

APPLIED WIRELESS ID GROUP, INC.

SENTINEL-PROX LR-911 2.6H3 RFID READER

Model : LR-911 2.6H3

28 September 2007



Report No.: SL07082012-WAT-004

(This report supersedes NONE)



Modifications made to the product : None

This Test Report is Issued Under the Authority of:

	
<b>Benjamin Jing</b> Test Engineer	<b>Leslie Bai</b> Engineering Reviewer

This test report may be reproduced in full only.

**EMC Test Report**  
To: FCC Part 15.247 ; IC RSS-210

**SIEMIC, INC.**  
Accessing global markets





**SIEMIC, Inc.**  
Accessing global markets

Title: EMC Test Report of Sentinel-Prox LR-911 2.6H3 RFID Reader  
To: FCC 15.247 (2007) and RSS-210 (2007)

Serial# SL07082012-WAT-004  
Issue Date 6 September 2007  
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www.siemec.com

**SIEMIC ACREDITATION DETAILS: NVLAP Lab Code: 200729-0**

**United States Department of Commerce  
National Institute of Standards and Technology**



**Certificate of Accreditation to ISO/IEC 17025:1999**

**NVLAP LAB CODE: 200729-0**

**SIEMIC Laboratories**  
San Jose, CA

*is recognized by the National Voluntary Laboratory Accreditation Program for conformance with criteria set forth in  
NIST Handbook 150:2001 and all requirements of ISO/IEC 17025:1999.  
Accreditation is granted for specific services, listed on the Scope of Accreditation, for:*

**ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS**

2007-01-01 through 2007-12-31  
Effective dates



*Dolly S. Bruce*  
For the National Institute of Standards and Technology



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**SIEMIC ACREDITATION DETAILS: FCC Registration No. 783147**

**FEDERAL COMMUNICATIONS COMMISSION**

Laboratory Division  
7435 Oakland Mills Road  
Columbia, MD 21046

January 27, 2005

Registration Number: 783147

SIEMIC Laboratories  
2206 Ringwood Avenue  
San Jose, CA 95131

Attention: Leslie Bai

Re: Measurement facility located at San Jose  
3 & 10 meter site  
Date of Renewal: January 27, 2005

Dear Sir or Madam:

Your request for renewal of the registration of the subject measurement facility has been received. The information submitted has been placed in your file and the registration has been renewed. The name of your organization will remain on the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website [www.fcc.gov](http://www.fcc.gov) under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Rhylis Parrish  
Information Technician



**SIEMIC, Inc.**  
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**SIEMIC ACREDITATION DETAILS: Industry of Canada Registration No. 4842-1**



April 28, 2006

OUR FILE: 46405-4842  
Submission No: 114591

Siemic Inc.  
2206 Ringwood Ave.,  
San Jose, CA 95131

Dear Sir/Madame:

The Bureau has received your application for the Alternate Test Site and the filing is satisfactory to Industry Canada.

Please reference to the file number (4842-1 ) in the body of all test reports containing measurements performed on the site.

Renewal of the filing is required every two years.

If you have any questions, you may contact the Bureau at the telephone number below or by e-mail at [certification.bureau@ic.gc.ca](mailto:certification.bureau@ic.gc.ca) Please reference our file number above for all correspondence.

Yours sincerely,

Robert Corey  
Manager Certification  
Certification and Engineering Bureau  
3701 Carling Ave., Building 94  
Ottawa, Ontario  
K2H 8S2  
Tel. No. (613) 990-3869



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**SIEMIC ACREDITATION DETAILS: Japan VCCI Registration No. 2195**



Voluntary Control Council for Interference  
by Information Technology Equipment  
7F NDA Bldg. 2-3-5, Azabudai,  
Minato-Ku, Tokyo, Japan, 106-0041  
Tel:+81-3-5575-3138  
Fax:+81-3-5575-3137  
<http://www.vccior.jp>

February 12, 2004

**TO: SIEMIC, INC.**

**Membership NO: 2195**

We confirmed your payment for annual membership fee and admission fee. Thank you very much for your remitting.

Please find enclosed VCCI documents. As admission fee and annual membership fee were confirmed, your company registered as VCCI official member.

From now on, it is possible for your company to submit conformity verification report or/and application for registration of measurement facilities.

Please find necessary forms for your submission from VCCI web-site.  
[www.vccior.jp](http://www.vccior.jp)

When you submit conformity verification report, please submit to Ms. Yoko Inagaki / [inagaki@vccior.jp](mailto:inagaki@vccior.jp) and application for registration of measurement facilities, please submit to Mr. Masaru Denda / [denda@vccior.jp](mailto:denda@vccior.jp)

Their address, phone and fax number are absolutely same as I. Please refer address indicated on top right-hand corner of this page.

If you have any other questions regarding membership, feel free to contact me. Thank you very much.

Best Regards,

Naoko Hori (Ms.)  
VCCI  
[hori@vccior.jp](mailto:hori@vccior.jp)

Enclosure



**SIEMIC, Inc.**  
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**SIEMIC ACREDITATION DETAILS: Japan RF Technologies Accreditation No. MRF050927**

**RFT**

# Certificate

This is to certify that the  
Quality Management System  
of

**SIEMIC , Inc.**  
2206 Ringwood Avenue  
San Jose, California 95131 U.S.A

has been authorized to carry out Japan Specified Radio Equipment test by  
order and under supervision of RF Technologies Co., Ltd. according to  
Notification No.88 of Radio Law.

An assessment of the laboratory was conducted according to the "Procedure and  
Conditions for Appointments of 2.4GHz Band Low power data communications system  
that Bluetooth and Wireless LAN test with reference to ISO/IEC 17025  
by an RF Technologies Co., Ltd. auditor.

**Audit Report No. MRF050927**

Kazuyuki Sarashina  
Auditor  
RF Technologies Co., Ltd.

Toshihiro Hiegami  
President  
RF Technologies Co., Ltd.

Audit Date  
September 27th, 2005

Issued Date  
October 5th, 2005

This Certificate is valid until **September 26<sup>th</sup> 2006 or next schedule audit.**

No:006 Registered Certification Body  
RF Technologies Co., Ltd.  
472, Nippa-cho, Kohoku-ku, Yokohama, 223-0057, Japan







**SIEMIC ACREDITATION DETAILS: Korea MIC Lab Code: KR0032**

# 시험기관지정서

## Certificate

of Designated Testing Laboratory

지정번호(No.) : KR0032

시험기관명 : (주)현대고정인증기술원  
(Name of Lab.) (Hyundai Calibration & Certification Technologies Co., Ltd)

주 소 : 경기도 이천시 부발읍 아미리 산136-1  
(Address) (136-1, Ami-ri, Bubal-eup, Icheon-si, Kyunggi-Do, Korea)  
2206 Ringwood Avenue San Jose, CA, USA.

시험분야 및 범위 : 유선(Telecommunication Part)  
(Area & Category) 무선(Radio Communication Part)  
전자파장해(EMD) : 미국지사 포함  
전자파내성(EMS) : 미국지사 포함  
전기안전(Safety)  
전자파흡수율(SAR)

위 기관을 정보통신기기시험기관지정및관리등에관한규칙에  
의해 정보통신기기시험기관으로 지정합니다.

*This is to certify that  
the above mentioned laboratory is designated  
as the testing laboratory in accordance with  
the Regulations on Designation of Testing Laboratory  
for Information and Communication Equipment.*

2005년(Year) 7월(Month) 5일(Date)

**전파연구소장**

Director General of Radio Research Laboratory  
Ministry of Information and Communication  
Republic of Korea





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**SIEMIC ACREDITATION DETAILS: Korea CAB ID: US0160**



**UNITED STATES DEPARTMENT OF COMMERCE**  
National Institute of Standards and Technology  
Gaithersburg, Maryland 20899

April 17, 2006

Mr. Leslie Bai  
SIEMIC Laboratories  
2206 Ringwood Avenue  
San Jose, CA 95131

Dear Mr. Bai:

I am pleased to inform you that your laboratory has been recognized by the Ministry of Information and Communication's Radio Research Laboratory (RRL) under the Asia Pacific Economic Cooperation (APEC) Mutual Recognition Arrangement (MRA). Your laboratory is now designated to act as a Conformity Assessment Body (CAB) under Appendix B, **Phase I** Procedures, of the APEC Tel MRA. The pertinent information about your laboratory's designation is as follows:

CAB Name: **SIEMIC Laboratories**  
Identification No.: **US0160**  
Scope:

Coverage	Standards	Date of Recognition
Electro Magnetic Interference	1. RRL Notice No. 2005-82: Technical Requirements for Electromagnetic Interference 2. Annex 8(KN-22), RRL Notice No. 2005-131: Conformity Assessment Procedure for Electromagnetic Interference	April 13, 2006
Electro Magnetic Susceptibility	1. RRL Notice No. 2005-130: Technical Requirements for Electromagnetic Susceptibility 2. Annex 1-7(KN-61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11), RRL Notice No. 2005-132: Conformity Assessment Procedure for Electromagnetic Susceptibility	April 13, 2006

You may submit test data to RRL to verify that the equipment to be imported into Korea satisfies the applicable requirements. The designation of your organization will remain in force as long as its accreditation for the designated scope remains valid and comply with the designation requirements.

The names of all recognized CABs will be posted on the NIST website at <http://ts.nist.gov/mra>. If you have any questions please contact Mr. Jugindar (Joe) Dhillon at (301) 975-5521. We appreciate your continued interest in our international conformity assessment activities.

Sincerely,

David F. Alderman  
Group Leader, Standards Coordination and Conformity Group

cc: Jugindar Dhillon





**SIEMIC, Inc.**  
Accessing global markets

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**SIEMIC ACREDITATION DETAILS: Taiwan BSMI Accreditation No. SL2-IN-E-1130R**



**UNITED STATES DEPARTMENT OF COMMERCE**  
National Institute of Standards and Technology  
Gaithersburg, Maryland 20885

May 3, 2006

Mr. Leslie Bai  
SIEMIC Laboratories  
2206 Ringwood Avenue  
San Jose, CA 95131

Dear Mr. Bai:

I am pleased to inform you that your laboratory has been recognized by the Chinese Taipei's Bureau of Standards, Metrology, and Inspection (BSMI) under the Asia Pacific Economic Cooperation (APEC) Mutual Recognition Arrangement (MRA). Your laboratory is now designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC Tel MRA. You may submit test data to BSMI to verify that the equipment to be imported into Chinese Taipei satisfies the applicable requirements. The designation of your organization will remain in force as long as its accreditation for the designated scope remains valid and comply with the designation requirements. The pertinent designation information is as follows:

- BSMI number: **SL2-IN-E-1130R** (Must be applied to the test reports)
- U.S. Identification No: **US0160**
- Scope of Designation: **CNS 13438**
- Authorized signatory: **Mr. Leslie Bai**

The names of all recognized CABs will be posted on the NIST website at <http://ts.nist.gov/mra>. If you have any questions, please contact Mr. Dhillon at 301-975-5321. We appreciate your continued interest in our international conformity assessment activities.

Sincerely,

David F. Alderman  
Group Leader, Standards Coordination and Conformity Group

cc: Jogindar Dhillon

**NIST**



**SIEMIC, Inc.**  
Accessing global markets

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**SIEMIC ACREDITATION DETAILS: Taiwan NCC CAB ID: US0160**



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Institute of Standards and Technology**  
Gaithersburg, Maryland 20899

August 8, 2006

Mr. Leslie Bai  
SIEMIC Laboratories  
2206 Ringwood Avenue  
San Jose, CA 95131

Dear Mr. Bai:

I am pleased to inform you that SIEMIC Laboratories has been recognized by the Chinese Taipei's National Communications Commission (NCC) under the Asia Pacific Economic Cooperation for Telecommunications and Information, Mutual Recognition Arrangement (APEC Tel MRA). Your laboratory is now designated to act as a Conformity Assessment Body (CAB) under Appendix B, **Phase I** Procedures, of the APEC Tel MRA.

You may submit test data to NCC to verify that the equipment to be imported into Chinese Taipei satisfies their applicable requirements using the following guidelines:

- Your laboratory's assigned 6-digit U.S. identification number is **US0160**. You should reference this number in your correspondence.
- The scope of designation is limited to **LP0002**. Your designation will remain in force as long as your accreditation remains valid for the scope of designation.

If you have any questions please contact Mr. Jogindar Dhillon via email at [dhillon@nist.gov](mailto:dhillon@nist.gov) or via fax at 301-975-5414. The names of all recognized laboratories will be posted on the NIST website at <http://ts.nist.gov/mra>. We appreciate your continued interest in our international conformity assessment activities.

