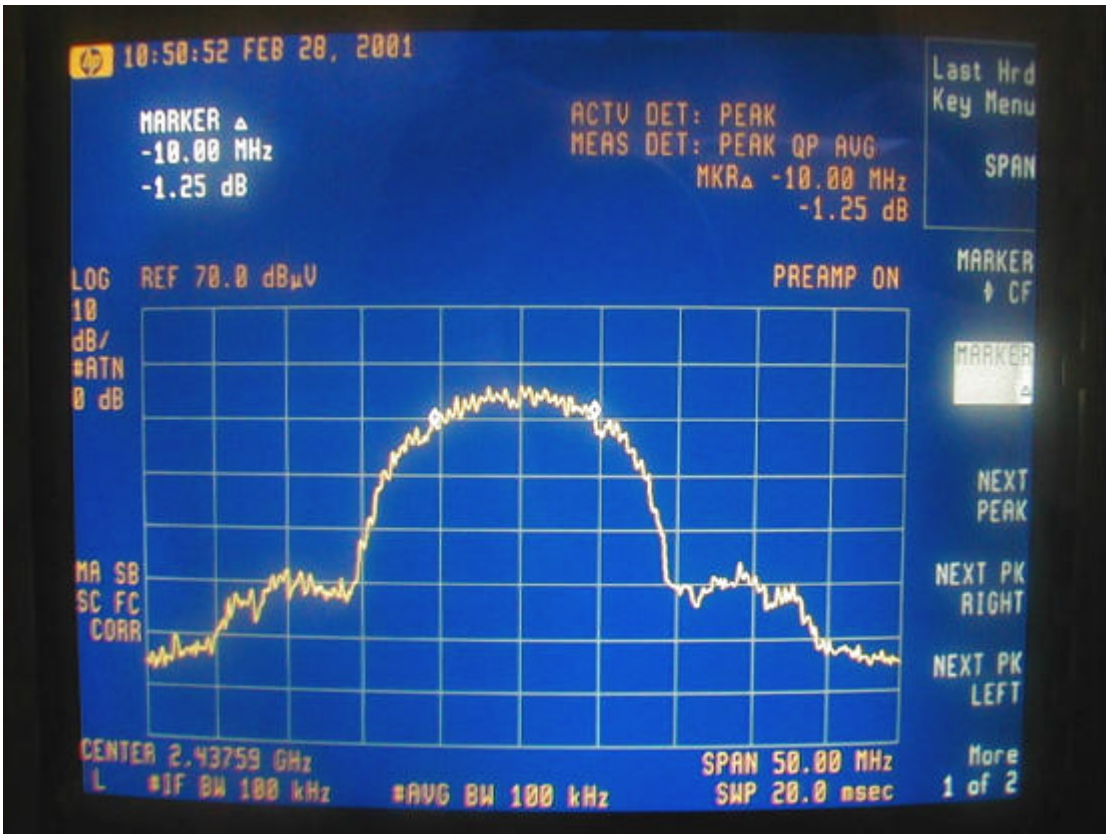
Bandwidth of Channel 1: 10.13 MHz, Power by AC Source



Bandwidth of Channel 1: 10.00 MHz, Power by AC/DC Adaptor

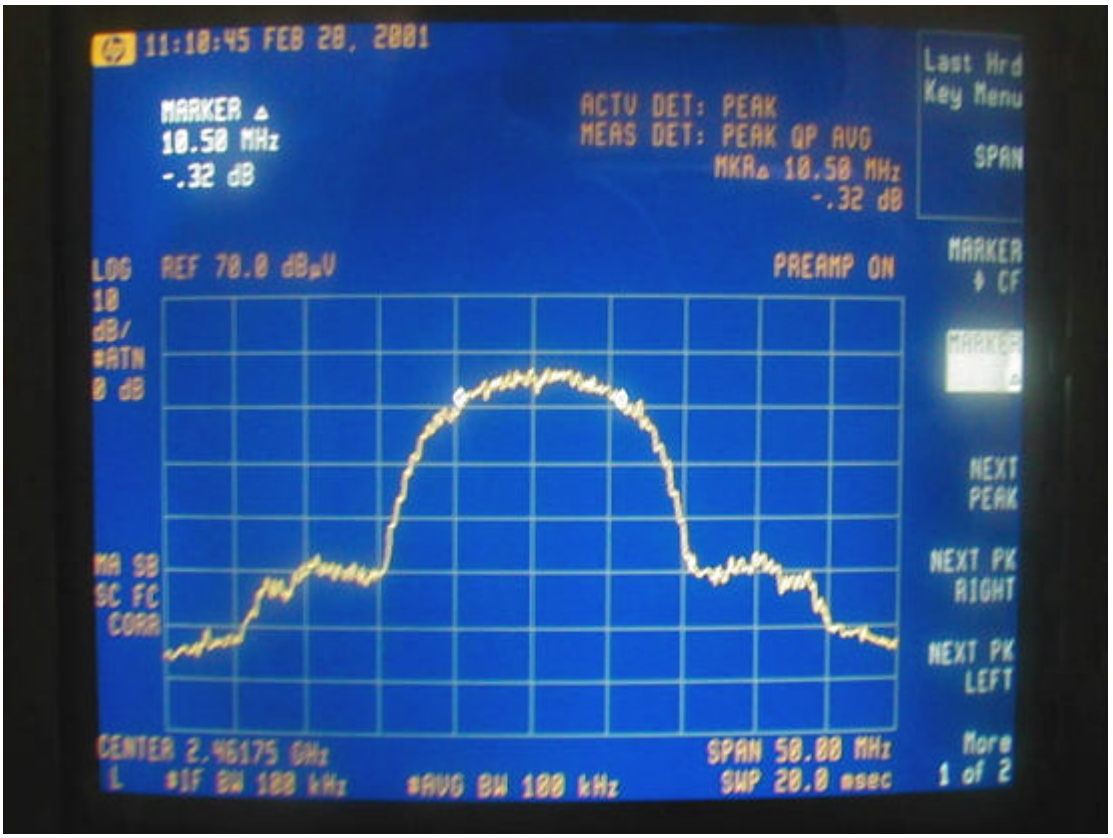


Bandwidth of Channel 6: 10.00 MHz, Power by AC Source

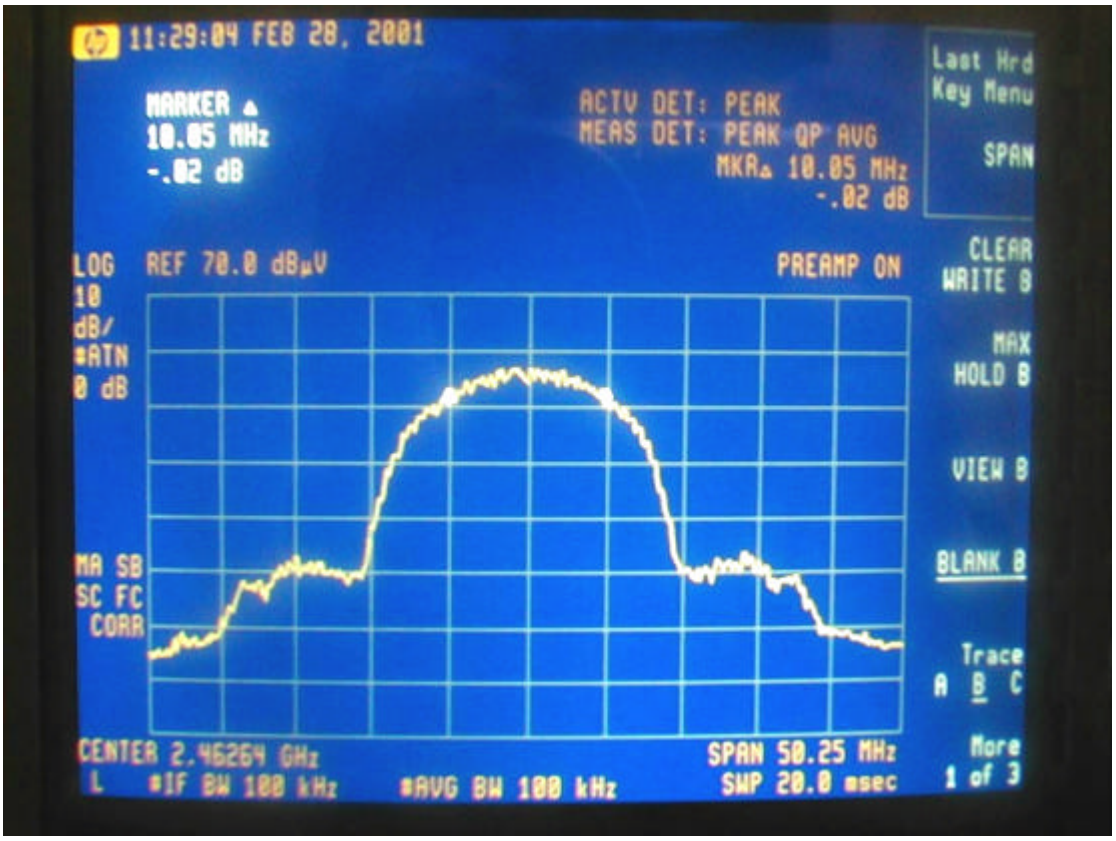


Bandwidth of Channel 6: 10.38 MHz, Power by AC/DC Adaptor

Bandwidth of Channel 11: 10.50 MHz, Power by AC Source



Bandwidth of Channel 11: 10.05 MHz, Power by AC/DC Adaptor



Ⅳ. Section 15.247(B): Power Output

4.1 Test Condition & Setup

The EUT was placed in an anechoic chamber and scanned at 3meter distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration that produced the highest emissions was noted so it could be reproduced later during the final tests. This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT. Final radiation measurements were made on a three-meter, anechoic chamber. The EUT system was placed on a nonconductive turntable, which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 9KHz to 6.5GHz using a Hewlett Packard EMI Receiver 8546A, EMCO whole range Horn antenna (Model No.: 3115) is used to measure frequency from operating frequency. The final test is used the spectrum HP 8546A. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the EMI Receiver. The EMI Receiver HP8546A used on this testing for foundational frequency. No post-detector video filters were used in the test. Set the RB= 3 MHz, VB = 3MHz and the span = 5 MHz. The analyzer was operated in the maximum hold mode.

There is a test condition apply in this test item, the test procedure description as the following:

(1) EUT transmit only:

Using the USB lan to USB port of Notebook PC and software to control the EUT through ethernet hub. Then making access to the mode of continuous transmission. Three channels were tested, one in the top (CH01), one in the middle (CH06) and the other in bottom (CH11).

With the transmitter operating from a AC source and using the internal antenna at EUT, Radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to low, mid and high channels in the 2400 ~ 2483.5 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter (dB μ V/m) is determined by algebraically adding the measured reading in dB μ V, the antenna factor (dB), and cable loss (dB) at the appropriate frequency.

4.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	10/18/00	10/18/01
RF Filter Section	85460A	H P	3448A00217	10/18/00	10/18/01
Horn Antenna	3115	EMCO	9704 – 5178	08/15/00	08/15/01

4.3 Test Result of Fundamental Emissions

The peak values of fundamental emissions from the EUT at various antenna heights, antenna polarization, EUT orientation, etc. are recorded on the following.

Table 6 Fundamental Emissions

Channel	*Frequency (GHz)*	*A.P. (H/V)*	*A.H. (M)*	*Table (degree)*	*Amplitude (dBmV/m)*	*CF (dB)*	*Corrected Amplitude (dBmV/m)*	*E.I.R.P.*	
								m W	*dB m*
AC Power Source 01	2.412	H	1.00	245	62.19	35.60	97.79	1.803	2.56
	2.412	V	1.00	176	68.36	35.60	103.96	7.464	8.73
AC Power Source 06	2.437	H	1.00	122	61.93	35.60	97.53	1.698	2.30
	2.437	V	1.00	21	70.14	35.60	105.74	11.246	10.51
AC Power Source 11	2.462	H	1.00	249	60.18	35.60	95.78	1.135	0.55
	2.462	V	1.00	36	70.43	35.60	106.03	12.026	10.80
AC/DC Adaptor 01	2.412	H	1.00	143	59.28	35.60	94.88	0.922	-0.35
	2.412	V	1.00	65	67.60	35.60	103.20	6.266	7.97
AC/DC Adaptor 06	2.437	H	1.00	233	61.86	35.60	97.46	1.671	2.23
	2.437	V	1.00	99	70.21	35.60	105.81	11.428	10.58
AC/DC Adaptor 11	2.462	H	1.00	277	63.52	35.60	99.12	2.449	3.89
	2.462	V	1.00	114	69.54	35.60	105.14	9.794	9.91

Note:

1. A.P. means antenna polarization, horizontal and vertical.
2. A.H. means antenna height.
3. Table means turntable turning position.
4. Corrected Factor (C. F.) = Cable Loss + Antenna Factor – Amplified Gain
   Corrected Amplitude = Peak Amplitude + Corrected Factor
   Amplitude means the fundamental emission measured.
5. Conducted output power "P", $P= (E d)^2 / 30G$
6. Since G=1. P=EIRP

E is the measured maximum field strength in V/m utilizing the maximum hold mode RBW (3MHz)
G is the numeric gain of the transmitting antenna over an isotropic radiator (1.00)
d is the distance in meters from which the field strength was measured (3 meter)

Example: the Max Radiation Emission of EUT for CH 11 = 106.03 dBμV/m

$10^{(106.03/20)} \times 10^{-6} = 0.200216562$ V

E.I.R.P. = $(0.200216562 \times 3)^2 / 30 = 12.026$ mW = 10 x log (12.026 mW / 1 mW) = 10.801 dBm

So, the Max Radiation Emission of EUT for CH 11 = 106.03 dBμV/m, output power for 12.026 mW.

Ⅴ. Section 15.247 (C)(2): Spurious Emissions (Radiated)

5.1 Test Condition & Setup

The EUT was placed in an anechoic chamber and scanned at 3 meter distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration, which produced the highest emissions was noted so it could be reproduced later during the final tests. This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT.

Final radiation measurements were made on a three-meter, anechoic chamber. The EUT system was placed on a nonconductive turntable, which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard 85460A EMI Receiver, Schaffner whole range Bi-Log antenna (Model No.: CBL6141A) is used to measure frequency from 30 MHz to 1GHz.The final test is used the spectrum HP 85460A and spectrum was examined from 1GHz to 18GHz using an Hewlett Packard 8564E Spectrum Analyzer, EMCO Horn Antenna (Model 3115) for 1G ~ 18GHz.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. There are two spectrum analyzers use on this testing, HP 85460A for frequency 30MHz to 1000MHz, and 8564E for frequency 1GHz to 18GHz. No post-detector video filters were used in the test. The spectrum analyzer's 6dB bandwidth was set to 120KHz (spectrum was examined from 30 MHz to 1000 MHz), the spectrum analyzer's 6 dB bandwidth was set to 1 MHz (spectrum was examined from 1GHz to 18GHz) and the analyzer was operated in the maximum hold mode.

There is a test condition apply in this test item, the test procedure description as the following:

(1) EUT transmit only:

Using the USB lan to USB port of Notebook PC and software to control the EUT through ethernet hub.Then making access to the mode of continuous transmission. Three channels is tested, one in the top (CH01), one in the middle (CH06) and the other in bottom (CH11).

With the transmitter operating from a AC source and using the internal of EUT, radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to low, mid and high channels in the 2400 ~ 2483.5 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter (dBμV/m) is determined by algebraically adding the measured reading in dBμV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency.

For frequency between 30MHz to 1000MHz

FIa (dBuV/m) = FIr (dBμV) – Correction Factors

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Amplifier Gain

For frequency between 1 GHz to 18 GHz

FIa (dBμV/m) = FIr (dBμV) + Correction Factor

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Amplifier Gain

The setting up procedure is recorded on Appendix A.

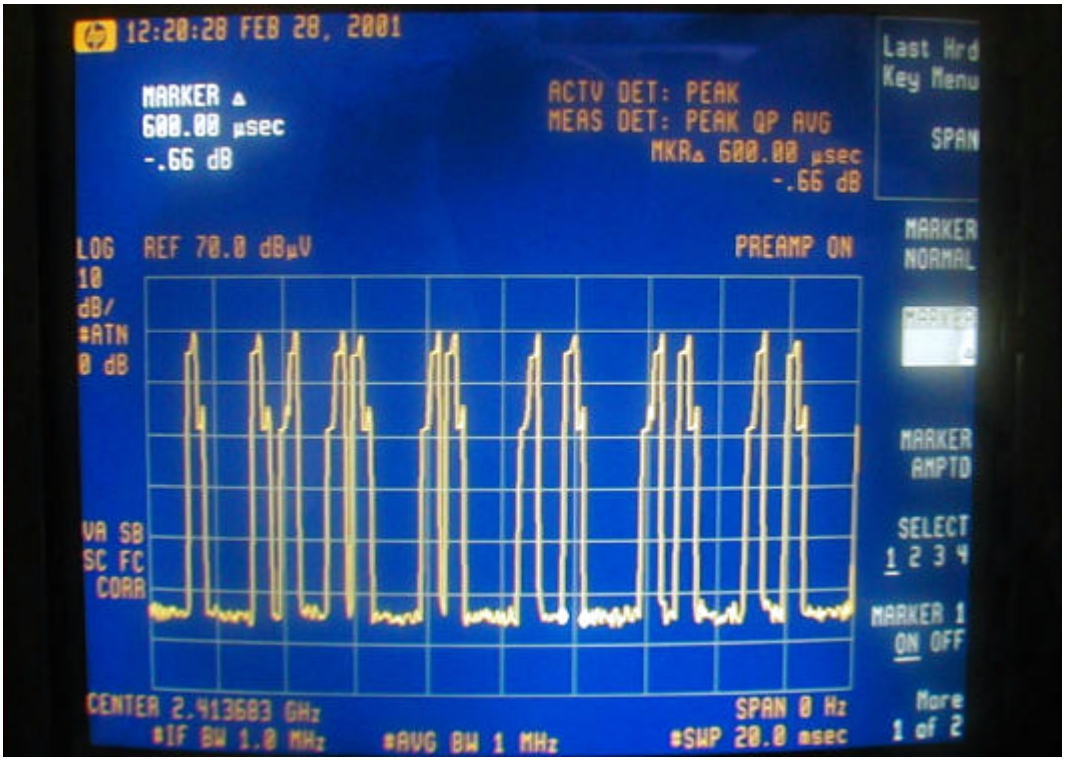
5.2 List of Test Instruments

Instrument Name	Model No	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	10/18/00	10/18/01
RF Filter Section	85460A	H P	3448A00217	10/18/00	10/18/01
Switch/Control Unit (> 30MHz)	3488A	H P	N/A	11/20/00	11/20/01
Auto Switch Box (> 30MHz)	ASB-01	TRC	9904-01	11/20/00	11/20/01
Spectrum Analyzer	8564E	H P	US36433002	08/13/00	08/13/01
Microwave Preamplifier	83051A	H P	3232A00347	08/13/00	08/13/01
Horn Antenna	3115	EMCO	9704 – 5178	08/15/00	08/15/01

5.2.1 Duty Cycle Factor Measurement

The duty cycle factor measurement is performed in a shield enclosure. The test condition and setup is as same as paragraph Ⅲ. Set the RB = 1MHz, VB=1MHz, and span = 0 MHz. Link the EUT, then get the Time of duty and cycle as follow page.

The duty cycle factor = 20 log (T_{duty} / T_{cycle}) = 20 log (0.600/ 2.150) = – 11.086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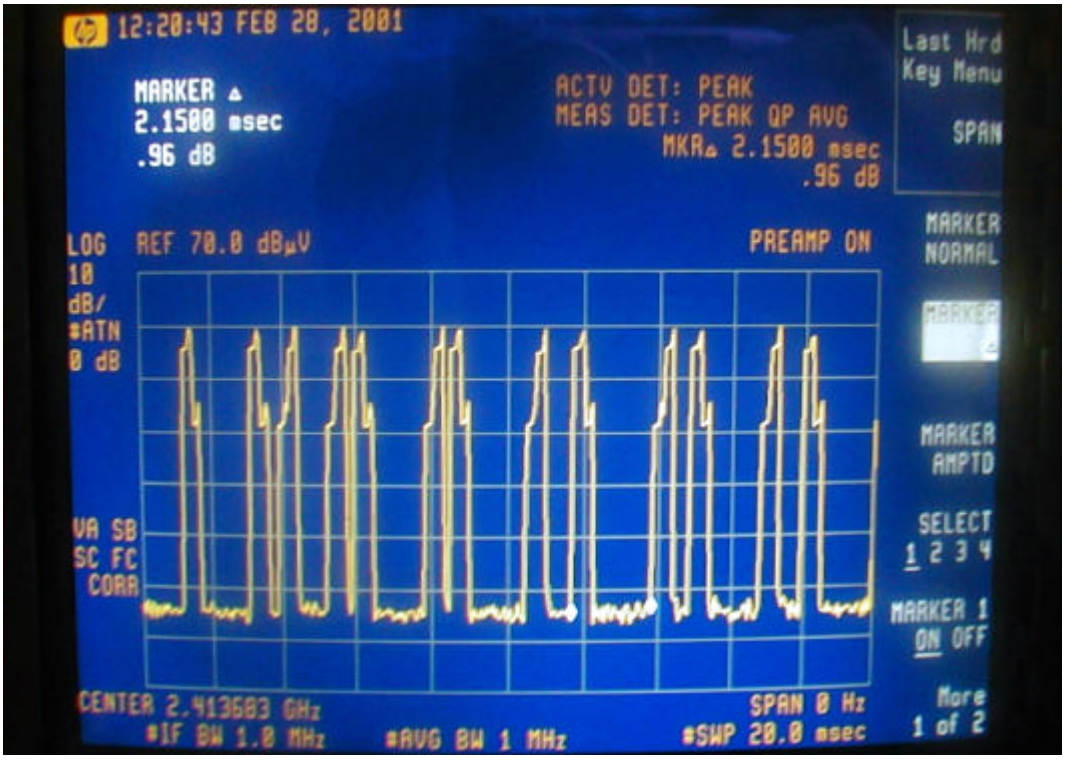
MARKER Δ
600.00 µsec
-.66 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 600.00 µsec
-.66 dB
Last Hrd Key Menu
SPAN
LOG
10
dB/
#ATN
0 dB
REF 70.0 dBµV
PREAMP ON
MARKER NORMAL
MARKER AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More 1 of 2
VA SB
SC FC
CORR
CENTER 2.413683 GHz
#IF BW 1.0 MHz
#AVG BW 1 MHz
SPAN 0 Hz
#SWP 20.0 msec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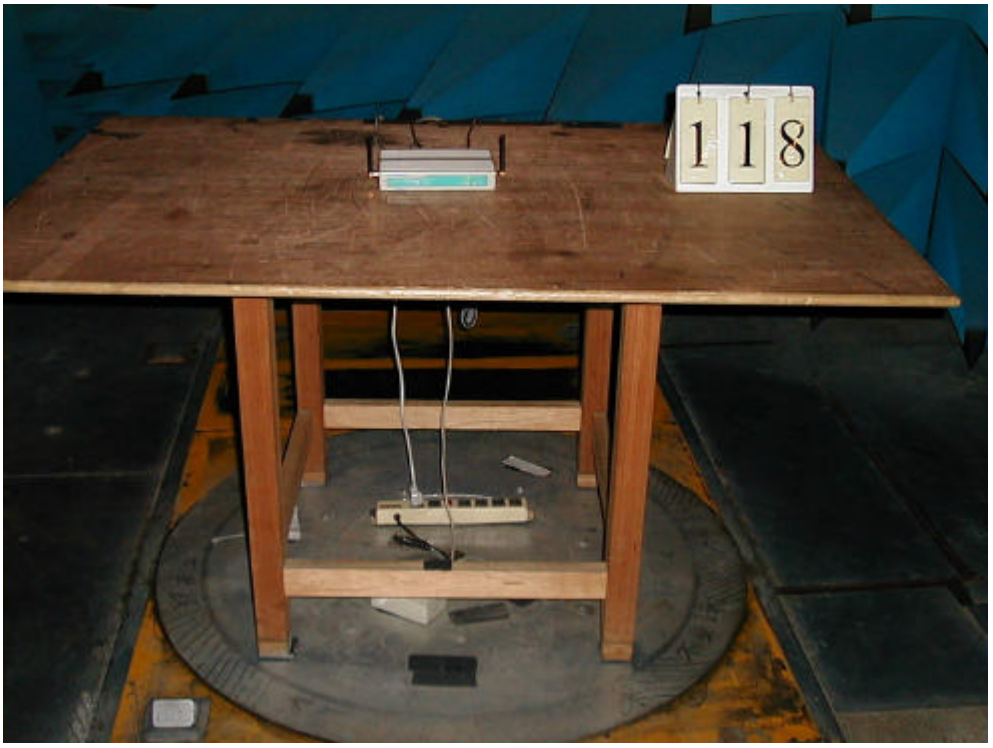
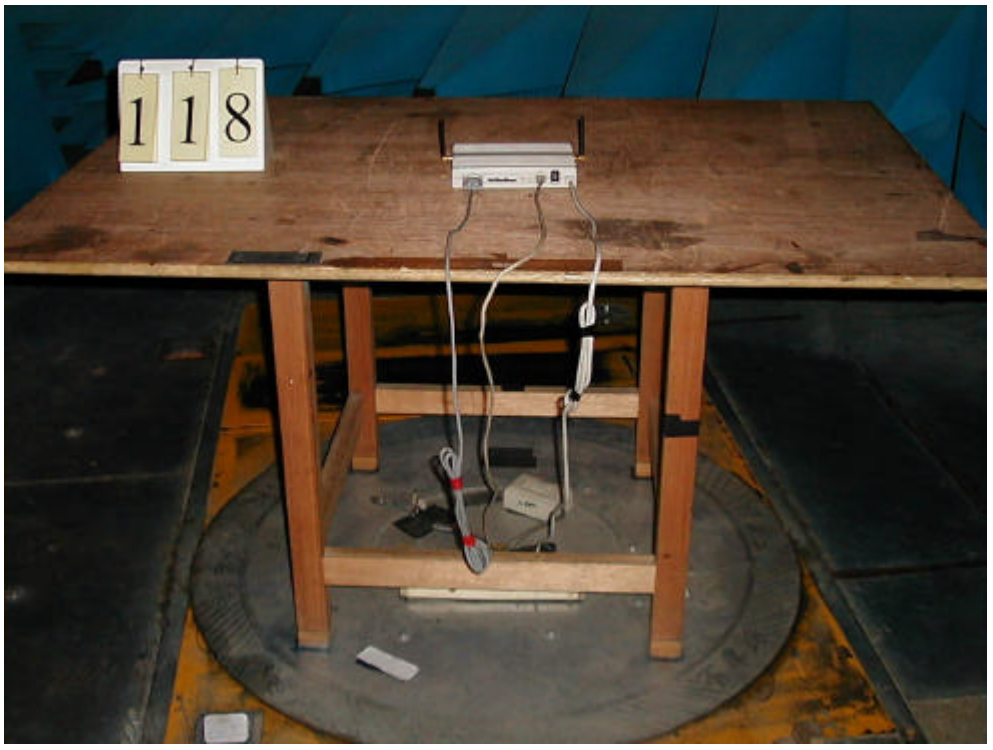
MARKER Δ
2.1500 msec
.96 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 2.1500 msec
.96 dB
Last Hrd Key Menu
SPAN
LOG
10
dB/
#ATN
0 dB
REF 70.0 dBµV
PREAMP ON
MARKER NORMAL
MARKER AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More 1 of 2
VA SB
SC FC
CORR
CENTER 2.413683 GHz
#IF BW 1.0 MHz
#AVG BW 1 MHz
SPAN 0 Hz
#SWP 20.0 msec