Sincerely,

David F. Alderman  
Group Leader, Standards Coordination and Conformity Group

cc: Jogindar Dhillon

**NIST**



**SIEMIC, Inc.**  
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**SIEMIC ACREDITATION DETAILS: Mexico NOM Recognition**



CAMARA NACIONAL  
DE LA INDUSTRIA  
ELECTRONICA, DE  
TELECOMUNICACIONES  
E INFORMATICA

## Laboratorio Valentín V. Rivero

México D.F. a 16 de octubre de 2006.

**LESLIE BAI  
DIRECTOR OF CERTIFICATION  
SIEMIC LABORATORIES, INC.  
ACCESSING GLOBAL MARKETS  
P R E S E N T E**

En contestación a su escrito de fecha 5 de septiembre del año en curso, le comento que estamos muy interesados en su intención de firmar un Acuerdo de Reconocimiento Mutuo, para lo cual adjunto a este escrito encontrara el Acuerdo en idioma inglés y español prefrenado de los cuales le pido sea revisado y en su caso corregido, para que si esta de acuerdo poder firmarlo para mandarlo con las autoridades Mexicanas para su visto bueno y así poder ejercer dicho acuerdo.

Aprovecho este escrito para mencionarle que nuestro intermediario gestor será la empresa Isabel de México, S. A. de C. V., empresa que ha colaborado durante mucho tiempo con nosotros en lo relacionado a la evaluación de la conformidad y que cuenta con amplia experiencia en la gestoría de la certificación de cumplimiento con Normas Oficiales Mexicanas de producto en México.

Me despido de usted enviándole un cordial saludo y esperando sus comentarios al Acuerdo que nos ocupa.

Atentamente:



**Ing. Faustino Bortez González  
Gerente Técnico del Laboratorio de  
CANIETI.**

Callejón 77  
Hidráulica Condésa  
06100 México, D.F.  
Tel. 5264-0908 con 12 líneas  
Fax 5264-0488  
www.canieti.org



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**SIEMIC ACREDITATION DETAILS: Hong Kong OFTA Recognition No. D23/16V**



Your Ref 來函編號 : D23/16 V  
Our Ref 本局編號 :

Telephone 電話 : (852) 2961 6320  
Fax No 圖文傳真 : (852) 2838 5004  
E-mail 電郵地址 : 20 July 2005

Mr. Leslie Bai  
Director of Certification,  
SIEMIC Laboratories  
2206 Ringwood Avenue  
San Jose, California 95131  
USA

Dear Mr. Bai,

**Application of Recognised Testing Agency (RTA)**

Referring your submission of 28 June 2005 in relation to the application of RTA, I am pleased to inform you that OFTA has appointed SIEMIC Laboratories (SIEMIC) as a Recognised Testing Agency (RTA) :

Please note that, under the Hong Kong Telecommunications Equipment Evaluation and Certification (HKTEC) Scheme, SIEMIC is authorized to conduct evaluation tests on telecommunications equipment against the following HKTA specifications :

Scope of recognition (HKTA Specifications) :

1001, 1002, 1004, 1006, 1007, 1008  
1010, 1015, 1016  
1022, 1026, 1027, 1029  
1030, 1031, 1032, 1033, 1034, 1035, 1039  
1041, 1042, 1043, 1045, 1047, 1048  
2001

You are requested to refer to and comply with the code of practice and guidelines for RTA as given in the Information Note OFTA I 411 "Recognised Testing Agency (RTA) for Conducting Evaluation Test of Telecommunications Equipment", which can be downloaded from OFTA's homepage at <http://www.ofta.gov.hk/tec/information-notes.html>.

If you have any queries, please do not hesitate to contact me.

Yours sincerely,

(K K Sin)  
for Director-General  
of Telecommunications

Office of the Telecommunications Authority  
29/F Wu Chung House 213 Queen's Road East Wan Chai Hong Kong  
電訊管理局  
香港灣仔皇后大道東 213 號胡忠大廈 29 字樓

<http://www.ofta.gov.hk>

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## 1 Executive Summary & EUT information

The purpose of this test programme was to demonstrate compliance of the Applied Wireless ID Group, Inc. Sentinel-Prox LR-911 2.6H3 RFID Reader , against the current Stipulated Standards. The Sentinel-Prox LR-911 2.6H3 RFID Reader have demonstrated compliance with the FCC 15.247 2007 and RSS-210 Issue 6(2007).

### EUT Information

**EUT Description** : The EUT is a long-range RFID reader , it is a frequency hopping system operating in the 902-928MHz band.

**Model No** : LR-911 2.6H3

**Serial No** : N/A

**Input Power** : 120 Vac

**Classification Per Stipulated Test Standard** : Spread Spectrum System / device



## 2 TECHNICAL DETAILS

Purpose	Compliance testing of Sentinel-Prox LR-911 2.6H3 RFID Reader with stipulated standard
Applicant / Client	Applied Wireless ID Group, Inc
Manufacturer	Applied Wireless ID Group, Inc 18300 Sutter Blvd, Morgan Hill, CA 95037
Laboratory performing the tests	SIEMIC Laboratories
Test report reference number	SL07082012-WAT-004
Date EUT received	28 August 2007
Standard applied	47 CFR §15.247 (2007) & RSS-210 Issue 7(2007)
Dates of test (from - to)	30 August 2007 - 6 September 2007
No of Units:	N/A
Equipment Category:	DSS
Trade Name:	Applied Wireless ID Group, Inc.
Model :	LR-911 2.6H3
RF Operating Frequency (	902.8 MHz to 927.2 MHz
Number of Channels :	123
Modulation :	AM
FCC ID :	OGSR26H3LR911
IC ID :	6449A-R26H3LR

### 3 MODIFICATION

**NONE**

## 4 TEST SUMMARY

The product was tested in accordance with the following specifications.  
All Testing has been performed according to below product classification:

Spread Spectrum System / device

### Test Results Summary

Test Standard		Description	Pass / Fail
CFR 47 Part 15.247: 2007	RSS 210 Issue6: 2007		
15.203		Antenna Requirement	Pass
15.205	RSS210(A8.5)	Restricted Band of Operation	Pass
15.207(a)	RSSGen(7.2.2)	Conducted Emissions Voltage	Pass
15.247(a)(1)	RSS210(A8.1)	Channel Separation	Pass
15.247(a)(1)	RSS210(A8.1)	Occupied Bandwidth	Pass
15.247(a)(1)	RSS210(A8.1)	Number of Hopping Channels	Pass
15.247(a)(1)	RSS210(A8.1)	Time of Occupancy	Pass
15.247(b)	RSS210(A8.4)	Output Power	Pass
15.247(c)	RSS210(A8.4)	Antenna Gain > 6 dBi	Pass
15.247(d)	RSS210(A8.5)	Conducted Spurious Emissions	Pass
15.209; 15.247(d)	RSS210(A8.5)	Radiated Spurious Emissions	Pass
15.247(e)	RSS210(A8.3)	Power Spectral Density	N/A
15.247(f)	RSS210(A8.3)	Hybrid System Requirement	N/A
15.247(g)	RSS210(A8.1)	Hopping Capability	Pass
15.247(h)	RSS210(A8.1)	Hopping Coordination Requirement	Pass
15.247(i)	RSSGen(5.5)	Maximum Permissible Exposure	Pass
	RSSGen(4.8)	Receiver Spurious Emissions	Pass
ANSI C63.4: 2003/ RSS-Gen Issue 2: 2007			

## 5 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

### Test Result

N/A



## 5.1 Occupied Bandwidth

### 1. Conducted Measurement

EUT was set for low , mid, high channel with modulated mode and highest RF output power. The spectrum analyzer was connected to the antenna terminal.

- |                             |                      |          |
|-----------------------------|----------------------|----------|
| 2. Environmental Conditions | Temperature          | 23°C     |
|                             | Relative Humidity    | 50%      |
|                             | Atmospheric Pressure | 1019mbar |

Test Date : August 30 2007

Tested By : Benjamin Jing

### Standard Requirement :

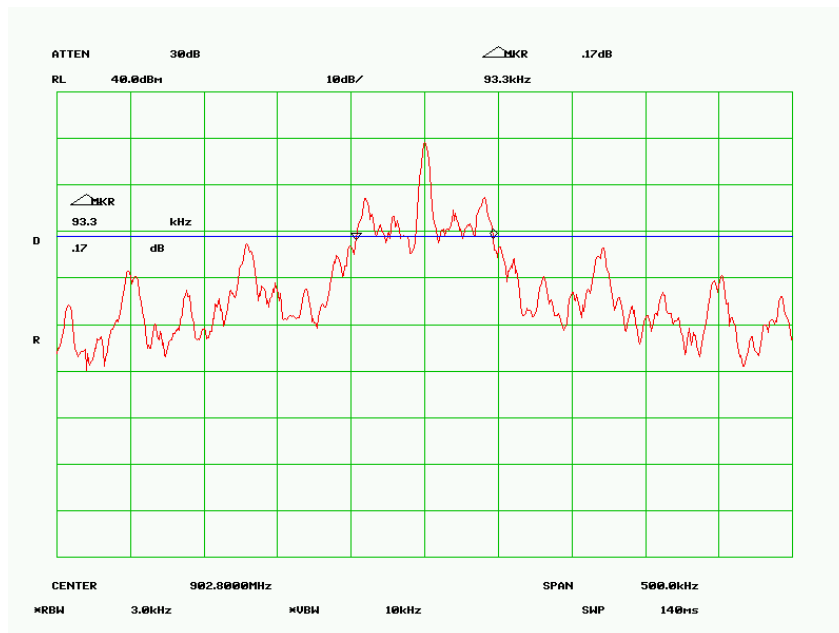
47 CFR §15.247(a)(1) & RSS-210 Issue 6(A 8.1)

Per FCC rule §15.247(a)(1), the 20 dB bandwidth were measured by conducted method using a spectrum analyzer for the low, mid, and high channels. 20 dB bandwidth limit : < 500 KHz.

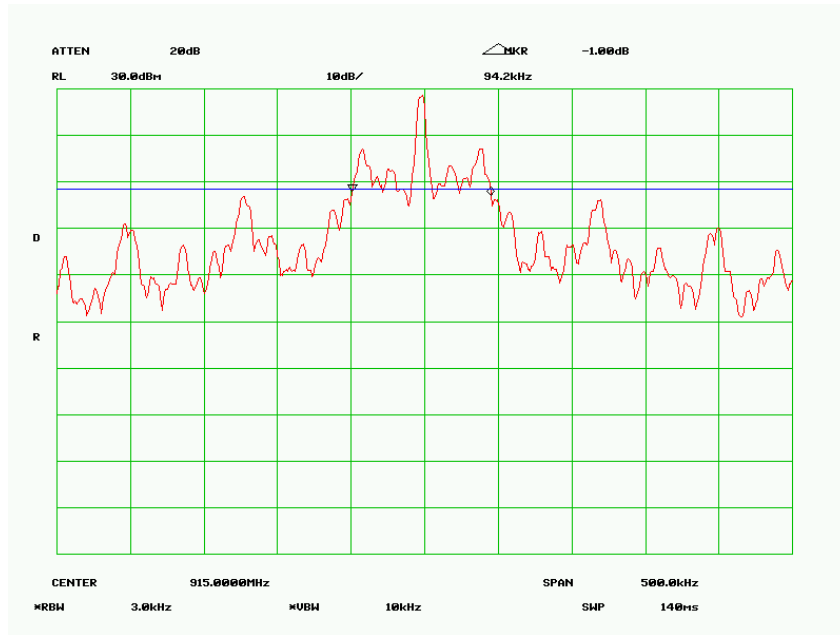
### Test Result:

Channel	Channel frequency (MHz)	20 dB Bandwidth (kHz)	99 % Bandwidth (kHz)
Low	902.8	93.3	250.0
Mid	915.0	94.2	248.3
High	927.2	93.3	256.7

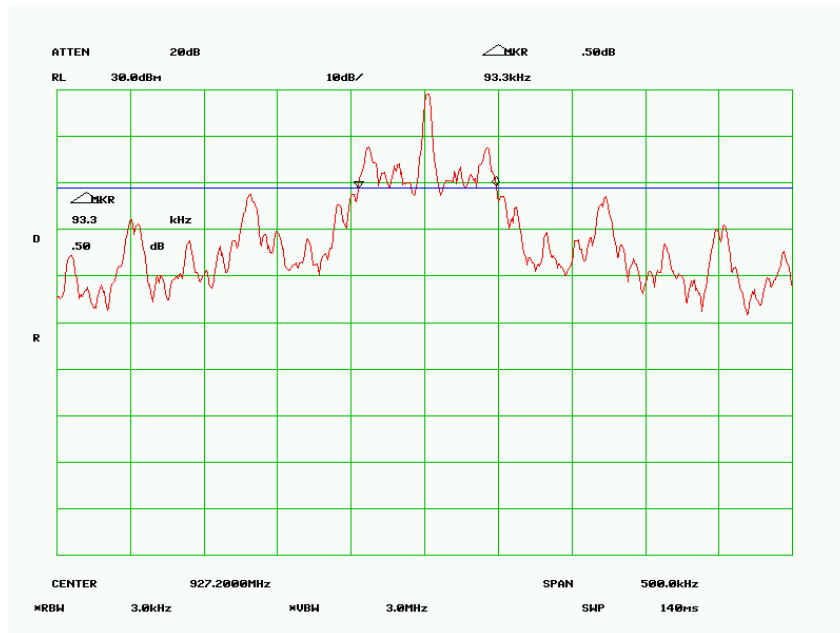
Refer to the attached plots.