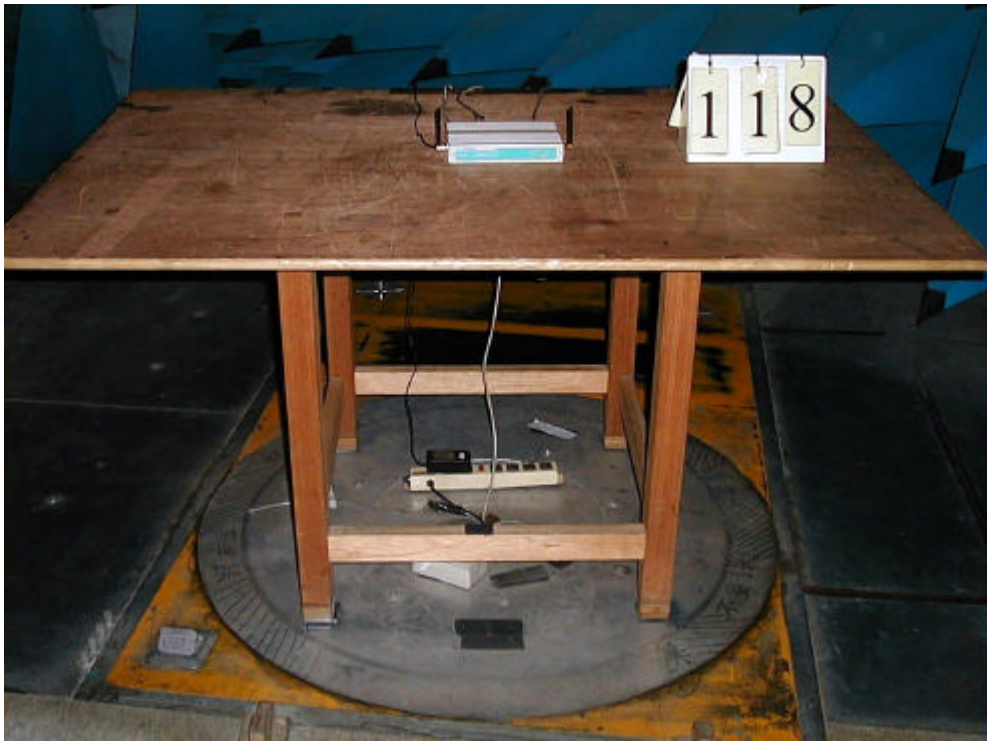
5.3 Test Instruments Configuration



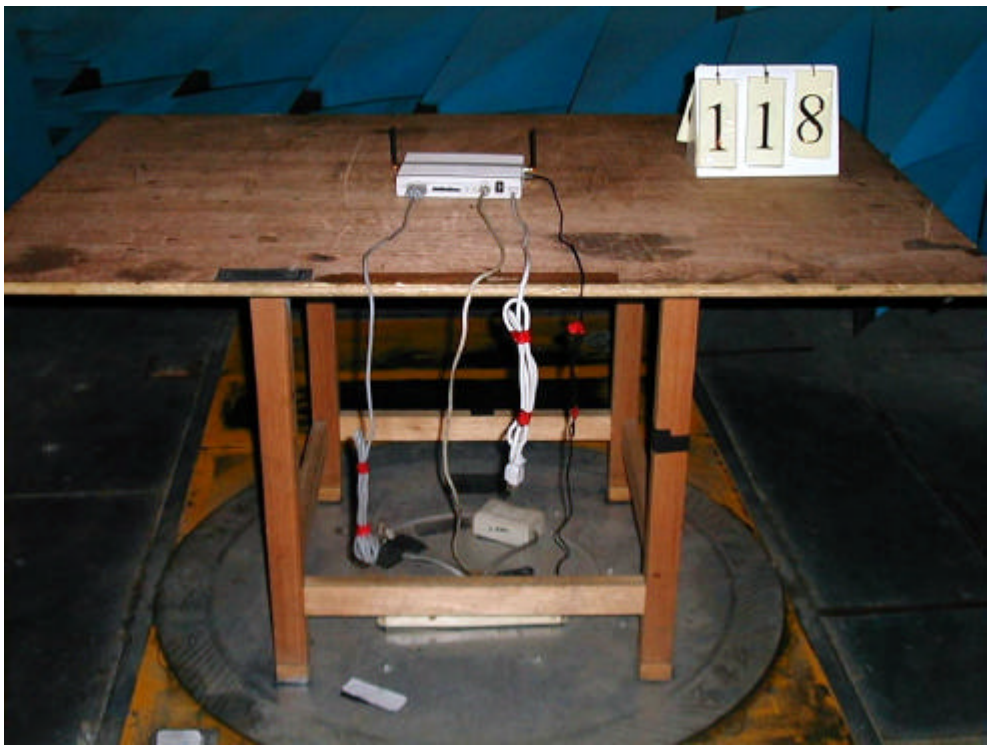
Pig 1 Front View of the Test Configuration AC power Source



Pig 2 Rear View of the Test Configuration for AC power Source



Pig 1 Front View of the Test Configuration for AC/DC Adaptor



Pig 2 Rear View of the Test Configuration for AC/DC Adaptor

The test configuration for frequency between 1GHz to 18GHz is same as above.

5.4 Test Result of Second Harmonic

Set the spectrum RB= 3 MHz, VB = 3MHz and span = 5MHz. The correction factors of the second harmonic is the second harmonic must lower 20 dB than the fundamental.

FCC ID : LZU-MAP-811
EUT : Wireless Bridge Router

Table 8 Second Harmonic Attendation

Channel		***Fundamental (MHz)***	***Fundamental (dBmV/m)***	***2nd Harmonic (GHz)***	***2nd Harmonic (dBmV/m)***	***Result (F/H dB)***	***Limit (dB)***	***Margin (dB)***
AC Power Source	01	2.412	103.96	4.060	39.40	64.56	20.00	44.56
	06	2.437	105.74	4.100	42.23	63.51	20.00	43.51
	11	2.462	106.03	4.180	43.73	62.30	20.00	42.30
AC/DC Adaptor	01	2.412	103.20	4.060	39.57	63.63	20.00	43.63
	06	2.437	105.81	4.100	43.40	62.41	20.00	42.41
	11	2.462	105.14	4.150	43.57	61.57	20.00	41.57

Note:

1. The 2nd Harmonic is comply with 15.209.
2. Result = Fundamental – 2nd Harmonic must over 20 dB and comply with 15.209.

5.5 Test Result of Spurious Radiated Emissions

5.5.1 EUT's transmit only

The highest peak values of radiated emissions form the EUT at various antenna heights, antenna polarizations, EUT orientation, etc. are recorded on the following.

FCC ID : LZU-MAP-811
EUT : Wireless Bridge Router

Test Conditions: Testing room : Temperature : 26 ° C Humidity : 73 % RH
Testing site : Temperature : 31 ° C Humidity : 75 % RH

Table 9 Radiated Emissions For 30MHz 1GHz [Power by AC Source, CH 1, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
60.004	22.33	3.93	137	-11.21	33.54	40.00	-6.46
100.000	20.28	3.93	115	-12.45	32.73	43.50	-10.77
125.000	21.93	2.45	114	-14.40	36.33	43.50	-7.17
240.000	16.00	1.00	111	-15.09	31.09	46.00	-14.91
330.000	23.49	1.00	24	-17.26	40.75	46.00	-5.25
360.000	22.01	1.00	69	-18.29	40.30	46.00	-5.70
***							

Note:

1. Margin = Corrected Amplitude – Limit.
2. Peak Amplitude – Correction Factors = Corrected Amplitude

Table 10 Radiated Emissions For 1GHz 18GHz [Power by AC Source, CH 1, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.060	40.87	1.00	138	-5.64	35.23	54.00	-18.77
***							

Note:

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factor = Corrected

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 11 Radiated Emissions For 30MHz 1GHz [Power by AC Source, CH 1, Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
37.541	14.72	1.00	153	-20.37	35.09	40.00	-4.91
60.002	25.10	1.00	58	-11.31	36.41	40.00	-3.59
100.001	21.21	1.00	67	-11.47	32.68	43.50	-10.82
125.000	23.81	1.00	42	-13.94	37.75	43.50	-5.75
300.000	13.84	1.00	32	-17.53	31.37	46.00	-14.63
569.911	10.48	1.00	132	-23.56	34.04	46.00	-11.96
***							

Table 12 Radiated Emissions For 1GHz 18GHz [Power by AC Source, CH 1, Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.060	45.04	1.00	29	-5.64	39.40	54.00	-14.60
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 13 Radiated Emissions For 30MHz 1GHz [Power by AC Source, CH 6, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
60.001	21.72	3.95	140	-11.21	32.93	40.00	-7.07
100.000	20.42	3.94	117	-12.45	32.87	43.50	-10.63
125.000	21.50	2.45	117	-14.40	35.90	43.50	-7.60
250.001	21.78	1.00	130	-15.49	37.27	46.00	-8.73
329.996	23.19	1.00	26	-17.26	40.45	46.00	-5.55
359.995	21.98	1.00	69	-18.29	40.27	46.00	-5.73
***							

Table 14 Radiated Emissions For 1GHz 18GHz [Power by AC Source, CH 6, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.100	41.21	1.00	281	-5.64	35.57	54.00	-18.43
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 15 Radiated Emissions For 30MHz 1GHz [Power by AC Source, CH 6, Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
37.542	12.41	1.00	140	-20.37	32.78	40.00	-7.22
60.000	25.42	1.00	40	-11.31	36.73	40.00	-3.27
100.000	21.66	1.00	70	-11.47	33.13	43.50	-10.37
125.001	23.85	1.00	47	-13.94	37.79	43.50	-5.71
359.997	13.76	1.00	69	-18.07	31.83	46.00	-14.17
599.990	10.80	1.00	51	-23.56	34.36	46.00	-11.64
***							

Table 16 Radiated Emissions For 1GHz 18GHz [Power by AC Source, CH 6, Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.100	47.87	1.00	81	-5.64	42.23	54.00	-11.77
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 17 Radiated Emissions For 30MHz 1GHz [Power by AC Source, CH 11, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
60.003	22.37	3.96	89	-11.21	33.58	40.00	-6.42
125.001	21.98	2.43	90	-14.40	36.38	43.50	-7.12
209.999	16.94	1.00	94	-14.08	31.02	43.50	-12.48
264.003	14.08	1.00	103	-15.71	29.79	46.00	-16.21
329.997	23.01	1.00	23	-17.26	40.27	46.00	-5.73
449.997	11.01	2.43	137	-20.57	31.58	46.00	-14.42
***							

Table 18 Radiated Emissions For 1GHz 18GHz [Power by AC Source, CH 11, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.180	43.87	1.00	21	-5.64	38.23	54.00	-15.77
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 19 Radiated Emissions For 30MHz 1GHz [Power by AC Source, CH 11, Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
37.542	12.41	1.00	129	-20.37	32.78	40.00	-7.22
59.999	25.33	1.00	12	-11.31	36.64	40.00	-3.36
100.002	21.49	1.00	42	-11.47	32.96	43.50	-10.54
125.001	23.81	1.00	33	-13.94	37.75	43.50	-5.75
359.999	13.66	1.00	69	-18.07	31.73	46.00	-14.27
599.990	10.68	1.00	47	-23.56	34.24	46.00	-11.76
***							

Table 20 Radiated Emissions For 1GHz 18GHz [Power by AC Source, CH 11, Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.180	49.37	1.00	9	-5.64	43.73	54.00	-10.27
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 21 Radiated Emissions For 30MHz 1GHz [Power by AC/DC Adaptor, CH 1, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
98.312	16.41	3.95	109	-12.24	28.65	43.50	-14.85
125.000	23.43	2.45	114	-14.40	37.83	43.50	-5.67
209.997	18.63	1.00	118	-14.08	32.71	43.50	-10.79
250.001	20.41	1.00	126	-15.49	35.90	46.00	-10.10
329.997	22.31	1.00	108	-17.26	39.57	46.00	-6.43
359.996	20.62	1.00	126	-18.29	38.91	46.00	-7.09
***							