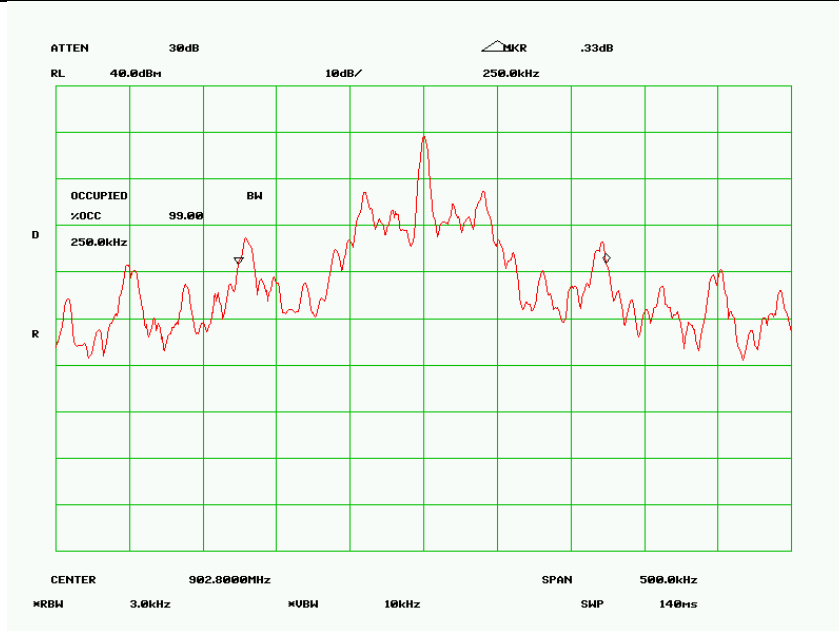
20 dB Bandwidth - Low Channel



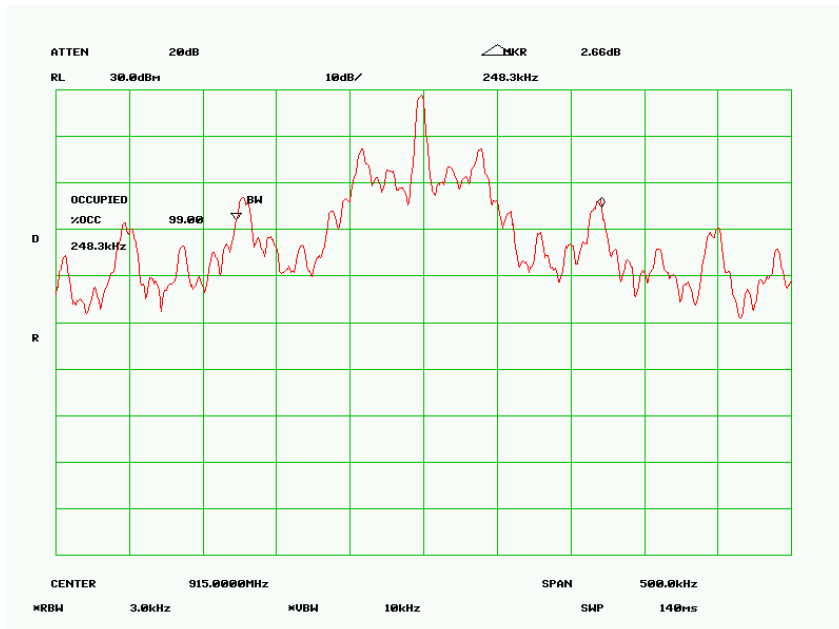
**20 dB Bandwidth - Mid Channel**



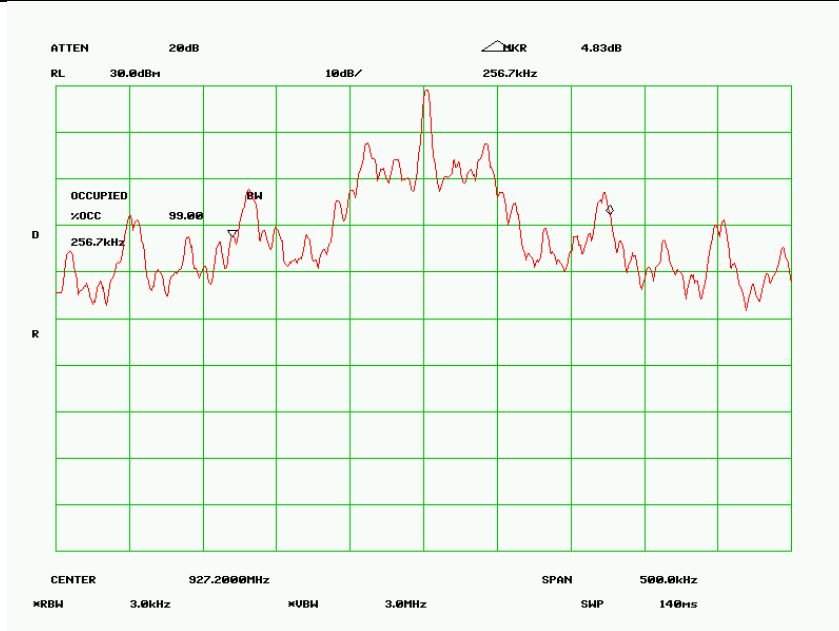
**20 dB Bandwidth - High Channel**



**99% Bandwidth - Low Channel**



**99% Bandwidth - Mid Channel**



**99% Bandwidth - High Channel**

## 5.2 Carrier Frequency Separation

### 1. Conducted Measurement

EUT was set for hopping mode with highest RF output power.  
 The spectrum analyzer was connected to the antenna terminal.

- |                             |                      |          |
|-----------------------------|----------------------|----------|
| 2. Environmental Conditions | Temperature          | 23°C     |
|                             | Relative Humidity    | 50%      |
|                             | Atmospheric Pressure | 1019mbar |

Test Date : August 30 2007

Tested By : Benjamin Jing

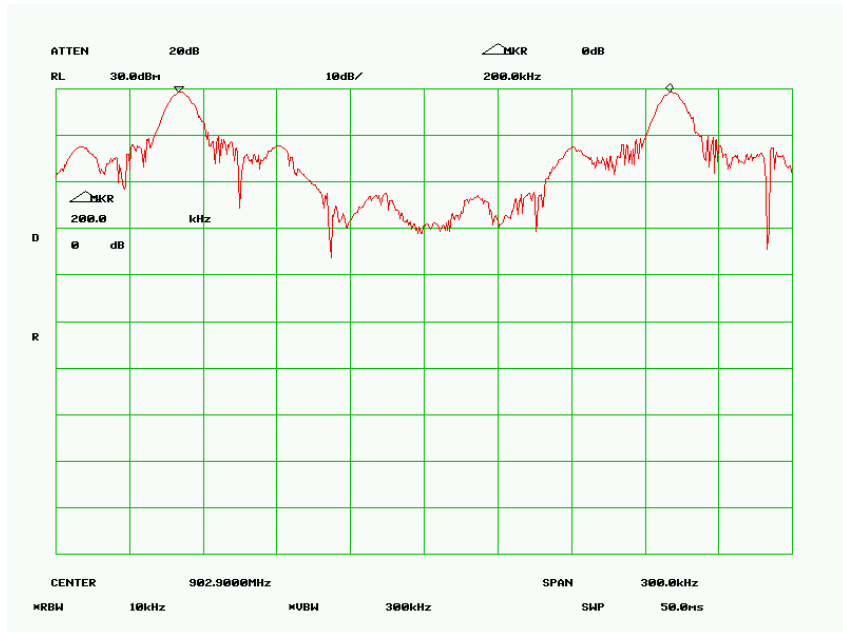
Standard Requirement :

47 CFR §15.247(a)(1) & RSS-210 Issue 6(A 8.1)

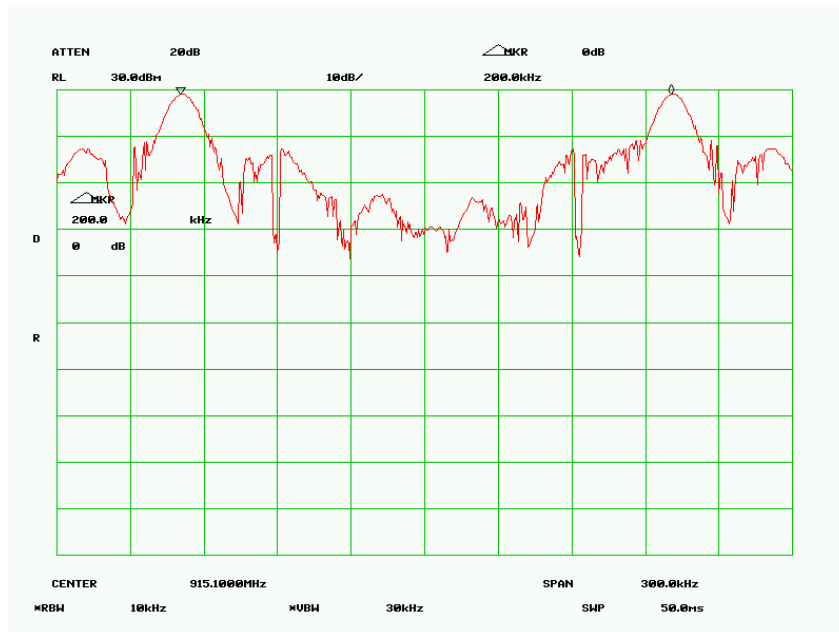
Per 15.247(a), carrier frequencies will be separated by a minimum of 25 KHz or the 20 dB bandwidth of the hopping channel, whichever is greater..

### Test Result :

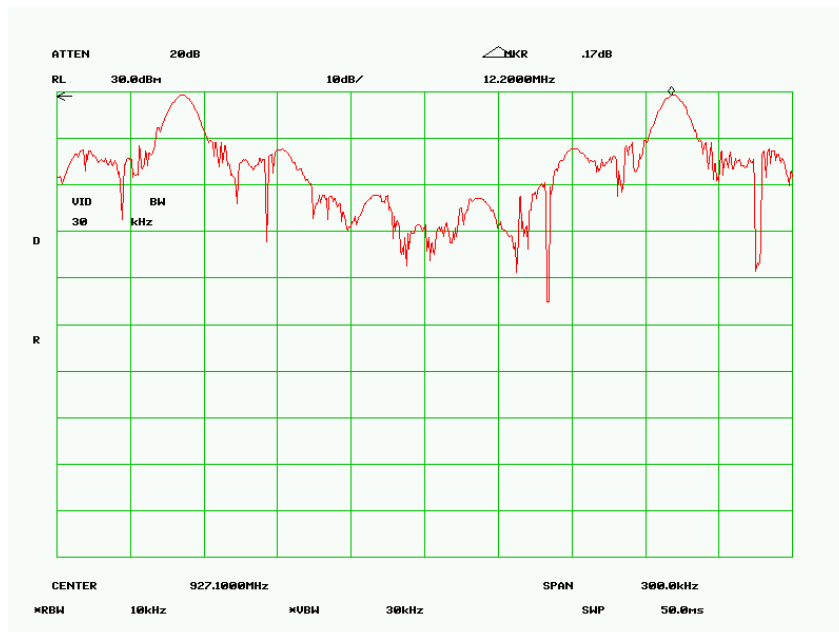
Carrier Frequency Separation : 200 KHz



Low Channel



Middle Channel



High channel



## 5.3 Number of Hopping Channels

1. Conducted Measurement

EUT was set for hopping mode with highest RF output power.  
The spectrum analyzer was connected to the antenna terminal.

2. Environmental Conditions
- |                      |          |
|----------------------|----------|
| Temperature          | 23°C     |
| Relative Humidity    | 50%      |
| Atmospheric Pressure | 1019mbar |

Test Date : August 30 2007

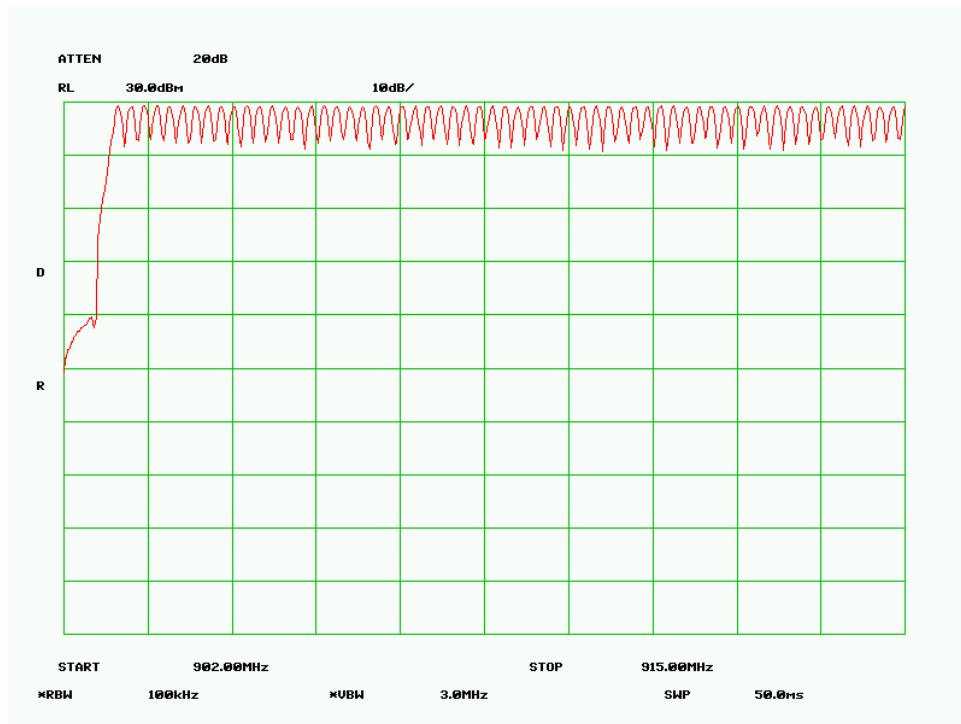
Tested By : Benjamin Jing

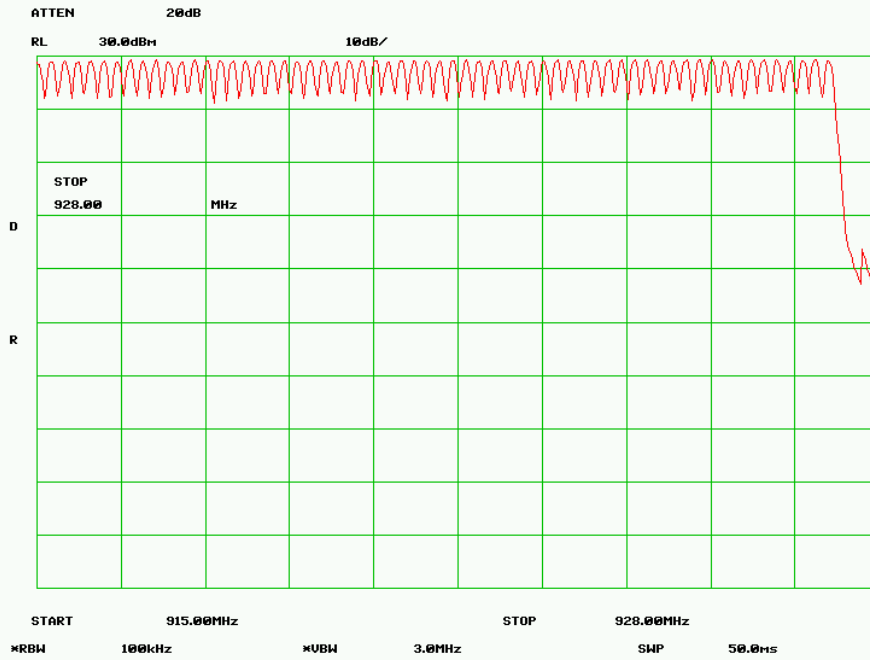
Standard Requirement :

47 CFR §15.247(a)(1) & RSS-210 Issue 6(A 8.1)

**Test Result :**

Number of Hopping Channels : 123





## 5.4 Time of Occupancy

### 1. Conducted Measurement

EUT was set for hopping mode with highest RF output power.  
The spectrum analyzer was connected to the antenna terminal.  
The span set to 0 Hz.

2. Environmental Conditions	Temperature	23°C
	Relative Humidity	50%
	Atmospheric Pressure	1019mbar

Test Date : August 30 2007

Tested By : Benjamin Jing

### Standard Requirement :

47 CFR §15.247(a)(1) & RSS-210 Issue 6(A 8.1)

Per FCC rule §15.247(a), time of occupancy shall not be greater than 0.4 second within a period of 20 second.

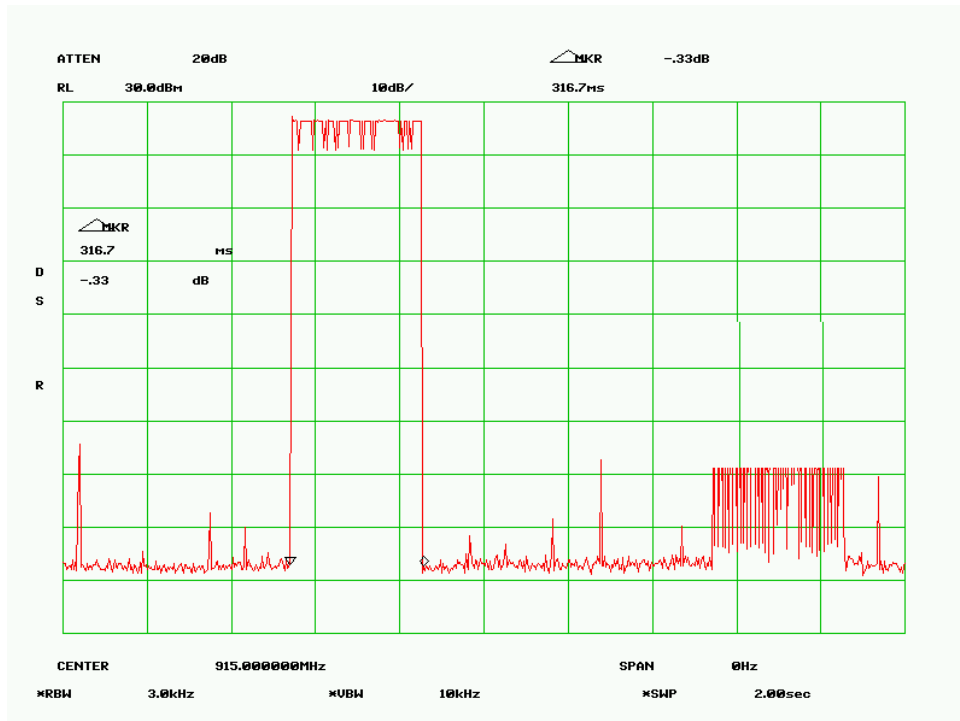
### Test Result:

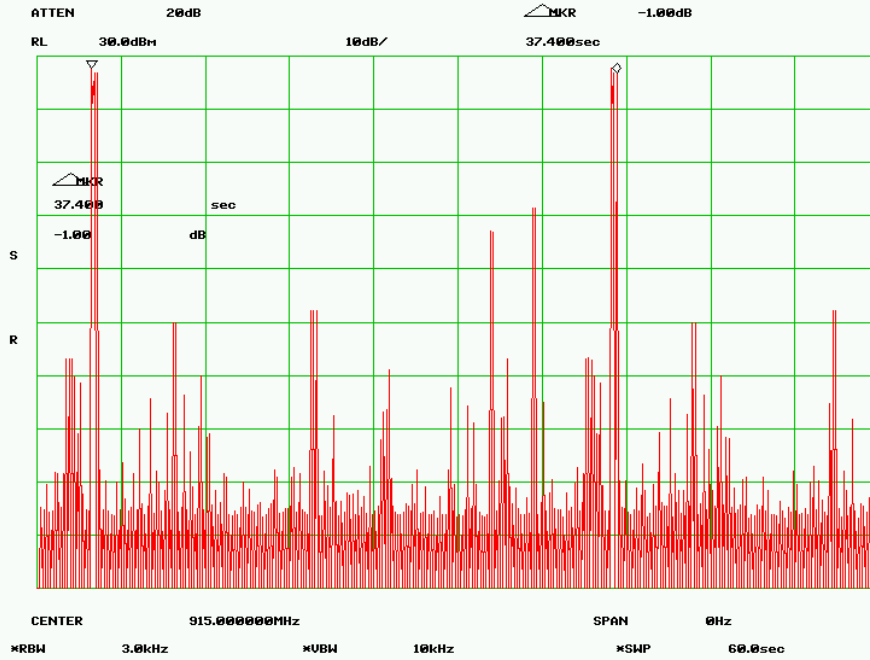
Dwell time = 0.3167 sec

Time between occupancy = 37.4 sec

Time of occupancy = period / time between occupancy \* dwell time

Therefore →  $(20 / 37.4) * 0.3167 = 0.1694$  second < 0.4 second





## 5.5 Peak RF Output Power

1. Conducted Measurement

EUT was set for hopping mode with highest RF output power.  
The spectrum analyzer was connected to the antenna terminal.

- |                             |                      |          |
|-----------------------------|----------------------|----------|
| 2. Environmental Conditions | Temperature          | 23°C     |
|                             | Relative Humidity    | 50%      |
|                             | Atmospheric Pressure | 1019mbar |