Table 22 Radiated Emissions For 1GHz 18GHz [Power by AC/DC Adaptor, CH 1, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.060	40.21	1.00	301	-5.64	34.57	54.00	-19.43
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 23 Radiated Emissions For 30MHz 1GHz [Power by AC/DC Adaptor, CH 1, Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude	FCC Class B (3 m)	
Frequency (MHz)	Amplitude (dBmV/m)	Ant. H. (m)	Table (°)	(dB)	(dBmV/m)	Limit (dBmV/m)	Margin (dB)
49.155	16.59	1.00	44	-15.12	31.71	40.00	-8.29
125.000	26.20	1.00	64	-13.94	40.14	43.50	-3.36
210.000	15.63	1.00	150	-14.22	29.85	43.50	-13.65
359.998	15.68	1.00	20	-18.07	33.75	46.00	-12.25
569.993	11.31	1.00	28	-23.56	34.87	46.00	-11.13
599.992	12.19	1.00	57	-23.56	35.75	46.00	-10.25
***							

Table 24 Radiated Emissions For 1GHz 18GHz [Power by AC/DC Adaptor, CH 1, Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.060	45.21	1.00	94	-5.64	39.57	54.00	-14.43
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 25 Radiated Emissions For 30MHz 1GHz [Power by AC/DC Adaptor, CH 6, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
125.001	22.55	2.46	120	-14.40	36.95	43.50	-6.55
209.998	18.99	1.00	116	-14.08	33.07	43.50	-10.43
249.999	20.03	1.00	102	-15.49	35.52	46.00	-10.48
329.995	22.23	1.00	126	-17.26	39.49	46.00	-6.51
359.996	21.02	1.00	7	-18.29	39.31	46.00	-6.69
599.991	8.82	1.00	149	-23.25	32.07	46.00	-13.93
***							

Table 26 Radiated Emissions For 1GHz 18GHz [Power by AC/DC Adaptor, CH 6, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.100	41.87	1.00	75	-5.64	36.23	54.00	-17.77
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 27 Radiated Emissions For 30MHz 1GHz [Power by AC/DC Adaptor, CH 6, Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
47.801	17.84	1.00	3	-15.80	33.64	40.00	-6.36
96.001	20.58	1.00	7	-11.18	31.76	43.50	-11.74
125.000	25.74	1.00	9	-13.94	39.68	43.50	-3.82
329.998	18.61	1.00	25	-17.10	35.71	46.00	-10.29
509.993	10.89	1.00	139	-22.10	32.99	46.00	-13.01
599.991	12.49	1.00	62	-23.56	36.05	46.00	-9.95
***							

Table 28 Radiated Emissions For 1GHz 18GHz [Power by AC/DC Adaptor, CH 6, Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.100	49.04	1.00	167	-5.64	43.40	54.00	-10.60
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 29 Radiated Emissions For 30MHz 1GHz [Power by AC/DC Adaptor, CH 11, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
124.999	22.83	2.45	122	-14.40	37.23	43.50	-6.27
191.703	17.19	1.00	64	-12.85	30.04	43.50	-13.46
200.000	16.87	1.00	22	-13.40	30.27	43.50	-13.23
239.996	18.94	1.00	114	-15.09	34.03	46.00	-11.97
329.994	22.32	1.00	108	-17.26	39.58	46.00	-6.42
359.994	21.25	1.00	69	-18.29	39.54	46.00	-6.46
***							

Table 30 Radiated Emissions For 1GHz 18GHz [Power by AC/DC Adaptor, CH 11, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.150	44.21	1.00	194	-5.64	38.57	54.00	-15.43
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Table 31 Radiated Emissions For 30MHz 1GHz [Power by AC/DC Adaptor, CH 11, Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude	FCC Class B (3 m)	
Frequency (MHz)	Amplitude (dBmV/m)	Ant. H. (m)	Table (°)	(dB)	(dBmV/m)	Limit (dBmV/m)	Margin (dB)
47.801	17.20	1.00	1	-15.80	33.00	40.00	-7.00
100.000	20.47	1.00	152	-11.47	31.94	43.50	-11.56
125.001	25.60	1.00	8	-13.94	39.54	43.50	-3.96
330.000	18.77	1.00	24	-17.10	35.87	46.00	-10.13
569.990	11.83	1.00	32	-23.56	35.39	46.00	-10.61
599.990	12.81	1.00	58	-23.56	36.37	46.00	-9.63
***							

Table 32 Radiated Emissions For 1GHz 18GHz [Power by AC/DC Adaptor, CH 11, Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude (dBm V/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBm V/m)*	*Limit (dBm V/m)*	*Margin (dB)*
4.150	49.21	1.00	194	-5.64	43.57	54.00	-10.43
***							

Above emissions of 4.2GHz, they are all under the limits more than twenty dB in Test Site.

Ⅵ. Section 15.247(d): Power Spectral Density

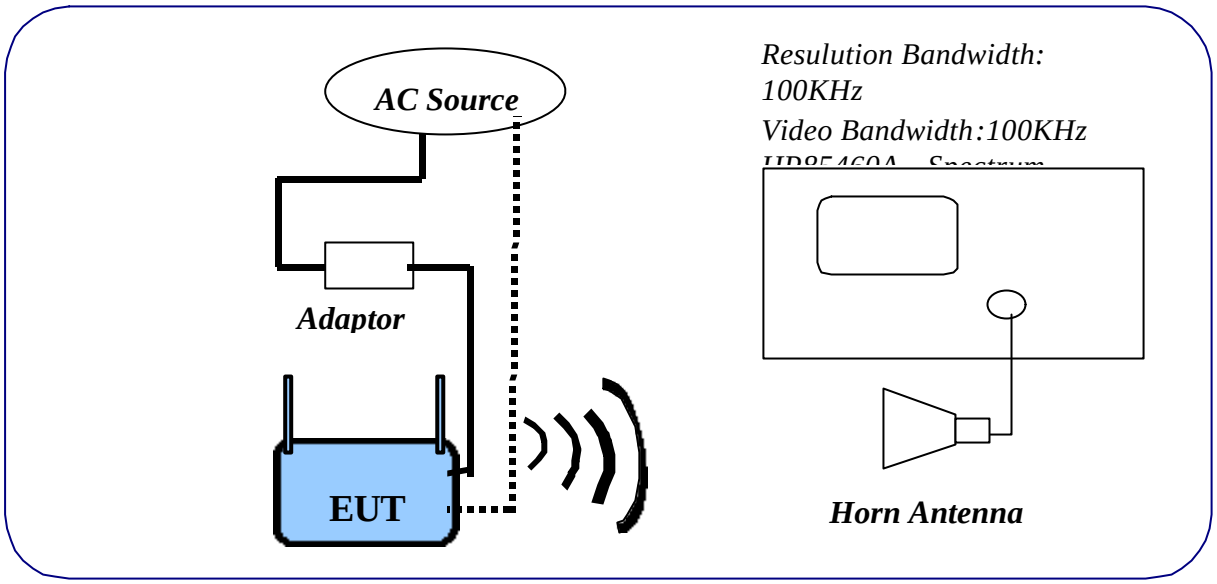
6.1 Test Condition & Setup

The tests below are running with the EUT transmitter set at high power in TDD mode .A mini-pci port from a notebook computer to the EUT. The EUT is needed to force selection of output power level and channel number. While testing, EUT was set to transmit continuously. A horn antenna was connected with the spectrum analyzer.

The EUT is tested in open field site. Put EUT on the middle of a wooden table. Set spectrum analyzer RBW = 3 KHz, VBW > RBW (e.g. VBW = 10 KHz), Span = 2 MHz. Turn around the table to find maximum emission. Then set the Span = 300 KHz and sweep time = 100 sec . Peak the maximum emission again. The peak level measured must be no greater than + 8dBm.

The setting up procedure is recorded on Appendix A.

6.2 Test Instruments Configuration



P.S.A USB lan to USB port from notebook computer to control the EUT at maximal power output and channel Number.

Fig 12. Test Configuration of power spectral density

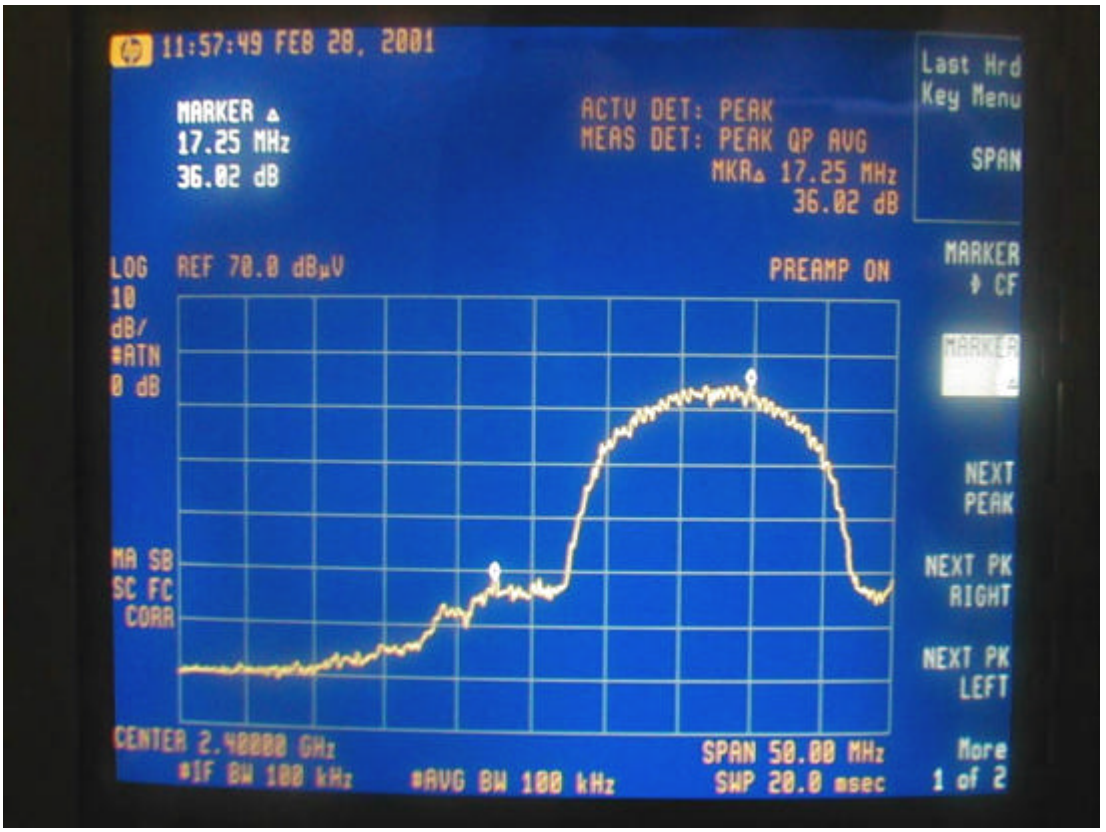
6.3 List of Test Instruments

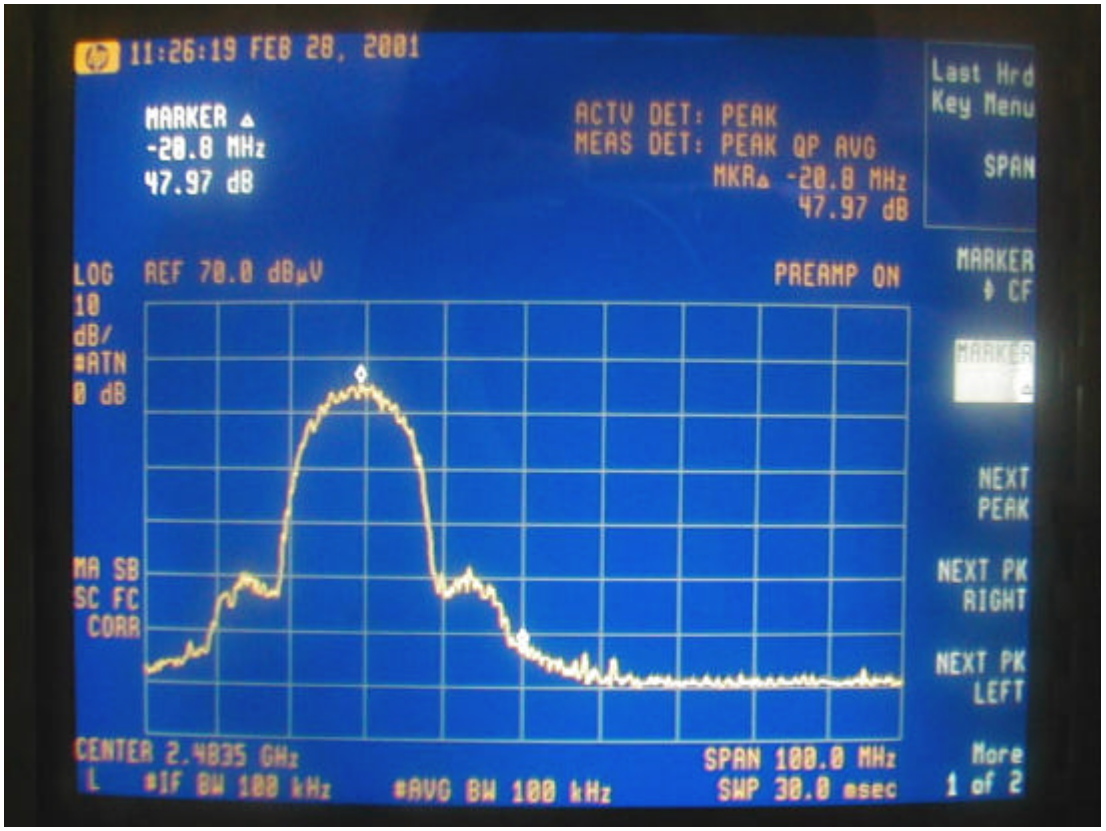
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	10/18/00	10/18/01
RF Filter Section	85460A	H P	3448A00217	10/18/00	10/18/01
Horn Antenna	3115	EMCO	9704 – 5178	08/15/00	08/15/01

6.4 Required of Carrier frequency

If any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified id § 15.209(a), whichever results in the lesser attenuation.

Test Condition & Setup: same as 3.1


11:57:49 FEB 28, 2001
MARKER Δ
17.25 MHz
36.02 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 17.25 MHz
36.02 dB
Last Hrd Key Menu
SPAN
LOG
10
dB/
#ATN
0 dB
REF 70.0 dBμV
PREAMP ON
MARKER → CF
MA SB
SC FC
CORR
NEXT PEAK
NEXT PK RIGHT
NEXT PK LEFT
CENTER 2.40000 GHz
#IF BW 100 kHz
#AVG BW 100 kHz
SPAN 50.00 MHz
SWP 20.0 msec
More 1 of 2


11:26:19 FEB 28, 2001
MARKER Δ
-20.0 MHz
47.97 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ -20.0 MHz
47.97 dB
Last Hrd Key Menu
SPAN
LOG
10
dB/
#ATN
0 dB
REF 70.0 dBμV
PREAMP ON
MARKER → CF
MA SB
SC FC
CORR
NEXT PEAK
NEXT PK RIGHT
NEXT PK LEFT
CENTER 2.4835 GHz
L
#IF BW 100 kHz
#AVG BW 100 kHz
SPAN 100.0 MHz
SWP 30.0 msec
More 1 of 2

6.5 Test Result of Power spectral density

The following table shows a summary of the highest power out of UT.

FCC ID : MAP-811

EUT : LZU-MAP-811

Channel	*Frequency (GHz)*	*Ppr (dBuV)*	*CF (dB)*	*Ppq (dBm)*	*Limit (dB)*	*Margin (dB)*
AC/DC Adaptor 01	2.413	40.53	35.60	-27.12	8.00	-35.12
AC/DC Adaptor 06	2.438	41.78	35.60	-25.69	8.00	-33.69
AC/DC Adaptor 11	2.483	43.47	35.60	-23.77	8.00	-31.77
AC Power Source 01	2.413	42.02	35.60	-28.44	8.00	-36.44
AC Power Source 06	2.438	42.72	35.60	-27.77	8.00	-35.77
AC Power Source 11	2.483	42.05	35.60	-29.27	8.00	-37.27

Note:

1. The attachment follow by this page and there is no page number.
2. Ppr: spectrum read power density (using peak search mode), CF: correct factor, Ppq: actual peak power density in the spread spectrum band.
3. Ppq = Ppr + CF
4. Effective Radiation Power (E.R.P.) = $(E\ d)^2 / 30G$

"E" is the measured maximum field strength in V/m utilizing the maximum hold mode RBW (3KHz)

"G" is the numeric gain of the transmitting antenna over an isotropic radiator (1.00).

"d" is the distance in meters from which the field strength was measured (3M).

Example: the Max Radiation Emission = 43.47 + (35.60) = 71.46 dBμV/m

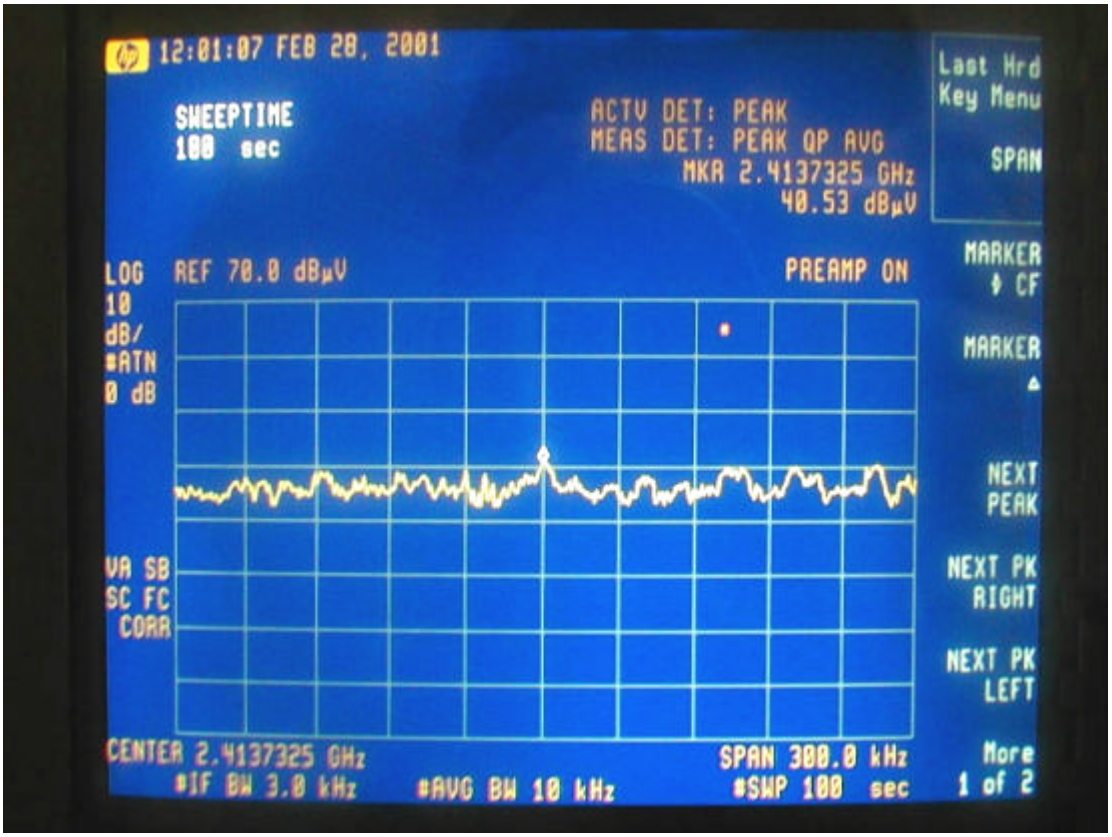
$10^{(71.46/20)} \times 10^{-6} = 0.003741$ V

E.R.P. = $(0.003741 \times 3)^2 / 30 = 0.004199$ mW

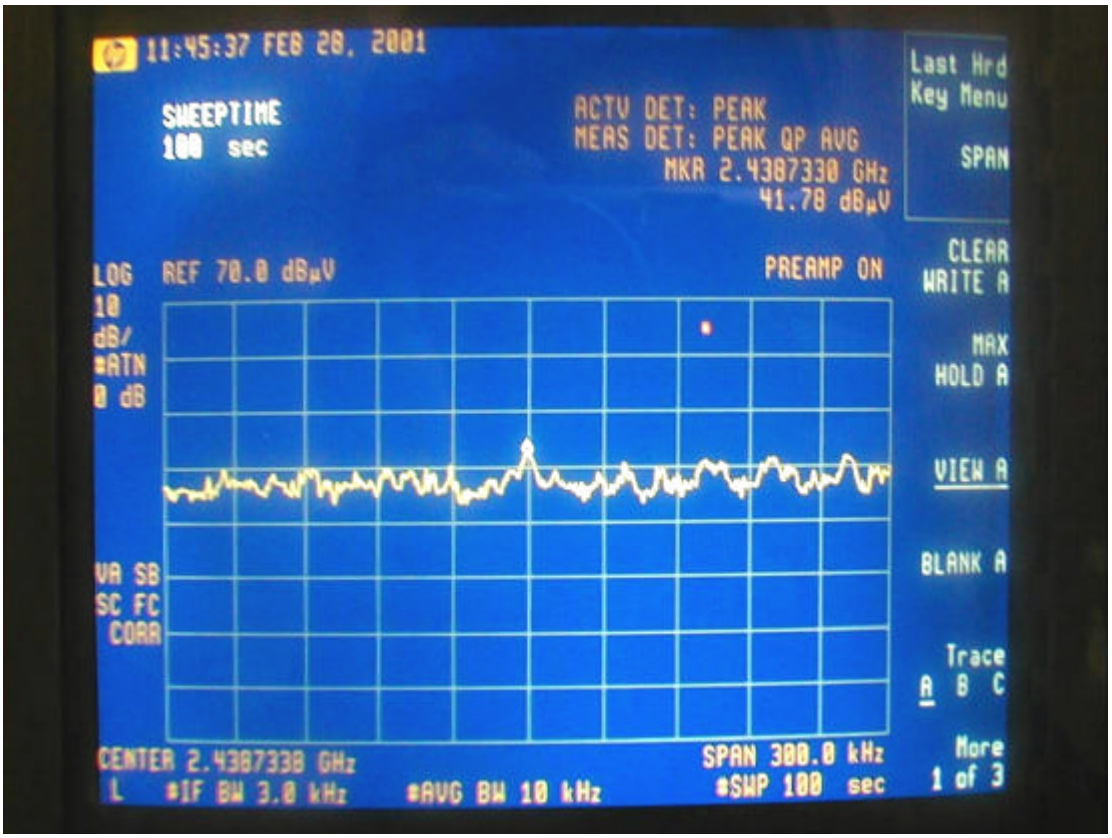
= 10 x log (0.004199 mW/1mW)

= -23.77 dBm

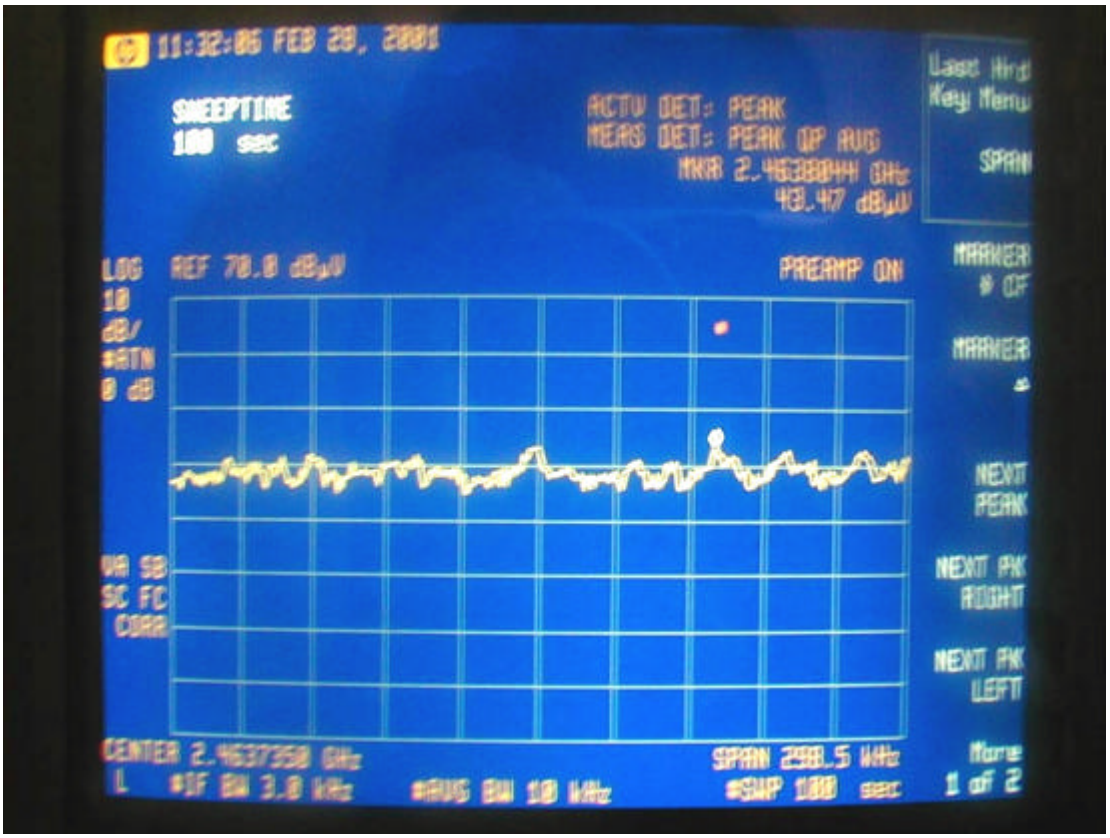
Power Spectral Density of Channel 01, Power by AC/DC Adaptor