Test Date : August 30 2007

Tested By : Benjamin Jing

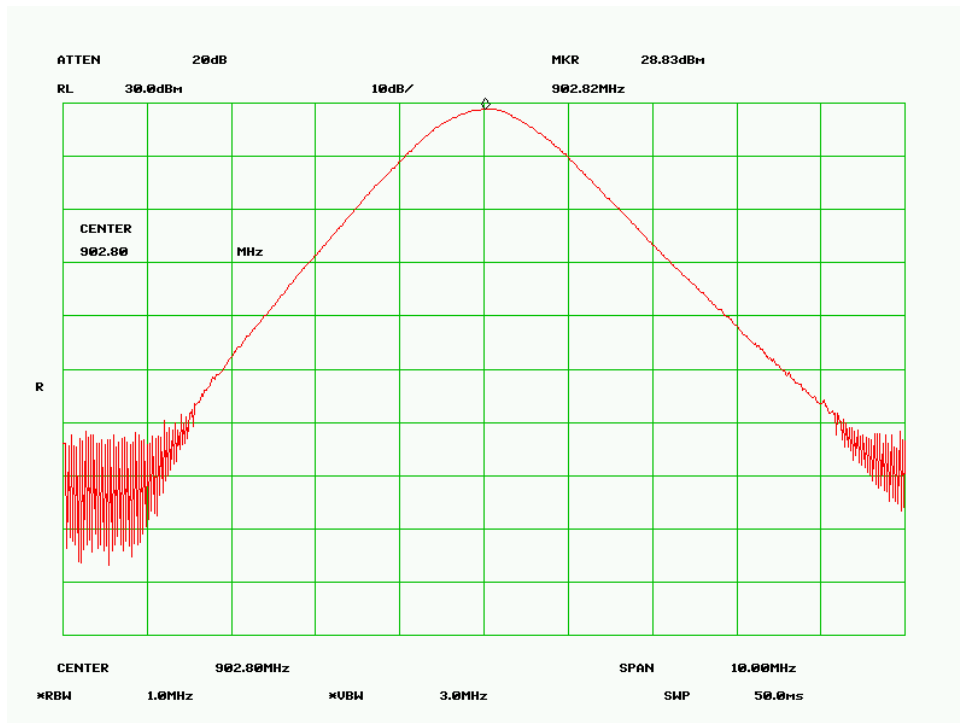
**Standard Requirement :**

47 CFR §15.247(b) & RSS-210 Issue 6(A 8.4)

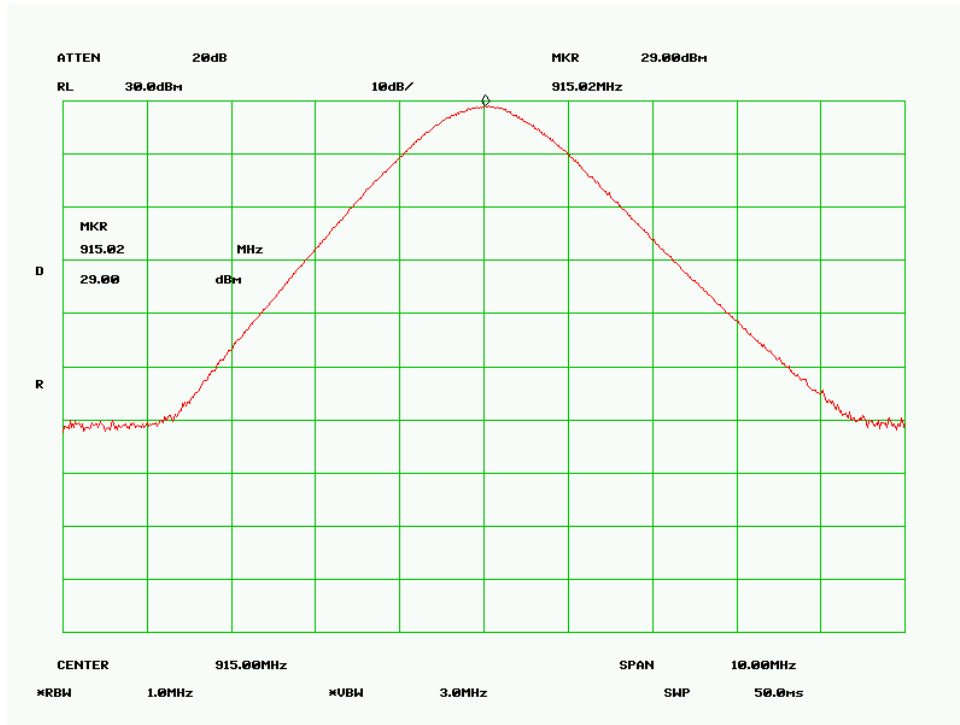
Per FCC §15.247(b) , the maximum peak power is 1W for systems operating in the band 902 – 928 MHz and employing at least 50 hopping channels.

**Test Result:**

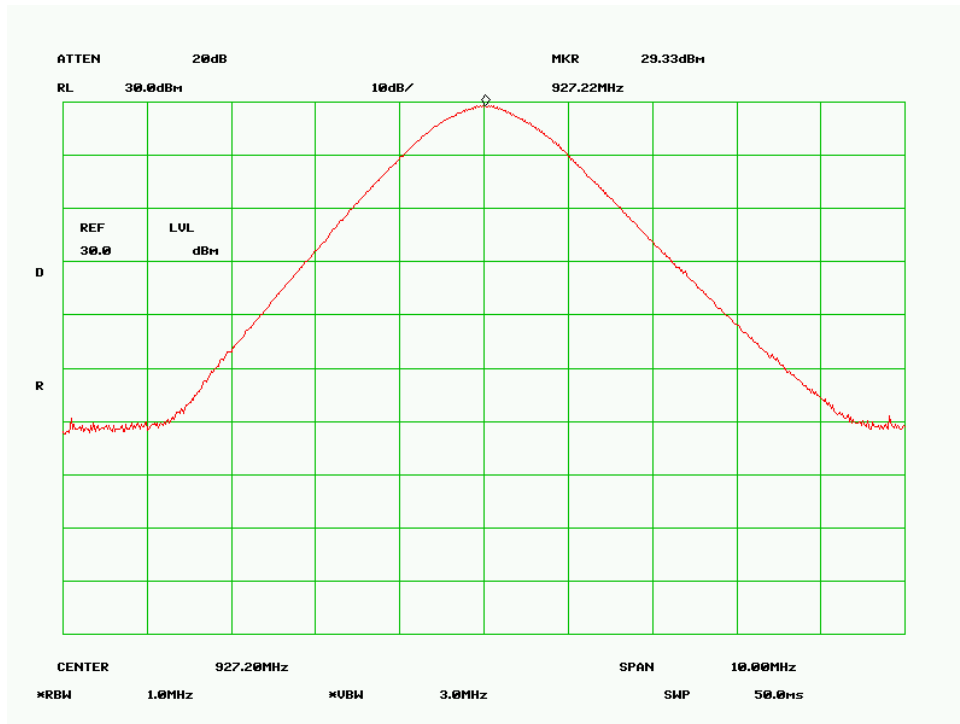
Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power (milliWatt)
Low	902.75	28.83	763.8
Mid	914.75	29.00	794.3
High	927.25	29.33	857.0



**Low Channel**



### Mid Channel



### High Channel

## 5.6 Spurious Emissions at Antenna Terminals

1. Conducted Measurement  
 EUT was set for fix mode with highest RF output power at low, mid, and high channel.  
 The spectrum analyzer was connected to the antenna terminal.
  2. Environmental Conditions
 

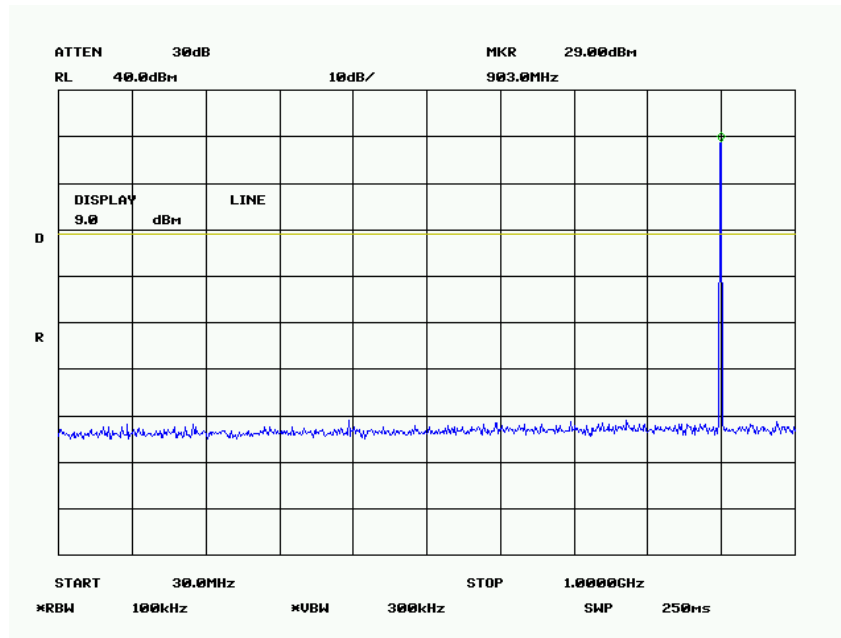
Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
- Test Date : August 30 2007  
 Tested By : Benjamin Jing

Standard Requirement :

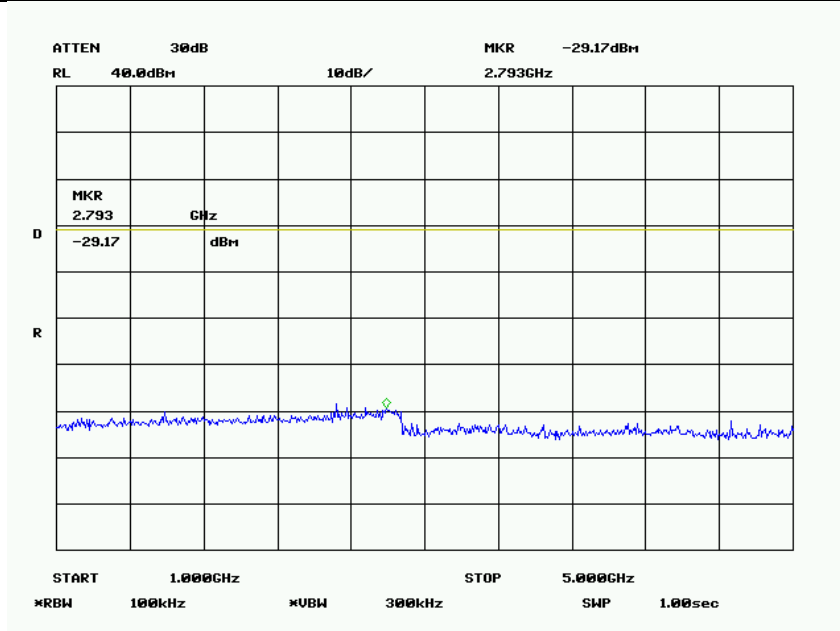
47 CFR §15.247(d) & RSS-210 Issue 6(A 8.5)

**Test Result:**

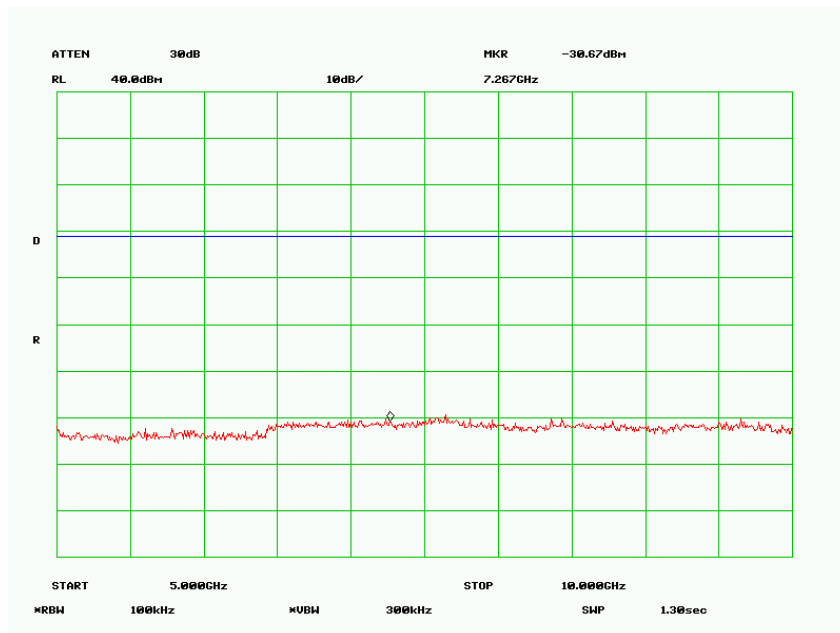
Channel	Channel Frequency (MHz)	Pass/Fail
Low	902.8	Pass
Mid	915.0	Pass
Hi	927.2	Pass



**Low Channel (0.3 - 1 GHz)**

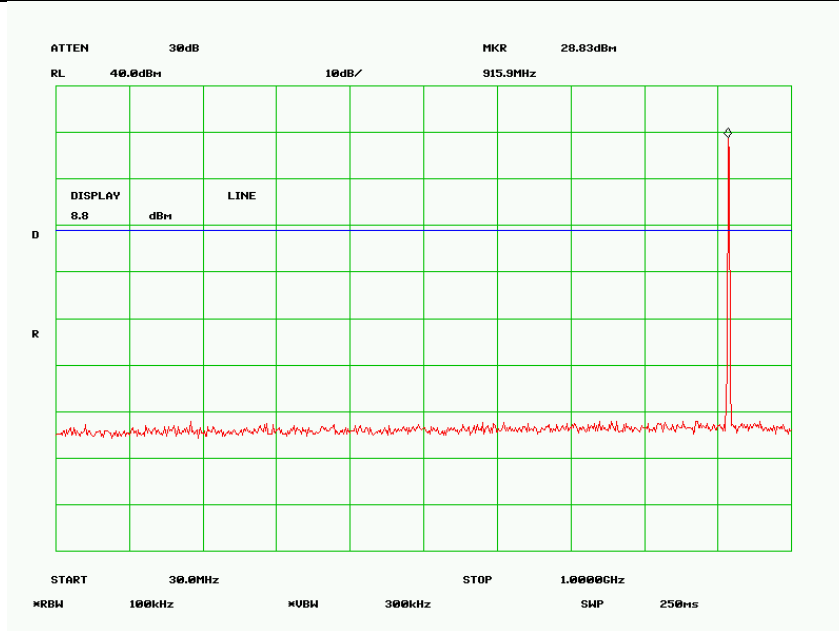


**Low Channel ( 1 - 5 GHz )**

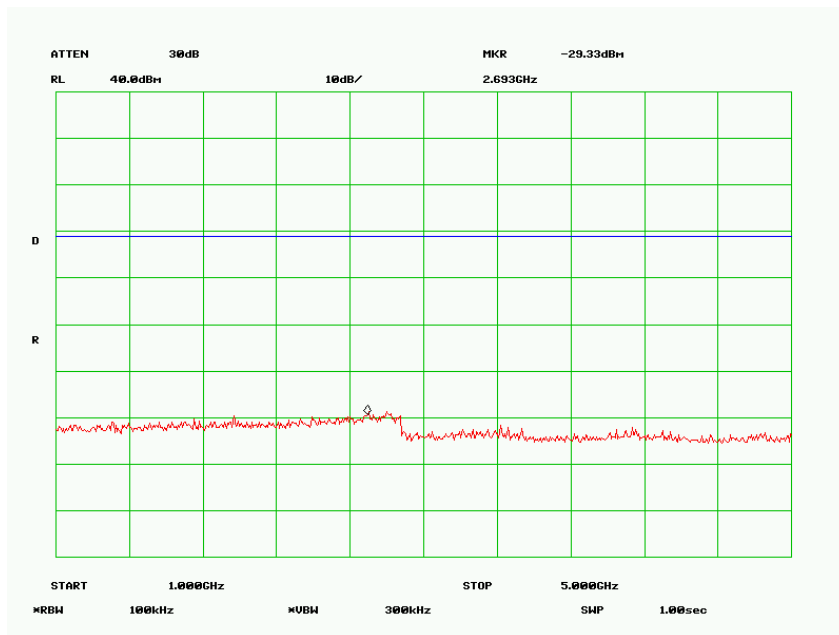


**Low Channel ( 5 - 10 GHz )**

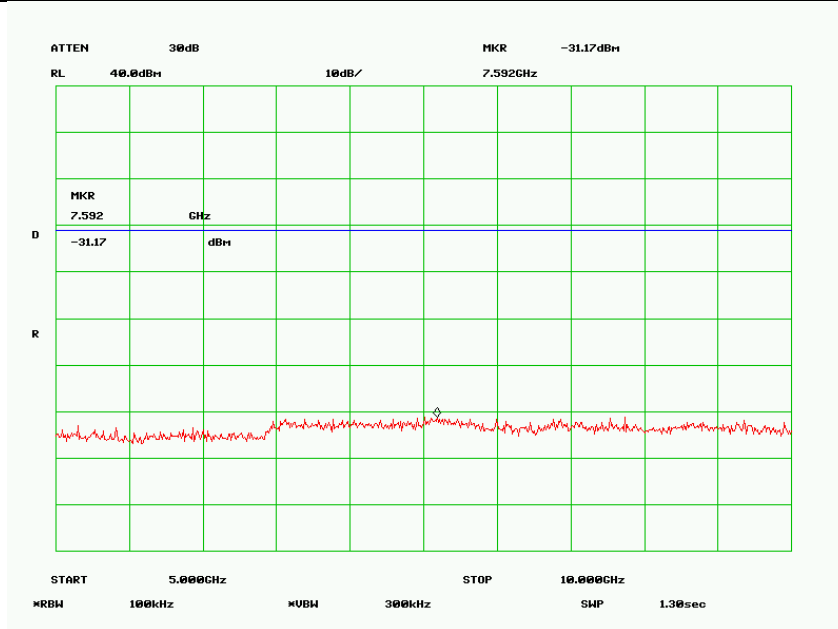




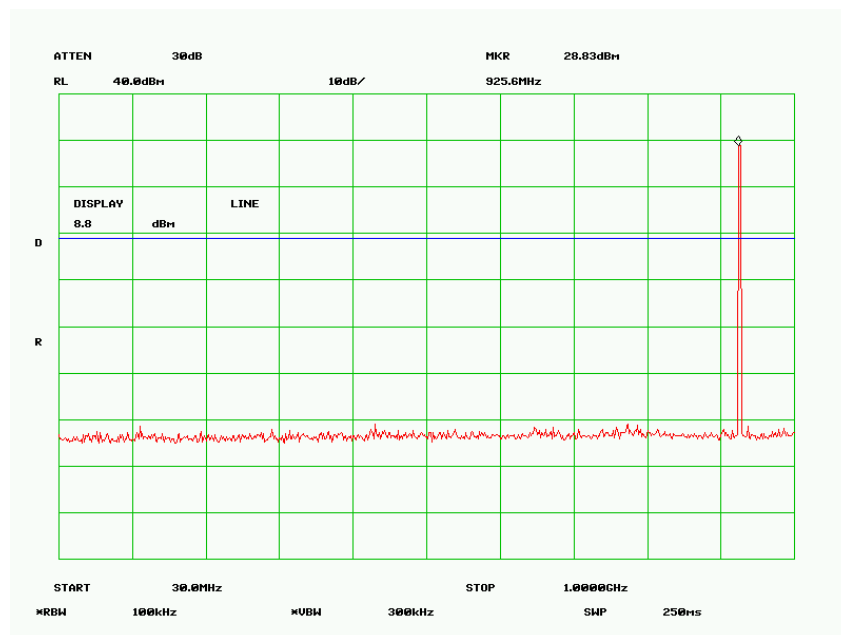
**Mid Channel (0.3 - 1 GHz)**



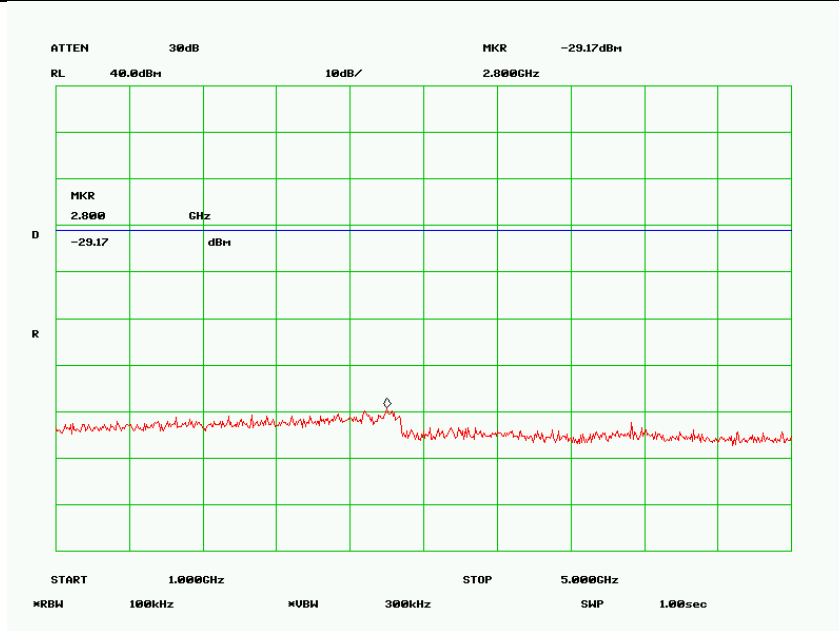
**Mid Channel (1 - 5 GHz)**



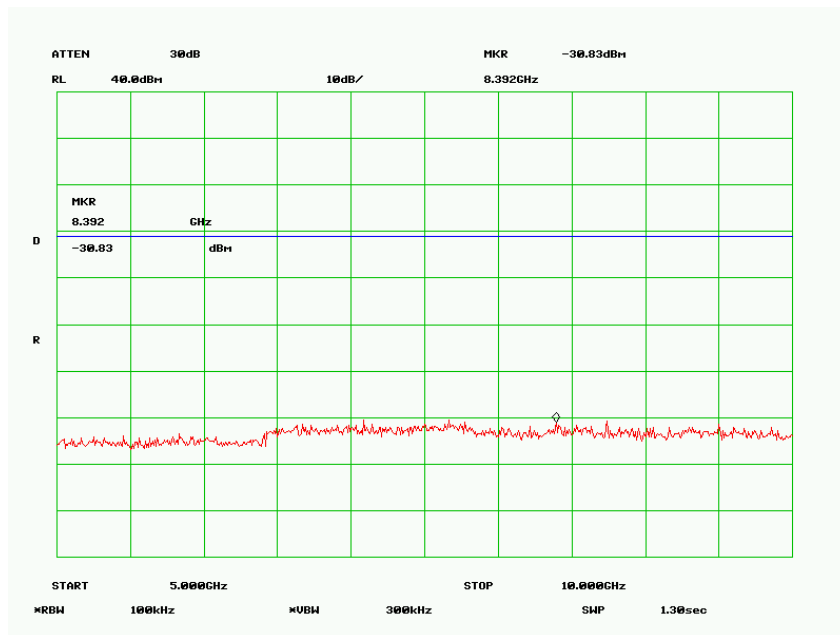
### Mid Channel (5 - 10 GHz)



### High Channel (0.3 - 1 GHz)



### High Channel ( 1 - 5 GHz )



### High Channel ( 5 - 10 GHz )

## 5.7 Radiated Spurious Emission

1. Radiated emissions below 1 GHz were measured according to ANSI C63.4. For radiated emissions above 1 GHz, equipment was setup in a semi-anechoic chamber, average measurement was taken with a 10Hz video bandwidth. Peak measurement was taken with 1 MHz BW. The EUT was tested at low, mid and high channel with the highest output power and worse case protocol. Note that while single channel mode is set, the side skirts of the fundamental is the same emissions
  2. All possible modes of operation were investigated. The worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant. The EUT was tested at three orthogonal plans.
  3. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
  4. Radiated Emissions Measurement Uncertainty  
 All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz (QP only @ 3m & 10m) is +5.6dB/-4.5dB (for EUTs < 0.5m X 0.5m X 0.5m). In range of 1-40GHz is ±3.6dB
  5. Environmental Conditions
 

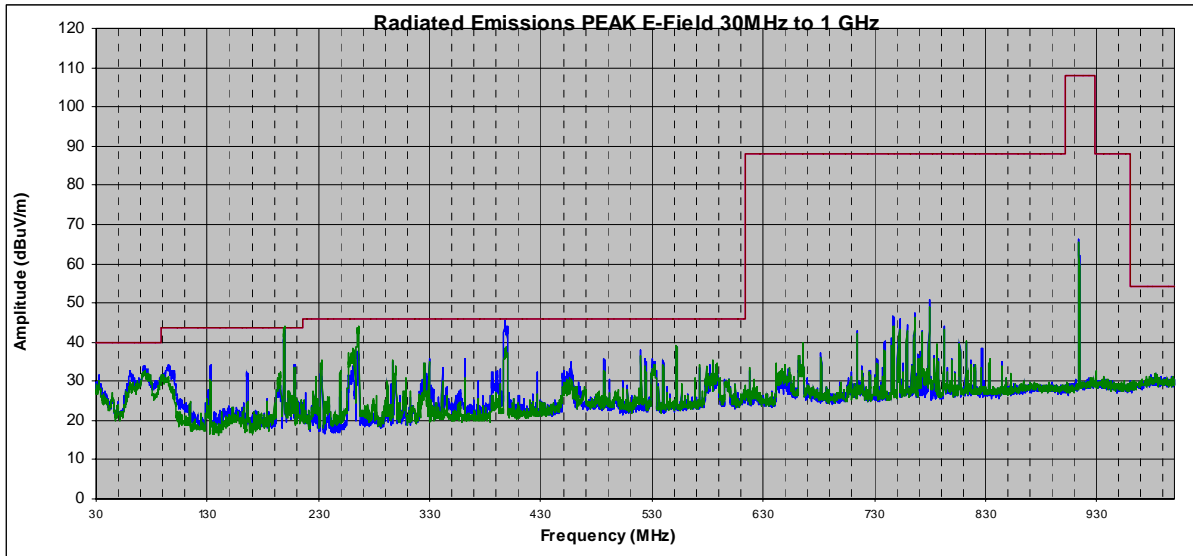
Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
- Test date : Aug. 30, 2007  
 Tested By : Benjamin Jing

Standard requirement : 47 CFR §15.247(d)) & RSS-210 Issue 6(A 8.5)

### Test Result for Radiated Spurious Emissions < 1 GHz

Sample Calculation: Corrected Amplitude = Raw Amplitude(dBuV/m) + ACF(dB) + Cable Loss(dB)

Plot : Vertical Polarization Horizontal Polarization Limit



Frequency	Azimuth	Measure	Antenna Polarity	Antenna Height	Raw Amplitude @ 3 m	ACF	CBL loss	Corrected Amplitude @ 3 m	Limit @ 3 m	Delta
(MHz)	(degrees)	(Avg/QP/Pk)	(H/V)	(m)	(dBuV/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
199.85	120	QP	H	1.5	22.57	12.3	0.9	35.77	43.5	-7.73
402.59	270	QP	V	1.2	18.43	15.9	1.6	35.93	46.0	-10.07

**Note: 1) Emission collected is the worse case using Restricted Band Limit.**

**2) A notch filter is used for the test, the fundamental level is 108 dBuV/m at 3 meters distance.**

## Test Result for Radiated Spurious Emissions > 1 GHz

Sample Calculation:

EUT Field Strength = Raw Amplitude(dBμV/m) – Amplifier Gain(dB) + Antenna Factor(dB) + Cable Loss(dB) + Filter Attenuation(dB, if used)

### Fundamental = 0.9027 GHz ( Low Channel )

Frequency (GHz)	Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna Heigh (m)	Raw Reading (dBuV)	Pre Amp. (dB)	Ant.Corr. Factor (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Delta (dB)	Detector (pk/avg)
1.8056	0	V	1.2	48.2	32.20	26.92	1.84	44.76	74	-29.24	pk
1.8056	0	V	1.2	46.3	32.20	26.92	1.84	42.86	54	-11.14	avg
1.8056	0	H	1.5	42.9	32.20	26.94	1.84	39.48	74	-34.52	pk
1.8056	0	H	1.5	40.7	32.20	26.94	1.84	37.28	54	-16.72	avg
3.6112	130	V	1.1	45.5	33.23	31.49	2.53	46.29	74	-27.71	pk
3.6112	130	V	1.1	42.6	33.23	31.49	2.53	43.39	54	-10.61	avg
3.6112	90	H	1.7	40.8	33.23	31.44	2.53	41.54	74	-32.46	pk
3.6112	90	H	1.7	37.9	33.23	31.44	2.53	38.64	54	-15.36	avg

### Fundamental = 0.915 GHz ( Mid Channel )

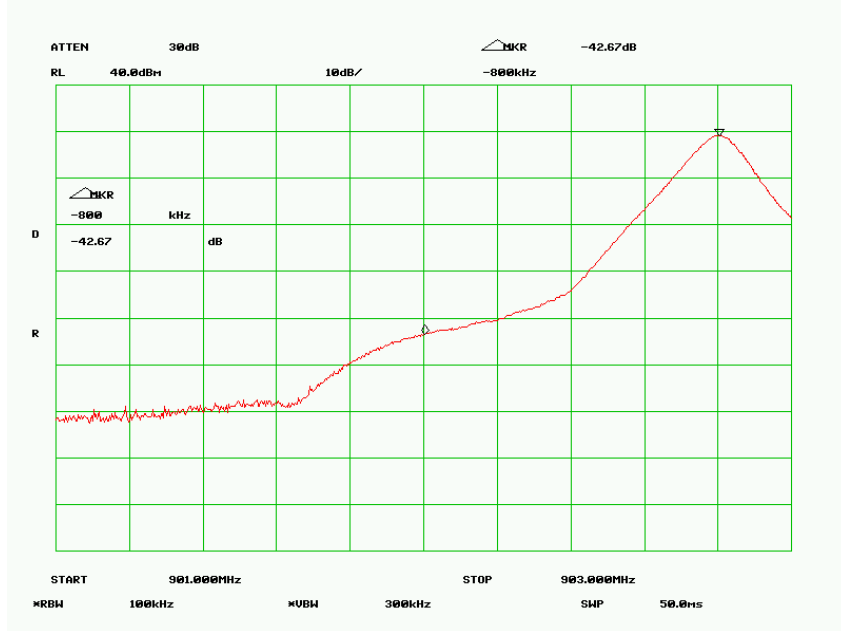
Frequency (GHz)	Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna Heigh (m)	Raw Reading (dBuV)	Pre Amp. (dB)	Ant.Corr. Factor (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Delta (dB)	Detector (pk/avg)
1.83	0	V	1.1	48.1	32.21	27.04	1.86	44.79	74	-29.21	pk
1.83	0	V	1.1	45.9	32.21	27.04	1.86	42.59	54	-11.41	avg
1.83	0	H	1.4	42.3	32.21	27.06	1.86	39.01	74	-34.99	pk
1.83	0	H	1.4	40.2	32.21	27.06	1.86	36.91	54	-17.09	avg
3.66	45	V	1.3	44.6	33.29	31.57	2.59	45.47	74	-28.53	pk
3.66	45	V	1.3	41.8	33.29	31.57	2.59	42.67	54	-11.33	avg
3.66	60	H	1.6	40.3	33.29	31.51	2.59	41.11	74	-32.89	pk
3.66	60	H	1.6	37.1	33.29	31.51	2.59	37.91	54	-16.09	avg

### Fundamental = 0.9272 GHz ( High Channel )

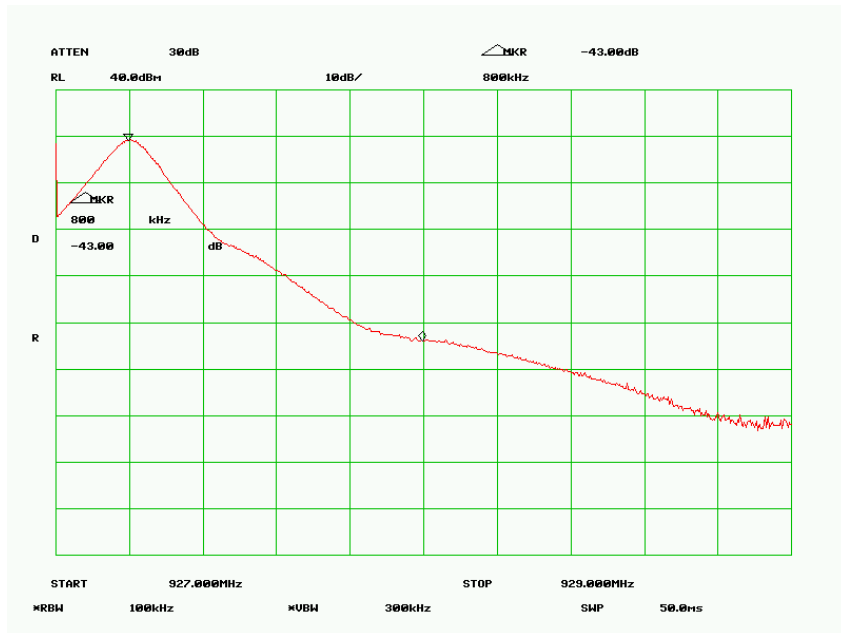
Frequency (GHz)	Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna Heigh (m)	Raw Reading (dBuV)	Pre Amp. (dB)	Ant.Corr. Factor (dB)	Cable Loss (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Delta (dBuV/m)	Detector (pk/avg)
1.8544	0	V	1.5	47.6	32.23	27.16	1.88	44.41	74	-29.59	pk
1.8544	0	V	1.5	44.8	32.23	27.16	1.88	41.61	54	-12.39	avg
1.8544	0	H	1.7	41.7	32.23	27.17	1.88	38.53	74	-35.47	pk
1.8544	0	H	1.7	39.5	32.23	27.17	1.88	36.33	54	-17.67	avg
3.7088	230	V	1.3	44.1	33.36	31.66	2.67	45.07	74	-28.93	pk
3.7088	230	V	1.3	41.3	33.36	31.66	2.67	42.27	54	-11.73	avg
3.7088	120	H	1.3	39.9	33.36	31.59	2.67	40.80	74	-33.20	pk
3.7088	120	H	1.3	36.2	33.36	31.59	2.67	37.10	54	-16.90	avg

Note : The levels of the spurious emissions above 4 GHz are too low to be tested .

**Band-edge Test Result :**



**Band-edge : Lowest Channel**



**Band-edge : Highest Channel**

## 5.8 AC Line Conducted Emission Test Result

Note:

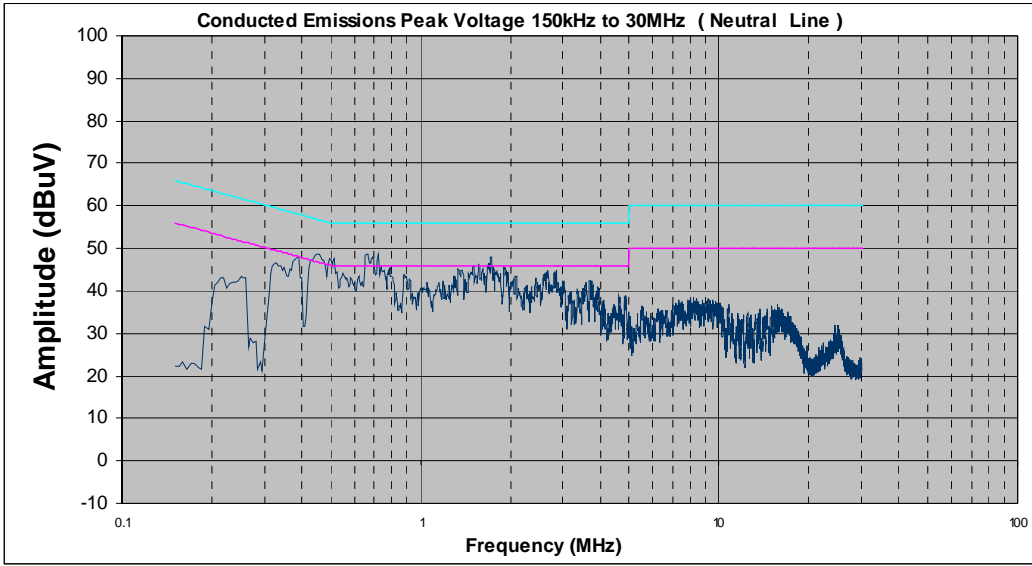
1. Standard requirement : 47 CFR §15.207 & RSS-Gen Issue 1(7.2.2)
2. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
3. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
4. Conducted Emissions Measurement Uncertainty  
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is  $\pm 2.64\text{dB}$ .

5. Environmental Conditions	Temperature	23°C
	Relative Humidity	50%
	Atmospheric Pressure	1019mbar

Test Date : Aug. 30 2007  
Tested By : Benjamin Jing

Quasi-Peak

Average Limit



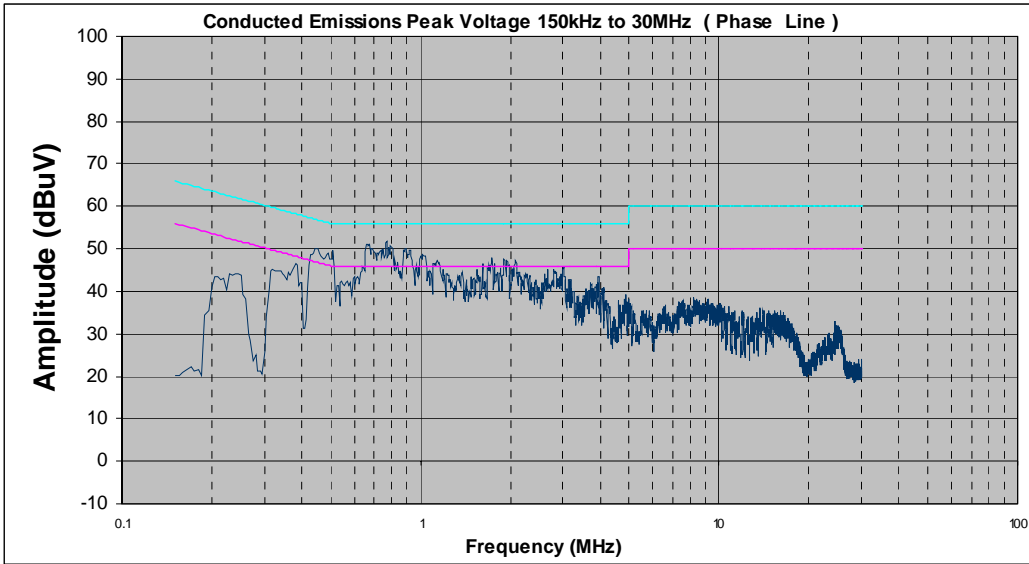
120V, 60Hz, Neutral Line

Frequency (MHz)	QP Value (dB $\mu$ V)	FCC 15.207 Limit (dB)	Pass / Fail	Margin (dB)	Avg Value (dB $\mu$ V)	FCC 15.207 Limit (dB)	Pass / Fail	Margin (dB)	Line
0.41	39.85	57.65	PASS	-17.80	30.22	47.65	PASS	-17.43	Neutral
0.46	40.92	56.69	PASS	-15.77	31.73	46.69	PASS	-14.96	Neutral
0.74	39.53	56.00	PASS	-16.47	30.15	46.00	PASS	-15.85	Neutral
1.73	37.87	56.00	PASS	-18.13	29.81	46.00	PASS	-16.19	Neutral
2.94	39.62	56.00	PASS	-16.38	31.47	46.00	PASS	-14.53	Neutral
3.73	35.44	56.00	PASS	-20.56	28.81	46.00	PASS	-17.19	Neutral



Quasi-Peak

Average Limit



120V, 60Hz, Phase Line

Frequency (MHz)	QP Value (dBμV)	FCC 15.207 Limit (dB)	Pass / Fail	Margin (dB)	Avg Value (dBμV)	FCC 15.207 Limit (dB)	Pass / Fail	Margin (dB)	Line
0.47	43.95	56.51	PASS	-12.56	35.87	46.51	PASS	-10.64	Phase
0.69	44.62	56.00	PASS	-11.38	36.04	46.00	PASS	-9.96	Phase
0.93	43.61	56.00	PASS	-12.39	34.25	46.00	PASS	-11.75	Phase
1.95	38.96	56.00	PASS	-17.04	29.57	46.00	PASS	-16.43	Phase
3.11	34.32	56.00	PASS	-21.68	26.69	46.00	PASS	-19.31	Phase
3.96	32.88	56.00	PASS	-23.12	24.75	46.00	PASS	-21.25	Phase

## 5.9 Antenna Requirement

**Requirement(s):** 47 CFR §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.

Antenna requirement must meet at least one of the following:

- a) Antenna must be permanently attached to the device.
- b) Antenna must use a unique type of connector to attach to the device.
- c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

This EUT antenna is attached permanently to the device which meets the requirement

## Annex A. TEST INSTRUMENT & METHOD

### Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Manufacturer	Model	CAL Due Date
Spectrum Analyzer	HP	8568B	04/26/2008
Quasi-Peak Adapter	HP	85650A	04/26/2008
RF Pre-Selector	HP	85685A	04/26/2008
Spectrum Analyzer	HP	8564E	12/29/2007
Power Meter	HP	437B	04/26/2008
Power Sensor	HP	8485A	04/26/2008
Bilog Antenna	Sunol Sciences, Inc.	JB1	09/11/2007
Horn Antenna	Emco	3115	08/17/2008
Signal Generator	Wiltron	68169B	04/26/2008
Chamber	Lingren	3m	08/21/2008
Pre-Amplifier	HP	8449	05/01/2008
Variac	KRM	AEEC-2090	See Note
Environment Chamber	TestEquity	1007H	10/27/2007
DMM	Fluke	51II	See Note
900 MHz Notch Filter	AWID	N/A	See Note
4GHz High Pass Filter	LORCH Microwave	4HPD-X4000-3R	See Note

Note: No calibration required.

**Annex A. ii RADIATED EMISSIONS TEST DESCRIPTION**

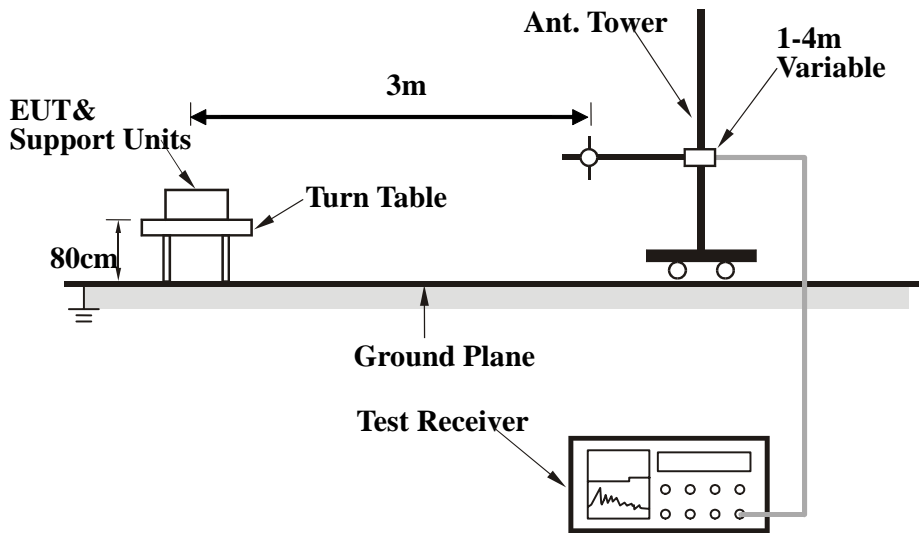
**EUT Characterisation**

EUT characterisation, over the frequency range from 30MHz to 10<sup>th</sup> Harmonic , was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred, clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS).

**Test Set-up**

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.



**Test Method**

The following procedure was performed to determine the maximum emission axis of EUT:

1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

**Final Radiated Emission Measurement**

1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.
5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100 kHz	100 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

**Sample Calculation Example**

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

$$\text{Peak} = \text{Reading} + \text{Corrected Factor}$$

where

$$\text{Corr. Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain (if any)}$$

And the average value is

$$\text{Average} = \text{Peak Value} + \text{Duty Factor}$$

Note :

If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function.

## **Annex B EUT AND TEST SETUP PHOTOGRAPHS**

**Please see the attachment.**

## **Annex C. TEST SETUP AND SUPPORTING EQUIPMENT**

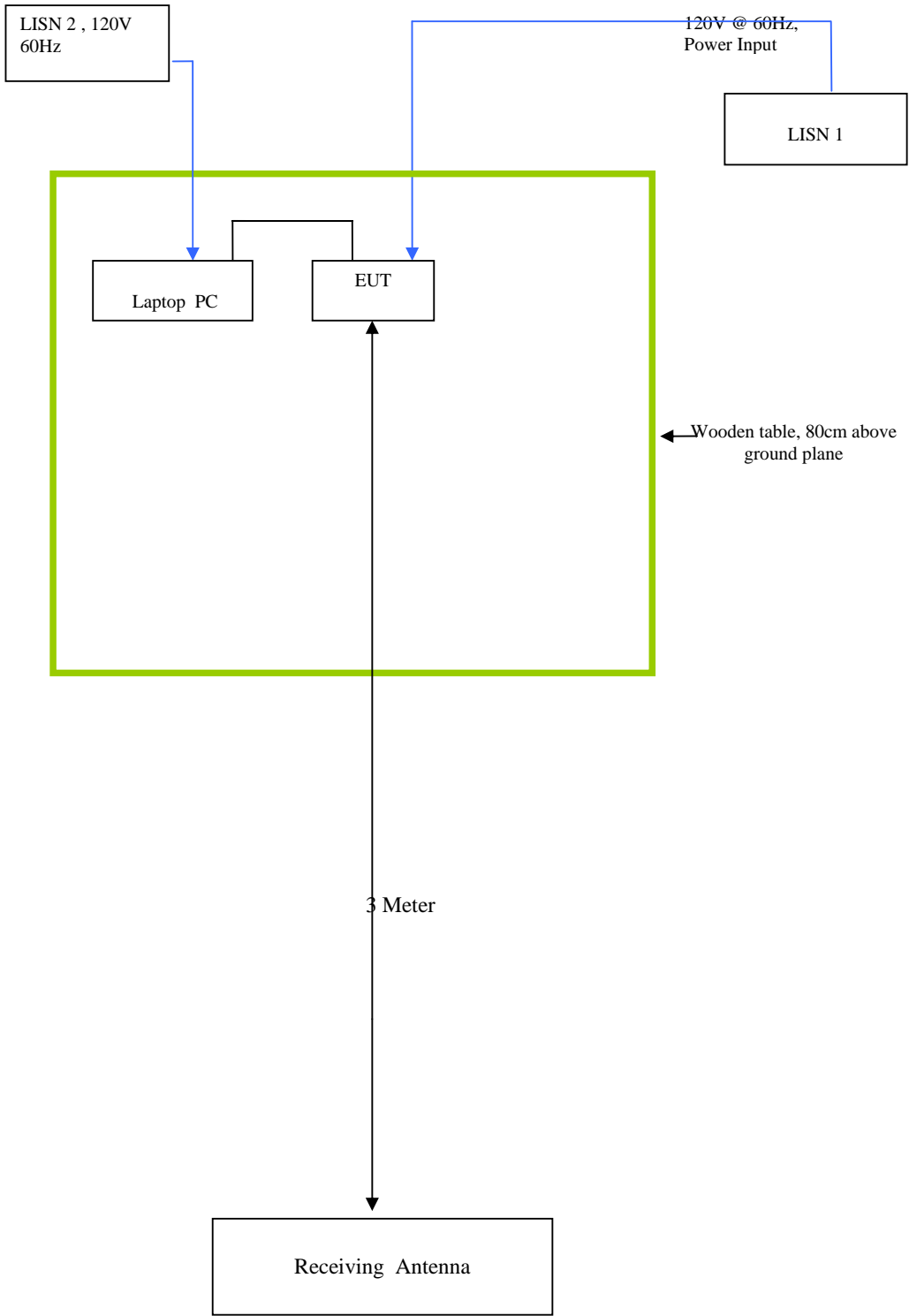
### **EUT TEST CONDITIONS**

#### **Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION**

The following is a description of supporting equipment and details of cables used with the EUT.

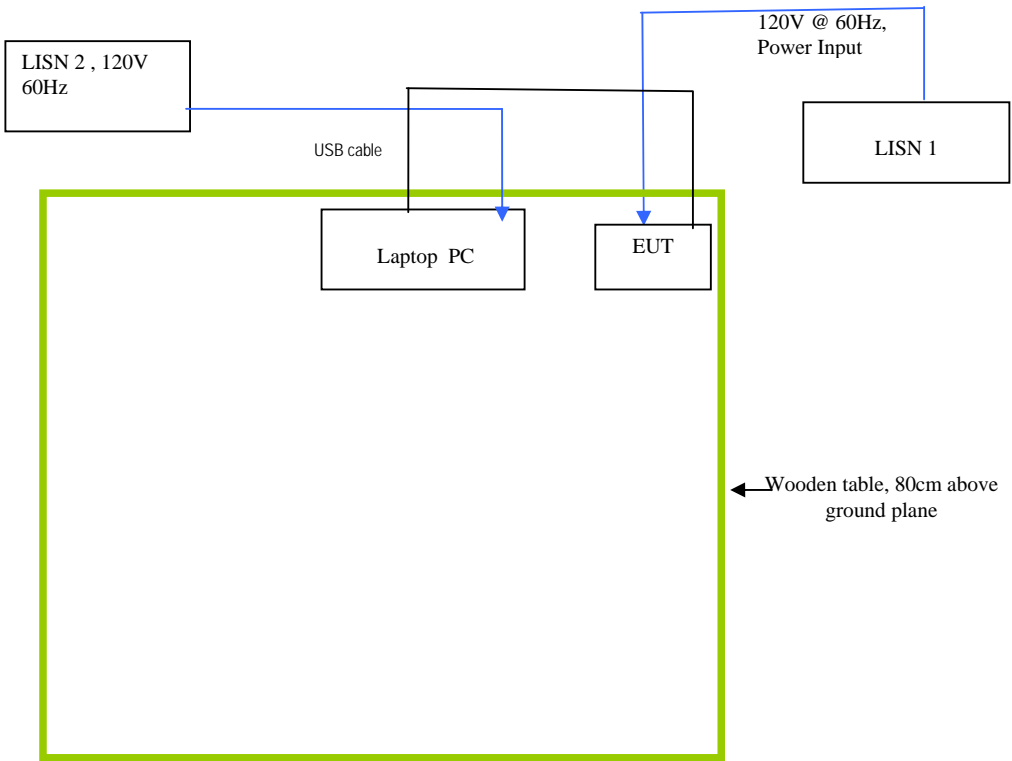
<b>Equipment Description (Including Brand Name)</b>	<b>Model &amp; Serial Number</b>	<b>Cable Description (List Length, Type &amp; Purpose)</b>
Laptop PC	Compaq 2100	RS232 Cable : 20 cm.

### Block Configuration Diagram for Radiated Emission





### Block Configuration Diagram for Conducted Emission



**Annex C.ii. EUT OPERATING CONDITIONS**

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
<b>Emissions</b>	The EUT was controlled via PC to enter test modes necessary to complete the testing. EUT is configured for worst case with AWID software.

## **Annex D USER MANUAL, BLOCK & CIRCUIT DIAGRAM**

**Please see attachment**