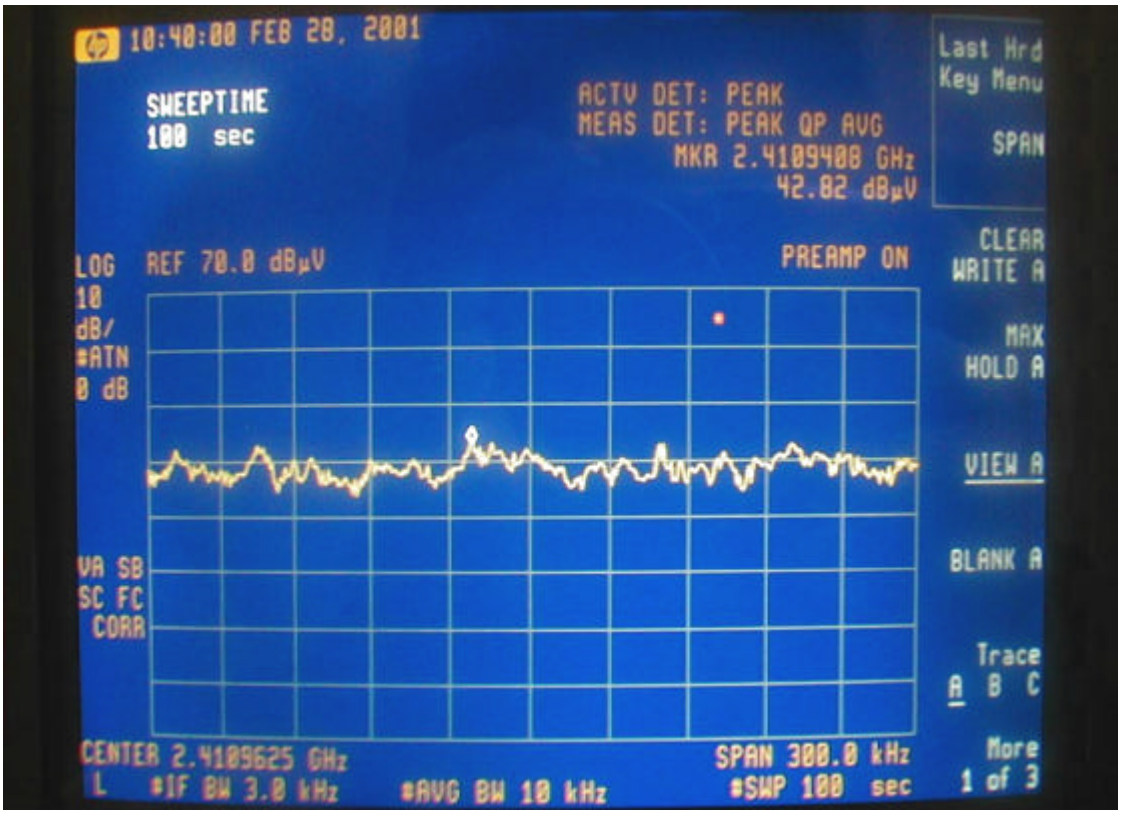
Power Spectral Density of Channel 06, Power by AC/DC Adaptor



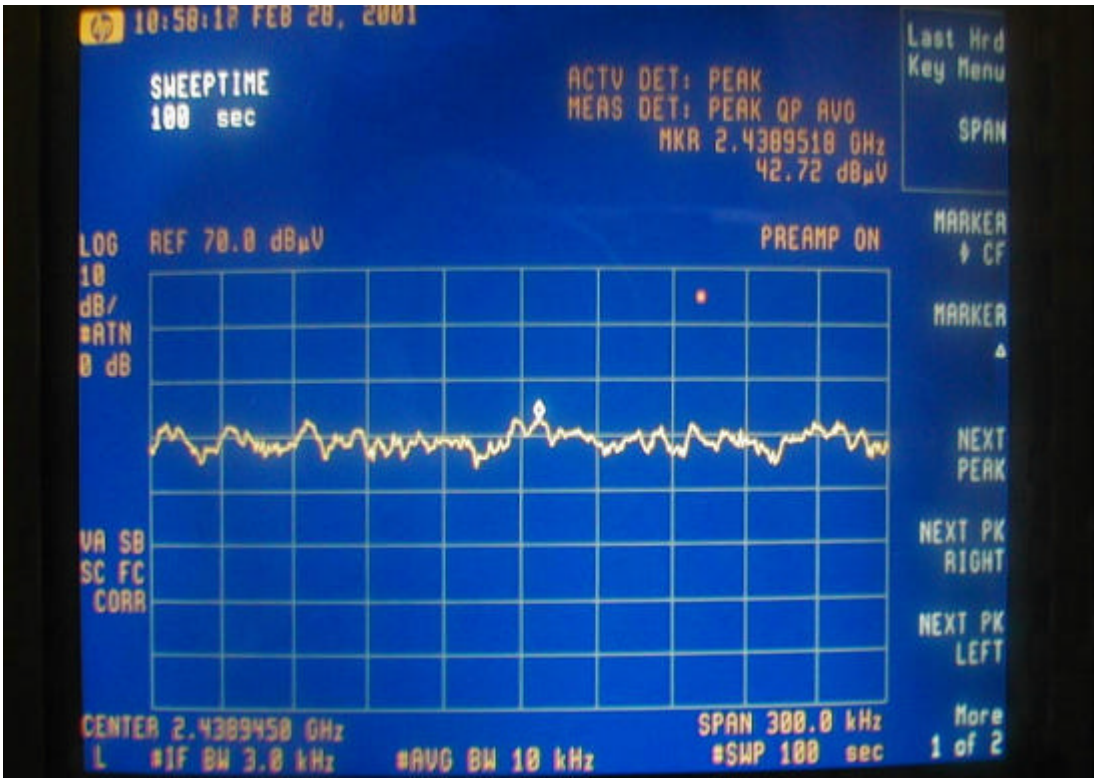
Power Spectral Density of Channel 11, Power by AC/DC Adaptor



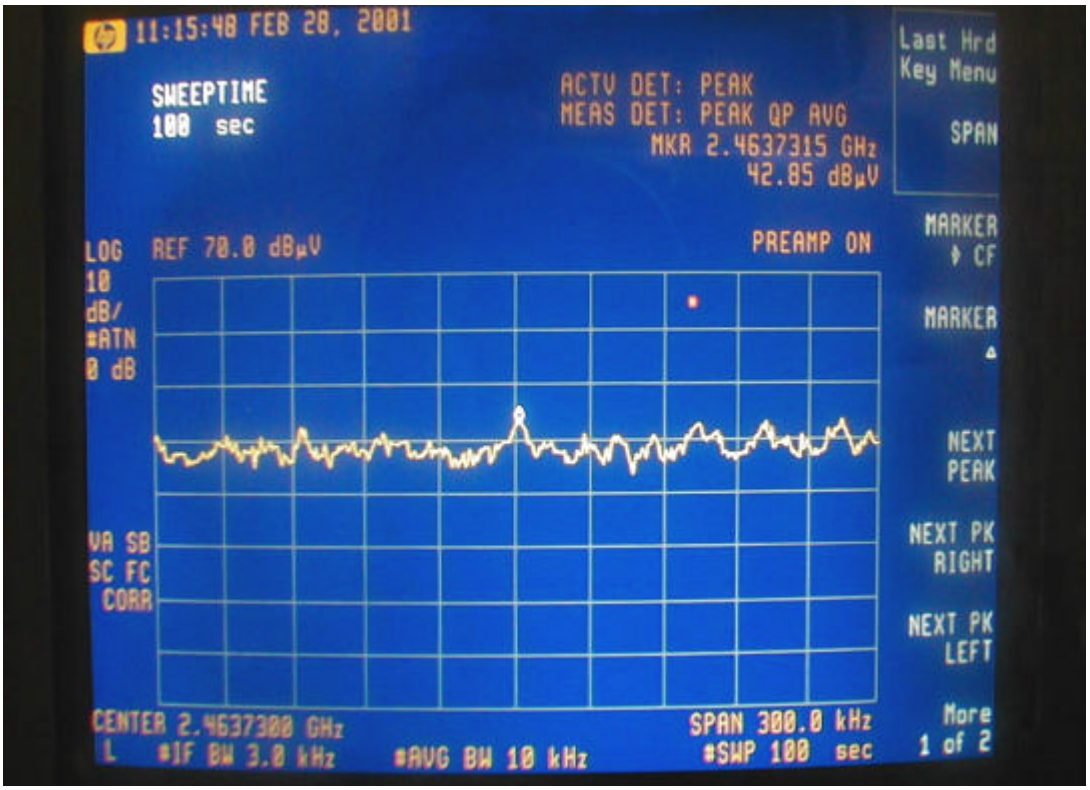
Power Spectral Density of Channel 1, Power by AC Source



Power Spectral Density of Channel 6, Power by AC Source



Power Spectral Density of Channel 11, Power by AC Source



Ⅶ. Section 15.247(e): Processing Gain

7.1 Test Method & Setup

The test method attach in the docket 97-114 appendix C Jamming Test setup that we found there were couple disadvantage as list in the follow:

(1) It can not simulate the real world condition

(2) Most of the hand held device (include notebook computer) there is no ground connection to the earth, especially the RF front end ground.

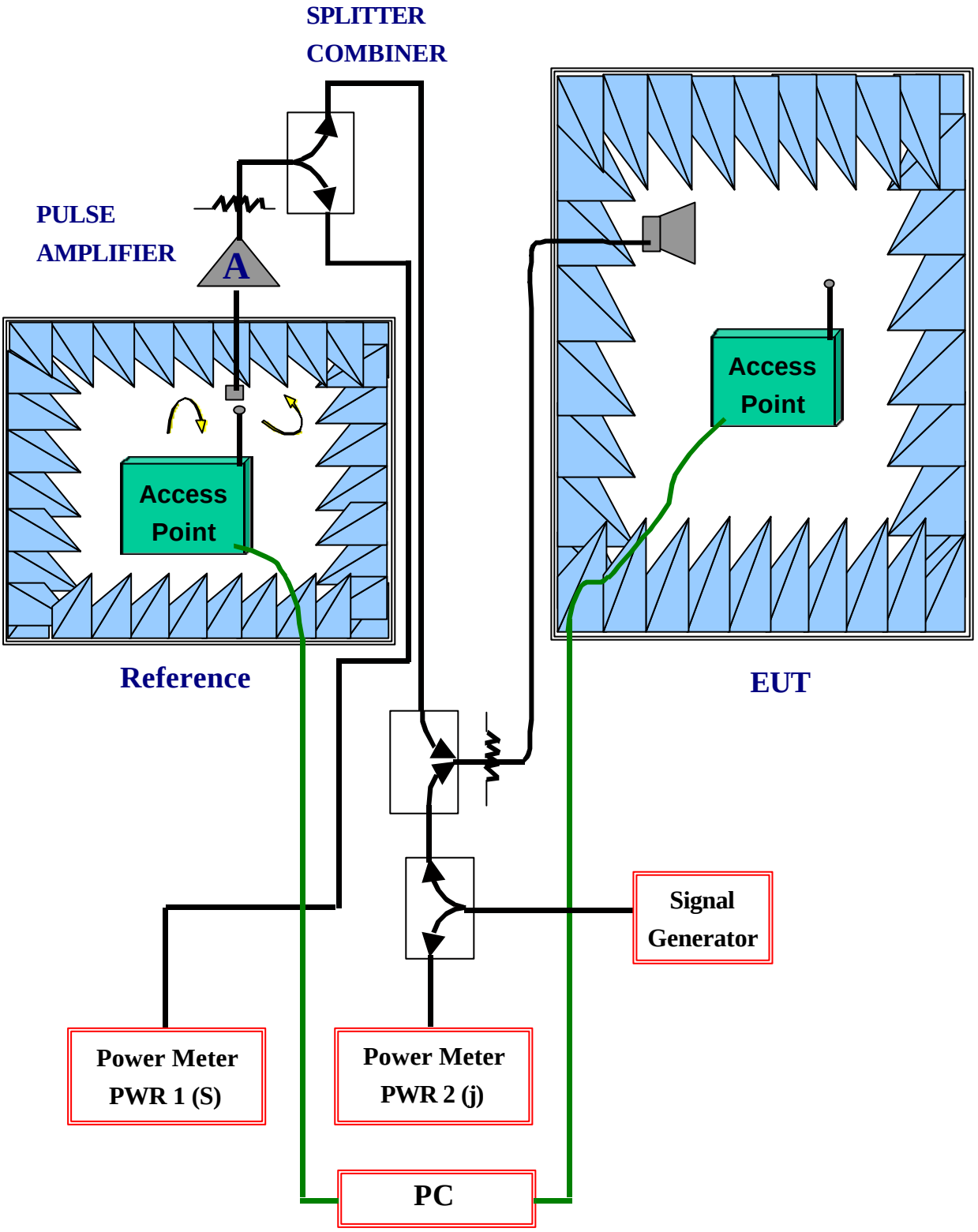
(3) The Coaxial and internal RF module will leak the signal that even you connect very high value attenuator .(shielding effective is low in the 2.4 GHz)

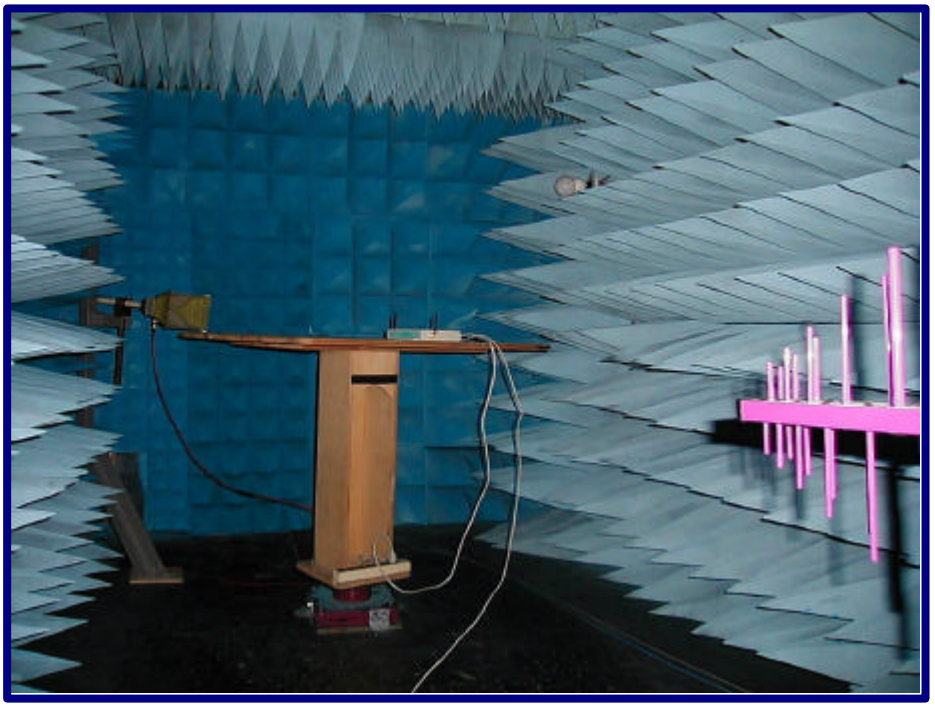
(4) There was very high uncertainty of measurement result and it is depended how you connect EUT, testing facility, wire and cable for BER measurement, power supply… all of this can affect the testing result.

(5) Move out the antenna and Matching pad are inconvenient for the testing and need more sample.

Base on the above reason we modify the original jamming test setup figure 1,and use two fully anechoic chambers to isolate test EUT and reference EUT.

Test procedure is simulated normal jamming setup, the block diagram and photograph as below.


SPLITTER
COMBINER
PULSE
AMPLIFIER
A
Access
Point
Reference
Access
Point
EUT
Signal
Generator
Power Meter
PWR 1 (S)
Power Meter
PWR 2 (j)
PC



7.2 Bit Error Rate (BER)

(1) Test Background and procedure

According to FCC regulation, a direct sequence spread spectrum system must have processing gain, G_p of the least 10 dB. Compliance to this requirement can be shown by demonstrating a relative bit-error-ratio (BER) performance improvement (and corresponding signal to noise ratio per symbol improvement of at least 10dB) between the case where spread spectrum processes (coding, modulation) are engaged relative to the processes being bypassed. In some practical system, the spread spectrum processing cannot simply bypassed. In accordance with the new NPRM 99-231, if the vendor has a system with less than 10 chips per symbol, the CW jamming results must be supported by a theoretical explanation of the system processing gain.

(2) Theoretical calculations

The processing gain is related to the jamming margin as follows:

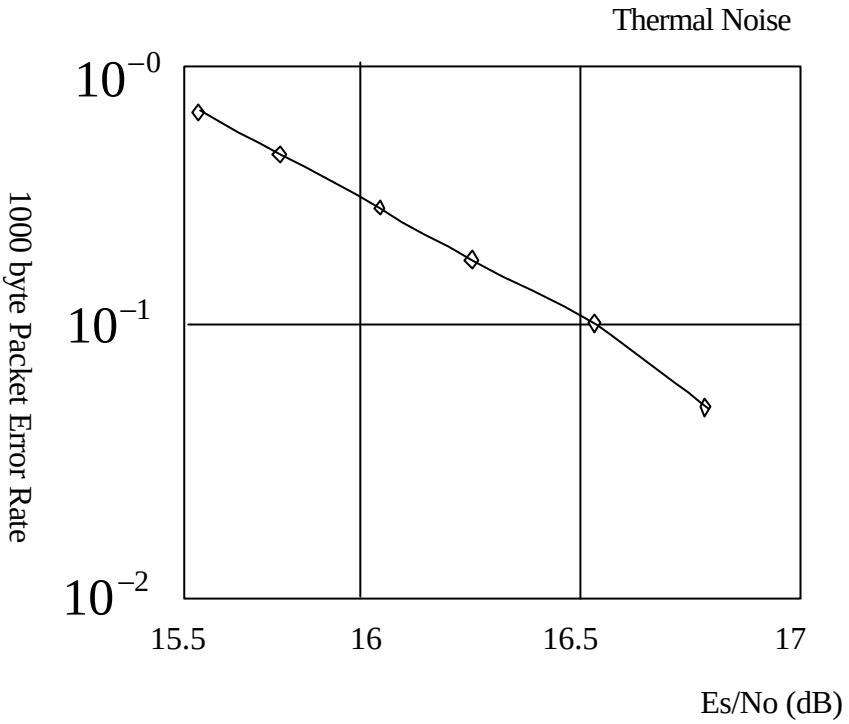
$$G_p = \left(\frac{S}{N}\right)_{output} + \left(\frac{J}{S}\right) + L_{systen}$$

Where $BER_{REFERENCE}$ is the reference bit error ratio with its corresponding, theoretical output signal to noise ratio per symbol, $\left(S/N\right)_{output}$, $\left(J/S\right)$ is the jamming margin (jamming signal power relative to desired signal power),and L_{system} are the system implementation losses. The maximum allowed total system implementation loss is 2 dB. The HFA3861A direct sequence spread spectrum baseband processor uses DBSK and DQSK modulation, which is a form of M-ray Orthogonal Keying. The BER performance curve is given by: The probability of error for generalized M-ary Orthogonal signaling using coherent demodulation is given by:

$$P_e = 1 - P_{c1} = 1 - \frac{1}{\sqrt{2p}} \int_{-\frac{S_{01}}{N_0}}^{\infty} \left[2\left(1 - Q\left\{ z + \sqrt{2\frac{E_b}{h}} \right\}\right)\right]^{\frac{M}{2}-1} \exp\left\{-\frac{Z^2}{2}\right\} dz$$

This integral cannot be solved in closed form, and numerical integration must be used. This is done in a MATHCAD environment and is displayed in graphical format

1000 byte PER vs. Es/No



The reference PER is specified as 8% . The corresponding Es/No (signal to noise ratio per symbol) is 16.4 dB. The Es/No required to achieve the desired BER with maximum system implementation losses is 18.4dB. The minimum processing gain is again, 10dB, therefore:

$$G_p = \left(\frac{E_s}{N_o}\right)_{output} + \left(\frac{J}{S}\right) + L_{system} = 16.4dB + 2.0dB + \left(\frac{J}{S}\right) \geq 10dB$$

$$G_p = 18.4dB + \left(\frac{J}{S}\right) \geq 10dB$$

The minimum jammer to signal ratio is as follow:

$$\left(\frac{J}{S}\right) \geq -8.4dB$$

7.3 List of Test Instruments

EQUIPMENT NAME	MANUFACTURE	MODEL NUMBER
ANTENNA	TRC	2.4GHz Mono Dipole
HORN	The Elector-Mechaniss	3115
COMBINER	MINI-CIRCULTS	15542 ZAPD-4
POWER METER	HP	436A
POWER METER	HP	E44188
AMPLIFIER	MINI-CIRCUITS	ZFL-2500M
SIGNAL GENERATOR	HP	86480
ANTENNUATOR	MINI-CIRCULTS	SAT-30
BI-LOG	Schaffner	CBL6141A

7.4 Test Procedure

The test block diagram in the figure (1) and the procedure as below.

(1) Install two lan card into PC.
(2) Install DOS Test into computers for E.U.T. and Reference.
(3) Set the two LAN card of computer as “Port1 ping Port2”.
(4) Generated the Log File in the Reference Port1 of computer and send the test file.
(5) The port 1of pc (Reference) send 1000 packet to EUT. Then EUT response to Port 2 of PC. Also, PC can calculated packet data bit error rate.
(6) Ensure that CW Jammer generator RF out put is disabled and measure the power at the power meter port using the power meter 1. This is the relative signal power, S_r.
(7) Set CW Jammer generator RF output frequency equal to the carrier frequency and enable generator output Set reference CW Jammer power level at power meter port 8.4 dB below S_r (minimum J/S, or 10 dB processing gain reference level).Note the power level setting on the generator, this is the reference CW Jammer power setting, J_r (Power Meter 2) .
(8) Enable CW Jammer at the reference power level and verify that the PER test indicates a per of less than 8%.
(9) Alternatively, adjust the CW Jammer level to that which causes 8% PER and verify that the S/J is less than 8.4dB.
(10) Repeat step 7 for uniform steps in frequency increments of 50kHz across the receiver passband with the CW Jammer. In this case the receiver passband is $\pm$5.0MHz.

The number of points where the PER fail to achieve 8% (is higher than 8%) is determined and if this is above 20% of the total, the test is failed otherwise it is passed.

The margin by which the radio passes the test (for information purposes) can be determined from the average of the remaining points’ PERs scaled on the PER curve above.

7.5 Test Result of Processing Gain

Table 33 Processing Gain [Channel 1, CCK, 2.40700GHz to 2.40895GHz]

Jammer Frequency (MHz)	Signal Level S (dBm)	Signal Generator RF Output J (dBm)	Mj (J/S)	Process Gain (dB)
2407.00	-27.00	-20.90	6.10	24.50
2407.05	-27.00	-20.92	6.08	24.48
2407.10	-27.00	-20.95	6.05	24.45
2407.15	-27.00	-20.96	6.04	24.44
2407.20	-27.00	-20.70	6.30	24.70
2407.25	-27.00	-20.93	6.07	24.47
2407.30	-27.00	-21.30	5.70	24.10
2407.35	-27.00	-20.80	6.20	24.60
2407.40	-27.00	-20.85	6.15	24.55
2407.45	-27.00	-21.50	5.50	23.90
2407.50	-27.00	-21.30	5.70	24.10
2407.55	-27.00	-21.00	6.00	24.40
2407.60	-27.00	-21.05	5.95	24.35
2407.65	-27.00	-21.15	5.85	24.25
2407.70	-27.00	-21.22	5.78	24.18
2407.75	-27.00	-21.20	5.80	24.20
2407.80	-27.00	-21.60	5.40	23.80
2407.85	-27.00	-21.50	5.50	23.90
2407.90	-27.00	-21.30	5.70	24.10
2407.95	-27.00	-21.28	5.72	24.12
2408.00	-27.00	-21.23	5.77	24.17
2408.05	-27.00	-21.35	5.65	24.05
2408.10	-27.00	-21.33	5.67	24.07
2408.15	-27.00	-21.70	5.30	23.70
2408.20	-27.00	-21.95	5.05	23.45
2408.25	-27.00	-22.00	5.00	23.40
2408.30	-27.00	-22.20	4.80	23.20
2408.35	-27.00	-22.25	4.75	23.15
2408.40	-27.00	-22.22	4.78	23.18
2408.45	-27.00	-22.30	4.70	23.10
2408.50	-27.00	-22.40	4.60	23.00
2408.55	-27.00	-22.44	4.56	22.96
2408.60	-27.00	-22.45	4.55	22.95
2408.65	-27.00	-22.50	4.50	22.90
2408.70	-27.00	-21.91	5.09	23.49
2408.75	-27.00	-21.97	5.03	23.43
2408.80	-27.00	-22.10	4.90	23.30
2408.85	-27.00	-22.51	4.49	22.89
2408.90	-27.00	-22.24	4.76	23.16
2408.95	-27.00	-22.47	4.53	22.93

Table 34 Processing Gain [Channel 1, CCK, 2.40900GHz to 2.41095GHz]

Jammer Frequency (MHz)	Signal Level S (dBm)	Signal Generator RF Output J (dBm)	Mj (J/S)	Process Gain (dB)
2409.00	-27.00	-22.57	4.43	22.83
2409.05	-27.00	-22.81	4.19	22.59
2409.10	-27.00	-22.86	4.14	22.54
2409.15	-27.00	-22.91	4.09	22.49
2409.20	-27.00	-22.97	4.03	22.43
2409.25	-27.00	-23.00	4.00	22.40
2409.30	-27.00	-23.10	3.90	22.30
2409.35	-27.00	-23.05	3.95	22.35
2409.40	-27.00	-23.02	3.98	22.38
2409.45	-27.00	-23.15	3.85	22.25
2409.50	-27.00	-23.11	3.89	22.29
2409.55	-27.00	-23.08	3.92	22.32
2409.60	-27.00	-23.04	3.96	22.36
2409.65	-27.00	-22.87	4.13	22.53
2409.70	-27.00	-22.63	4.37	22.77
2409.75	-27.00	-22.94	4.06	22.46
2409.80	-27.00	-22.90	4.10	22.50
2409.85	-27.00	-22.90	4.10	22.50
2409.90	-27.00	-23.00	4.00	22.40
2409.95	-27.00	-23.10	3.90	22.30
2410.00	-27.00	-23.11	3.89	22.29
2410.05	-27.00	-23.13	3.87	22.27
2410.10	-27.00	-22.90	4.10	22.50
2410.15	-27.00	-22.87	4.13	22.53
2410.20	-27.00	-22.70	4.30	22.70
2410.25	-27.00	-22.60	4.40	22.80
2410.30	-27.00	-22.50	4.50	22.90
2410.35	-27.00	-22.20	4.80	23.20
2410.40	-27.00	-22.50	4.50	22.90
2410.45	-27.00	-22.80	4.20	22.60
2410.50	-27.00	-23.00	4.00	22.40
2410.55	-27.00	-23.00	4.00	22.40
2410.60	-27.00	-22.80	4.20	22.60
2410.65	-27.00	-22.90	4.10	22.50
2410.70	-27.00	-22.70	4.30	22.70
2410.75	-27.00	-22.50	4.50	22.90
2410.80	-27.00	-22.40	4.60	23.00
2410.85	-27.00	-22.00	5.00	23.40
2410.90	-27.00	-22.00	5.00	23.40
2410.95	-27.00	-22.04	4.96	23.36

Table 35 Processing Gain [Channel 1, CCK, 2.41100GHz to 2.41295GHz]

Jammer Frequency (MHz)	Signal Level S (dBm)	Signal Generator RF Output J (dBm)	Mj (J/S)	Process Gain (dB)
2411.00	-27.00	-22.20	4.80	23.20
2411.05	-27.00	-22.15	4.85	23.25
2411.10	-27.00	-22.14	4.86	23.26
2411.15	-27.00	-22.08	4.92	23.32
2411.20	-27.00	-22.10	4.90	23.30
2411.25	-27.00	-22.06	4.94	23.34
2411.30	-27.00	-22.30	4.70	23.10
2411.35	-27.00	-22.50	4.50	22.90
2411.40	-27.00	-22.60	4.40	22.80
2411.45	-27.00	-22.60	4.40	22.80
2411.50	-27.00	-22.50	4.50	22.90
2411.55	-27.00	-22.30	4.70	23.10
2411.60	-27.00	-22.00	5.00	23.40
2411.65	-27.00	-22.00	5.00	23.40
2411.70	-27.00	-21.90	5.10	23.50
2411.75	-27.00	-21.70	5.30	23.70
2411.80	-27.00	-21.60	5.40	23.80
2411.85	-27.00	-22.00	5.00	23.40
2411.90	-27.00	-22.00	5.00	23.40
2411.95	-27.00	-22.20	4.80	23.20
2412.00	-27.00	-22.00	5.00	23.40
2412.05	-27.00	-22.10	4.90	23.30
2412.10	-27.00	-22.15	4.85	23.25
2412.15	-27.00	-22.20	4.80	23.20
2412.20	-27.00	-22.30	4.70	23.10
2412.25	-27.00	-22.20	4.80	23.20
2412.30	-27.00	-22.20	4.80	23.20
2412.35	-27.00	-22.10	4.90	23.30
2412.40	-27.00	-22.00	5.00	23.40
2412.45	-27.00	-21.90	5.10	23.50
2412.50	-27.00	-21.80	5.20	23.60
2412.55	-27.00	-22.00	5.00	23.40
2412.60	-27.00	-22.00	5.00	23.40
2412.65	-27.00	-22.00	5.00	23.40
2412.70	-27.00	-22.10	4.90	23.30
2412.75	-27.00	-22.40	4.60	23.00
2412.80	-27.00	-22.45	4.55	22.95
2412.85	-27.00	-22.60	4.40	22.80
2412.90	-27.00	-22.61	4.39	22.79
2412.95	-27.00	-22.70	4.30	22.70

Table 36 Processing Gain [Channel 1, CCK, 2.41300GHz to 2.41495GHz]

Jammer Frequency (MHz)	Signal Level S (dBm)	Signal Generator RF Output J (dBm)	Mj (J/S)	Process Gain (dB)
2413.00	-27.00	-22.50	4.50	22.90
2413.05	-27.00	-22.55	4.45	22.85
2413.10	-27.00	-22.60	4.40	22.80
2413.15	-27.00	-22.60	4.40	22.80
2413.20	-27.00	-22.50	4.50	22.90
2413.25	-27.00	-22.51	4.49	22.89
2413.30	-27.00	-22.55	4.45	22.85
2413.35	-27.00	-22.60	4.40	22.80
2413.40	-27.00	-22.66	4.34	22.74
2413.40	-27.00	-22.65	4.35	22.75
2413.50	-27.00	-22.68	4.32	22.72
2413.55	-27.00	-22.80	4.20	22.60
2413.60	-27.00	-22.90	4.10	22.50
2413.65	-27.00	-22.90	4.10	22.50
2413.70	-27.00	-22.81	4.19	22.59
2413.75	-27.00	-22.95	4.05	22.45
2413.80	-27.00	-23.40	3.60	22.00
2413.85	-27.00	-23.60	3.40	21.80
2413.90	-27.00	-23.30	3.70	22.10
2413.95	-27.00	-23.35	3.65	22.05
2414.00	-27.00	-23.20	3.80	22.20
2414.05	-27.00	-23.25	3.75	22.15
2414.10	-27.00	-23.20	3.80	22.20
2414.15	-27.00	-23.21	3.79	22.19
2414.20	-27.00	-23.26	3.74	22.14
2414.25	-27.00	-23.31	3.69	22.09
2414.30	-27.00	-23.60	3.40	21.80
2414.35	-27.00	-23.15	3.85	22.25
2414.40	-27.00	-23.18	3.82	22.22
2414.45	-27.00	-23.22	3.78	22.18
2414.50	-27.00	-23.35	3.65	22.05
2414.55	-27.00	-23.61	3.39	21.79
2414.60	-27.00	-23.50	3.50	21.90
2414.65	-27.00	-23.55	3.45	21.85
2414.70	-27.00	-23.52	3.48	21.88
2414.75	-27.00	-23.60	3.40	21.80
2414.80	-27.00	-23.64	3.36	21.76
2414.85	-27.00	-23.65	3.35	21.75
2414.90	-27.00	-23.70	3.30	21.70
2414.95	-27.00	-23.20	3.80	22.20

Table 37 Processing Gain [Channel 10, CCK, 2.41500GHz to 2.41695GHz]

Jammer Frequency (MHz)	Signal Level S (dBm)	Signal Generator RF Output J (dBm)	Mj (J/S)	Process Gain (dB)
2415.00	-27.00	-23.00	4.00	22.40
2415.05	-27.00	-23.10	3.90	22.30
2415.10	-27.00	-23.15	3.85	22.25
2415.15	-27.00	-22.50	4.50	22.90
2415.20	-27.00	-22.50	4.50	22.90
2415.25	-27.00	-22.70	4.30	22.70
2415.30	-27.00	-22.50	4.50	22.90
2415.35	-27.00	-22.80	4.20	22.60
2415.40	-27.00	-22.60	4.40	22.80
2415.45	-27.00	-22.65	4.35	22.75
2415.50	-27.00	-22.64	4.36	22.76
2415.55	-27.00	-22.70	4.30	22.70
2415.60	-27.00	-22.75	4.25	22.65
2415.65	-27.00	-22.40	4.60	23.00
2415.70	-27.00	-22.20	4.80	23.20
2415.75	-27.00	-22.00	5.00	23.40
2415.80	-27.00	-21.85	5.15	23.55
2415.85	-27.00	-21.80	5.20	23.60
2415.90	-27.00	-21.60	5.40	23.80
2415.95	-27.00	-21.65	5.35	23.75
2416.00	-27.00	-21.70	5.30	23.70
2416.05	-27.00	-21.82	5.18	23.58
2416.10	-27.00	-21.86	5.14	23.54
2416.15	-27.00	-21.78	5.22	23.62
2416.20	-27.00	-21.75	5.25	23.65
2416.25	-27.00	-21.71	5.29	23.69
2416.30	-27.00	-21.56	5.44	23.84
2416.35	-27.00	-21.55	5.45	23.85
2416.40	-27.00	-21.40	5.60	24.00
2416.45	-27.00	-21.35	5.65	24.05
2416.50	-27.00	-21.25	5.75	24.15
2416.55	-27.00	-20.80	6.20	24.60
2416.60	-27.00	-20.85	6.15	24.55
2416.65	-27.00	-20.70	6.30	24.70
2416.70	-27.00	-20.86	6.14	24.54
2416.75	-27.00	-20.85	6.15	24.55
2416.80	-27.00	-20.80	6.20	24.60
2416.85	-27.00	-20.30	6.70	25.10
2416.90	-27.00	-20.20	6.80	25.20
2416.95	-27.00	-20.10	6.90	25.30

Table 38 Processing Gain [Channel 10, CCK, 2.41700GHz to 2.41800GHz]

Jammer Frequency (MHz)	Signal Level S (dBm)	Signal Generator RF Output J (dBm)	Mj (J/S)	Process Gain (dB)
2417.00	-27.00	-20.80	6.20	24.60
2417.05	-27.00	-20.75	6.25	24.65
2417.10	-27.00	-20.70	6.30	24.70
2417.15	-27.00	-20.65	6.35	24.75
2417.20	-27.00	-20.50	6.50	24.90
2417.25	-27.00	-20.55	6.45	24.85
2417.30	-27.00	-20.20	6.80	25.20
2417.35	-27.00	-20.30	6.70	25.10
2417.40	-27.00	-20.25	6.75	25.15
2417.45	-27.00	-20.20	6.80	25.20
2417.50	-27.00	-20.15	6.85	25.25
2417.55	-27.00	-20.10	6.90	25.30
2417.60	-27.00	-19.95	7.05	25.45
2417.65	-27.00	-19.80	7.20	25.60
2417.70	-27.00	-19.90	7.10	25.50
2417.75	-27.00	-19.70	7.30	25.70
2417.80	-27.00	-19.75	7.25	25.65
2417.85	-27.00	-19.65	7.35	25.75
2417.90	-27.00	-19.55	7.45	25.85
2417.95	-27.00	-19.50	7.50	25.90
2418.00	-27.00	-19.45	7.55	25.95

Test Result: Processing Gain: 22.50 dB

Note: GP = (S/No) + Mj + Lsys

= 16.4dB + Mj + 2dB

Appendix A

Setting up Procedure

1. The UTP port EUT connected to ethernet hub which connect to USB port of notebook computer through USB lan. Using the bcated remotely USB lan to lan port of notebook computer and software to control the EUT
2. Use the software that is given by the customer and operated in the windows or DOS to control the EUT's continuous transmission.
3. Then making access to the mode of continuous transmission and set testing channel.

Appendix B

Antenna Spec.

Patch Antenna Specification

Model No: XI _300 _ANT.
Patch Antenna Specification

No	Items	Specifications
1	RF frequency band	2.4 ~ 2.5 GHz
2	Transmission power	100mW Accuracy: less than +20% and more than - 50%
3	RF Output connector	~~MMCX(R) connector~~ REVERSE SMA P/A PLUG SMA P/A PLUG
4	Output impedance	50Ω
5	VSWR	Less than 1.5
6	Antenna peak gain and directivity	0 dBi (peak)Typ. : 2 dBi, max) Azimuth: Omni Elevation: Double Oval
7	Polarization	Horizontal
8	Antenna shape	λ/4 – Patch antenna
9	Temperature range	0°C ~ +50°C
10	Notice	

Appendix C

The antenna of the device is fixed outside of EUT, the user can not remove it freely without any tools from outside the device. This is comply with the FCC rules part 15.203

Appendix D

RF Exposure Calculations

From FCC 1.1310 table 1A, the maximum permissible RF exposure for an uncontrolled environment is $1mW/cm^2$. The Electric field generated for a $1mW/cm^2$ exposure (S) is calculated as follows:

$S = E^2 / Z$

Where:

S = Power density

E = Electric field

Z = Impedance.

$E = \sqrt{S \times Z}$

$1mW/cm^2 = 10\ W/m^2$

The impedance of free space is 337 ohms, where E and H fields are perpendicular.

Thus:

$E = \sqrt{10 \times 377} = 61.4$ V/m which is equivalent to $1mW/cm^2$

Using the relationship between Electric field E, Power in watts P, and distance in meters d, the corresponding

Antenna numeric gain G and the transmitter output power and solving for d,

$$d = \frac{\sqrt{P_{eak} \times 30 \times G}}{E}$$

The Numeric gain G of antenna with a gain specified in dB is determined by:

$G = Log^{-1}$ (dB gain/10)

$G = Log^{-1}$ (2.0/10) = 1.584

Notice in Installation Manual:

While installing and operating this transmitter and antenna combination the radio frequency exposure limit of $1mW/cm^2$ may be exceeded at distances close to the antennas installed. Therefore, the user must maintain a minimum distance of 20 cm from the antenna at all time.

The table in follow page identifies the distances where the 1mW/cm ^{2} exposure limits may be exceeded during continuous transmission using the antenna

Antenna Type	Gain (dBi)	Gain Numeric	Peak Output Power (mW)	Calculated RF Exposure Separation Distance (cm)	Minimum RF Exposure Separation Distance (cm)
Dipole	2.0	1.584	12.026	1.231	20

Measurement of MPE

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Filed Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
300-1500	--	--	f/300	30
1500-100,000	--	--	5	30
(B) Limits for General Population/Uncontrolled Exposure				
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30
Test Result of EUT			0.0101	30

Setting up Procedure: (See Appendix A)

List of Test Instruments:

Instrument Name	Model No	Brand	Serial No.	Last time	Next time
EM Radiation Monitor	EMC-20	WG	Y-0026	05/11/2000	05/11/2001
E-Field Sensor 3GHz	TYP-8	WG	Z-0001	05/08/2000	05/08/2001

Picture of Test: