FCC PART 15.247 & 15.249

EMI MEASUREMENT AND TEST REPORT

For

Radicom Research Inc

2148 Bering Drive, San Jose, CA 95131

FCC ID: K7T-WHM900

This Report Concerns:	**Equipment Type:**
☒ Original Report	Wireless Half Inch Radio Frequency Module

Test Engineer:	Snell Leong/
Report No.:	R0504283
Report Date:	2005-06-17
Reviewed By:	Daniel Deng/
Prepared By:	Bay Area Compliance Laboratory Corporation 230 Commercial Street Sunnyvale, CA 94085 Tel (408) 732-9162 Fax (408) 732-9164

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Radicom Research Inc.* product, FCC ID: *K7T-WHM900*, or the "EUT" as referred to in this report is a Wireless Half Inch Radio Frequency Module which is measured approximately 20mmL x 20mmW x 8mmH.

** The test data gathered are from production sample, serial number:Number1, provided by the manufacturer.*

Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2003.

The tests were performed in order to determine compliance with Part 2, Subpart J, Part 15, Subparts A, B, C.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp.

Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003.

Schematics and Block Diagram

Please refer to Appendix A.

Equipment Modifications

No modifications were made to the EUT.

Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
AMIGO	AC Adapter	AM-91000A	N/A	N/A

SUMMARY OF TEST RESULTS FOR FCC PART 15.247

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§ 15.205	Restricted Bands	Compliant
§15.207 (a)	Conducted Emission	Compliant
§15.209	Radiated Emission	Compliant*
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1) (i)	Channel Bandwidth	Compliant
§15.247 (a) (1) (i)	Number of Hopping Frequencies Used	Compliant
§15.247 (a) (1) (i)	Dwell Time of Each Frequency within a 20 Second Period of time	Compliant
§15.247 (b) (2)	Maximum Peak Output Power	Compliant
§ 15.247 (b)(5) § 2.1091	RF Safety Requirements	Compliant
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§ 2.1051	Spurious Emission at Antenna Port	Compliant

* within the measurement uncertainty

ANTENNA REQUIREMENT

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (1), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The gain of antenna is 2 dBi by default. Please see EUT photo for details.

§15.207(a) - CONDUCTED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is $\pm$2.4 dB.

Test Setup

The measurement was performed at shield room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC Class B limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected with LISN-1.

Spectrum Analyzer Setup

The spectrum analyzer was set to investigate the spectrum from 150 kHz to 30MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
R&S	Receiver, EMI Test	ESCS30	100176	9/15/2004
R&S	LISN, Artificial Mains	ESH2-Z5	871884/039	8/16/2004

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Procedure

During the conducted emission test, the power cord of the host system was connected to the mains outlet of the LISN-1.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Qusi-Peak readings are distinguished with an "QP". Average readings are distinguished with an "Ave".

Environmental Conditions

Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

**The testing was performed by Snell Leong on 2005-04-28.*

Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Conducted limit for a Class B device, with the *worst* margin reading of:

-18.5 dB at **0.255 MHz** in the **Line** conductor

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.255	43.1	QP	Line	61.59	-18.5
0.220	44.2	QP	Neutral	62.82	-18.6
0.150	46.2	QP	Neutral	66.00	-19.8
0.150	46.2	QP	Line	66.00	-19.8
21.500	14.2	Ave	Line	50.00	-35.8
0.220	15.7	Ave	Neutral	52.82	-37.1
0.255	13.7	Ave	Line	51.59	-37.9
0.150	16.5	Ave	Neutral	56.00	-39.5
0.150	16.2	Ave	Line	56.00	-39.8
21.500	14.5	QP	Line	60.00	-45.5
8.100	4.4	Ave	Neutral	50.00	-45.6
8.100	13.9	QP	Neutral	60.00	-46.1

Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.

Bay Area Compliance Laboratory Corp

28. Apr 05 13:07

Class B

28/April/2005

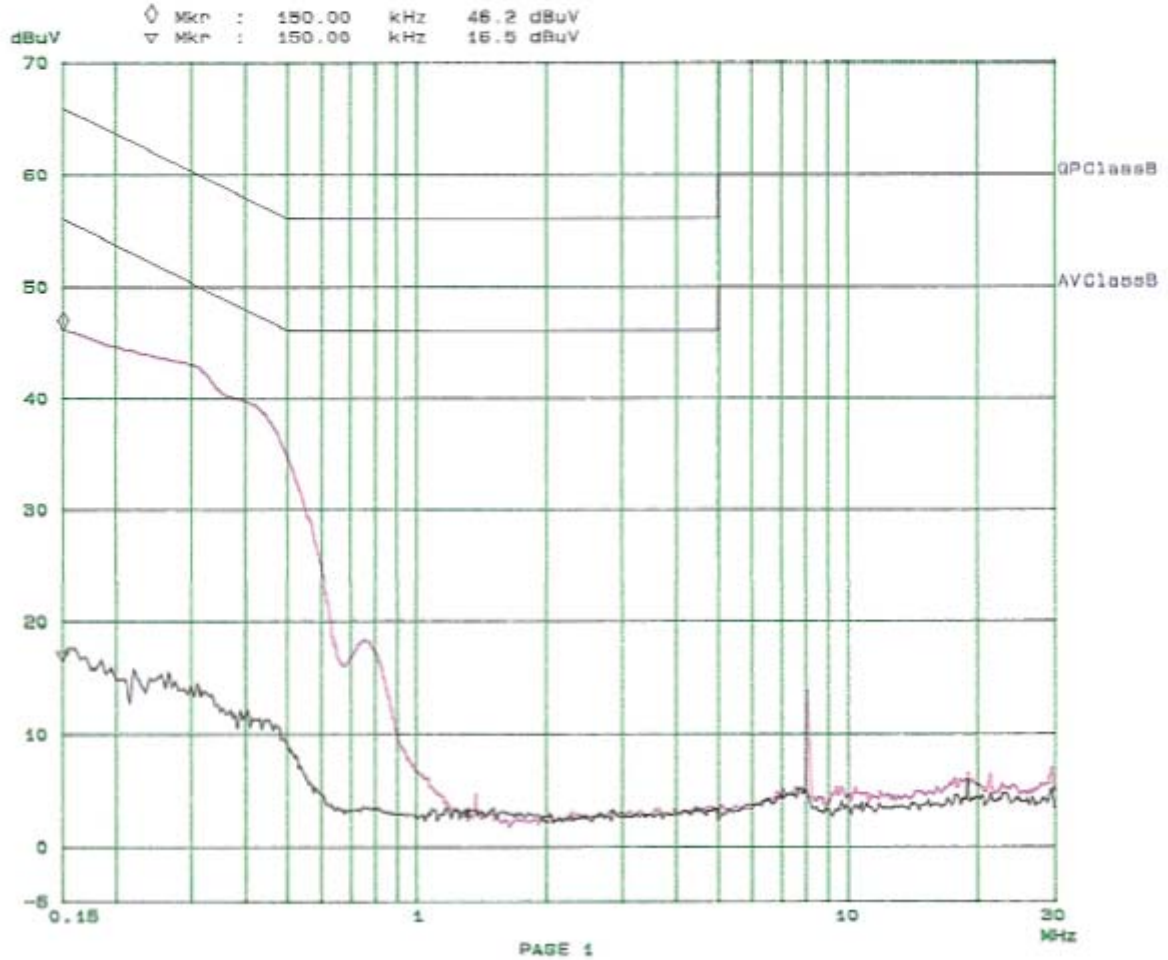
Snell

EUT: WHM900
Manuf: RADICOM
Op Cond: Normal
Operator: SNELL
Comment: N
120VAC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



PAGE 1

Bay Area Compliance Laboratory Corp
Class B

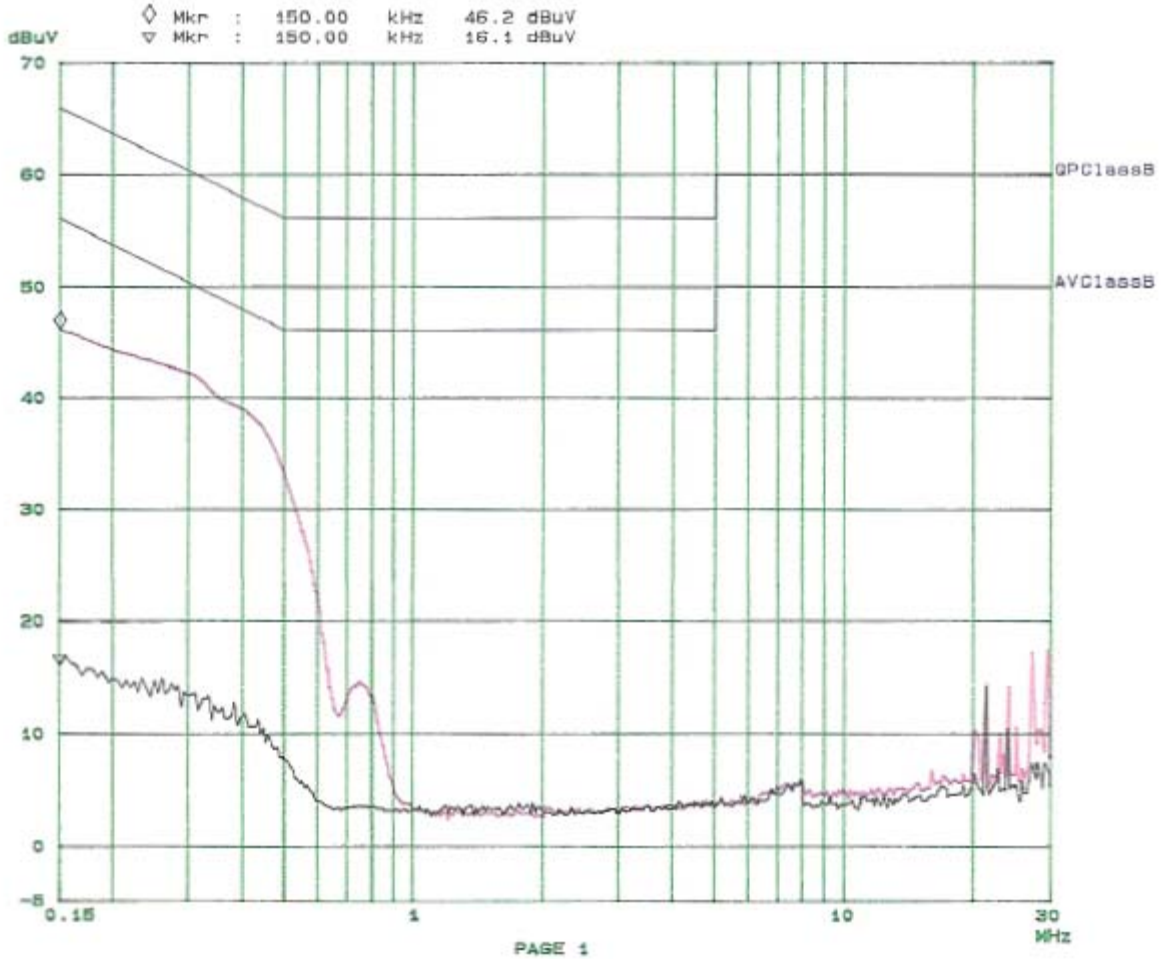
28. Apr 05 14:11
28/April/2005
Snell

EUT: WHM900
Manuf: RADICOM
Op Cond: Normal
Operator: SNELL
Comment: L
120VAC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



PAGE 1

§15.205 & §15.209 - RADIATED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ±4.0 dB.

Test Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected with 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 10GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Sunol Sciences	Antenna	JB1	A03105-3	2/11/2005
HP	Amplifier, Pre	8447D	2944A10198	8/20/2004
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
EMCO	Antenna, Log-Periodic	3148	4-1155	12/14/2004
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	03/14/2005
Wisewave	Antenna, Horn, Std	ARH-2823-02	10555-02	12/13/2004

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

**The testing was performed by Snell Leong on 2005-04-28.*

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**Qp**" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Class B Limit

Summary of Test Results

According to the recorded data in following table, the EUT measured -0.1dB margin, within the measurement uncertainty of ±4.0dB, and had the worst margin of:

-3.9 dB at **2707.5 MHz** in the **Vertical** polarization, Low Channel, 3 meters

-0.8 dB at **1830 MHz** in the **Vertical** polarization, Middle Channel, 3 meters

-0.1 dB at **2782.5 MHz** in the **Vertical** polarization, High Channel, 3 meters

-3.1 dB at **545.59 MHz** in the **Vertical** polarization, Unintentional Emission, 3 meters

3 Meters Radiated Emission Test Data

Indicated			Antenna	Antenna		Correction Factor			FCC 15.247		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Comments
MHz	dBμV/m	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB	
Low Channel											
902.5000	102.7	90	1.0	v	23.6	3.8	28.4	101.7			Fund/Peak
902.5000	94.3	0	1.2	h	23.6	3.8	28.4	93.3			Fund/Peak
902.5000	102.7	180	1.2	v	23.6	3.8	28.4	101.7			Ave
902.5000	92.3	0	1.2	h	23.6	3.8	28.4	91.3			Ave
2707.5000	54.3	180	2.0	v	28.9	2.4	35.5	50.1	54	-3.9	Ave
1805.0000	52.0	270	2.4	v	24.8	1.9	36.3	42.3	54	-11.7	Ave
1805.0000	50.2	180	2.3	h	24.8	1.9	36.3	40.6	54	-13.5	Ave
2707.5000	57.6	90	2.0	v	28.9	2.4	35.5	53.4	74	-20.6	Peak
1805.0000	54.6	270	2.4	v	24.8	1.9	36.3	44.9	74	-29.1	Peak
2707.5000	27.7	90	2.0	h	28.9	2.4	35.5	23.5	54	-30.5	Ave
1805.0000	52.1	180	2.3	h	24.8	1.9	36.3	42.4	74	-31.6	Peak
2707.5000	40.1	180	2.0	h	28.9	2.4	35.5	35.9	74	-38.1	Peak
Middle Channel											
915.0000	102.5	270	2.4	v	23.2	3.9	28.4	101.3			Fund/Peak
915.0000	96.8	180	2.2	h	23.2	3.9	28.4	95.6			Fund/Peak
915.0000	100.1	270	2.4	v	23.2	3.9	28.4	98.9			Ave
915.0000	91.0	180	2.2	h	23.2	3.9	28.4	89.8			Ave
1830.0000	62.9	270	2.4	v	24.8	1.9	36.3	53.2	54	-0.8	Ave
1830.0000	62.5	180	2.2	h	24.8	1.9	36.3	52.8	54	-1.2	Ave
2745.0000	55.8	270	2.4	v	28.9	2.4	35.5	51.6	54	-2.4	Ave
3660.2500	46.4	270	2.4	v	30.0	2.7	34.8	44.3	54	-9.7	Ave
2745.0000	47.3	180	2.2	h	28.9	2.4	35.5	43.1	54	-10.9	Ave
2543.0000	46.2	180	2.3	h	28.9	2.4	35.5	42.0	54	-12.0	Ave
3660.2500	40.2	180	2.3	h	30.0	2.7	34.8	38.1	54	-15.9	Ave
2543.0000	39.8	270	2.4	v	28.9	2.4	35.5	35.6	54	-18.4	Ave
1830.0000	64.2	270	2.4	v	24.8	1.9	36.3	54.6	74	-19.5	Peak
2745.0000	58.1	270	2.4	v	28.9	2.4	35.5	53.9	74	-20.1	Peak
1830.0000	62.9	180	2.2	h	24.8	1.9	36.3	53.2	74	-20.8	Peak
2543.0000	53.2	180	2.1	h	28.9	2.4	35.5	49.0	74	-25.0	Peak
3660.2500	50.6	270	2.4	v	30.0	2.7	34.8	48.4	74	-25.6	Peak
2745.0000	51.5	180	2.3	h	28.9	2.4	35.5	47.3	74	-26.7	Peak
2543.0000	48.5	270	2.4	v	28.9	2.4	35.5	44.4	74	-29.7	Peak
3660.2500	46.4	180	2.2	h	30.0	2.7	34.8	44.3	74	-29.8	Peak

High Channel											
927.5000	106.4	0	1.3	v	23.4	4.0	28.3	105.5			Fund/Peak
927.5000	100.8	0	1.5	h	23.4	4.0	28.3	99.9			Fund/Peak
927.5000	105.3	0	1.3	v	23.4	4.0	28.3	104.4			Ave
927.5000	100.5	0	1.5	h	23.4	4.0	28.3	99.6			Ave
2782.5000	58.1	270	2.4	v	28.9	2.4	35.5	53.9	54	-0.1	Ave
1855.0000	63.1	90	2.1	h	24.8	1.9	36.3	53.4	54	-0.6	Ave
1855.0000	60.3	270	2.4	v	24.8	1.9	36.3	50.6	54	-3.4	Ave
2782.5000	53.0	90	2.1	h	28.9	2.4	35.5	48.8	54	-5.2	Ave
2782.5000	67.4	270	2.4	v	28.9	2.4	35.5	63.2	74	-10.8	Peak
2782.5000	64.4	90	2.1	h	28.9	2.4	35.5	60.2	74	-13.8	Peak
1855.0000	68.5	270	2.4	v	24.8	1.9	36.3	58.8	74	-15.2	Peak
1855.0000	68.3	90	2.1	h	24.8	1.9	36.3	58.6	74	-15.4	Peak

Note:

FUND: Fundamental
AVG: Average

Unintentional Emission

Indicated			Antenna	Antenna		Correction Factor			FCC 15B	
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/m	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB
545.59	49.59	330	1.2	V	19.3	2.9	28.9	42.9	46	-3.1
516.10	46.51	75	1.8	V	18.4	3.1	28.9	39.1	46	-6.9
545.59	43.84	270	2.1	H	19.3	2.9	28.9	37.1	46	-8.9
516.10	41.14	270	3.2	H	18.4	3.1	28.9	33.7	46	-12.3
40.03	38.60	250	1.0	V	11.9	1.2	28.9	22.8	40	-17.2
40.03	34.74	280	2.8	H	11.9	1.2	28.9	18.9	40	-21.1

§15.247 (a) (1) (i) - HOPPING CHANNEL SEPARATION

Standard Applicable

According to §15.247(a)(1)(i), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

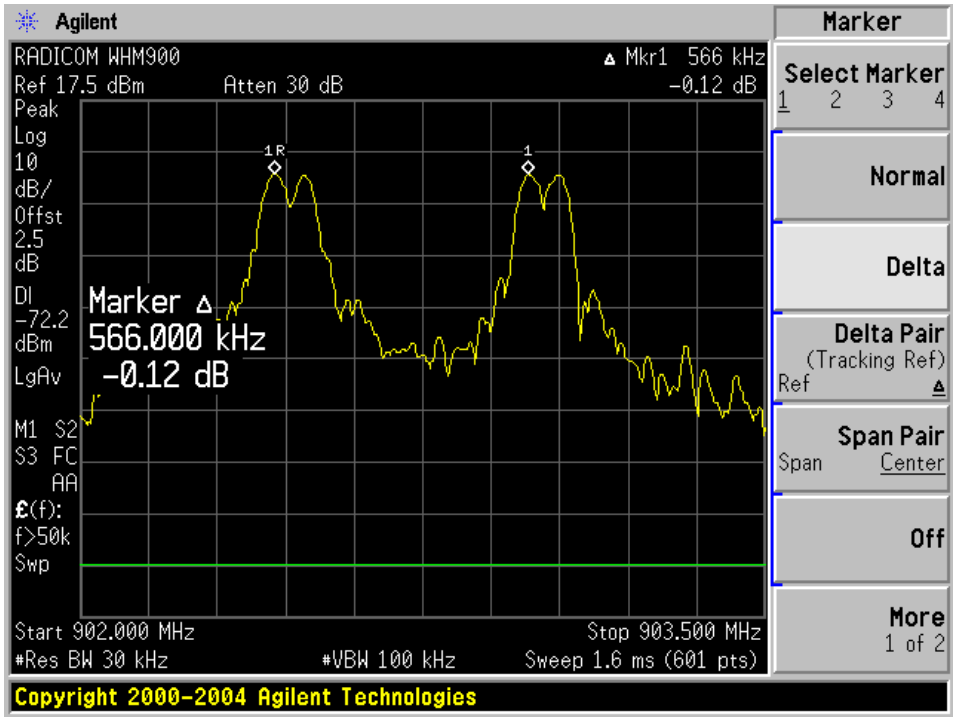
**The testing was performed by Snell Leong on 2005-04-28.*

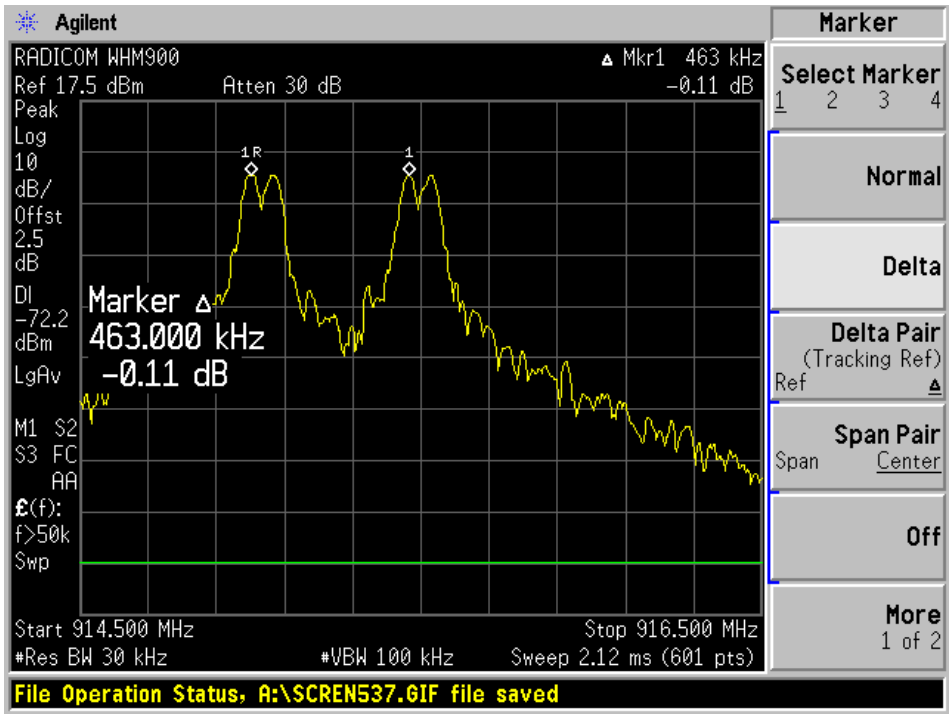
Measurement Results

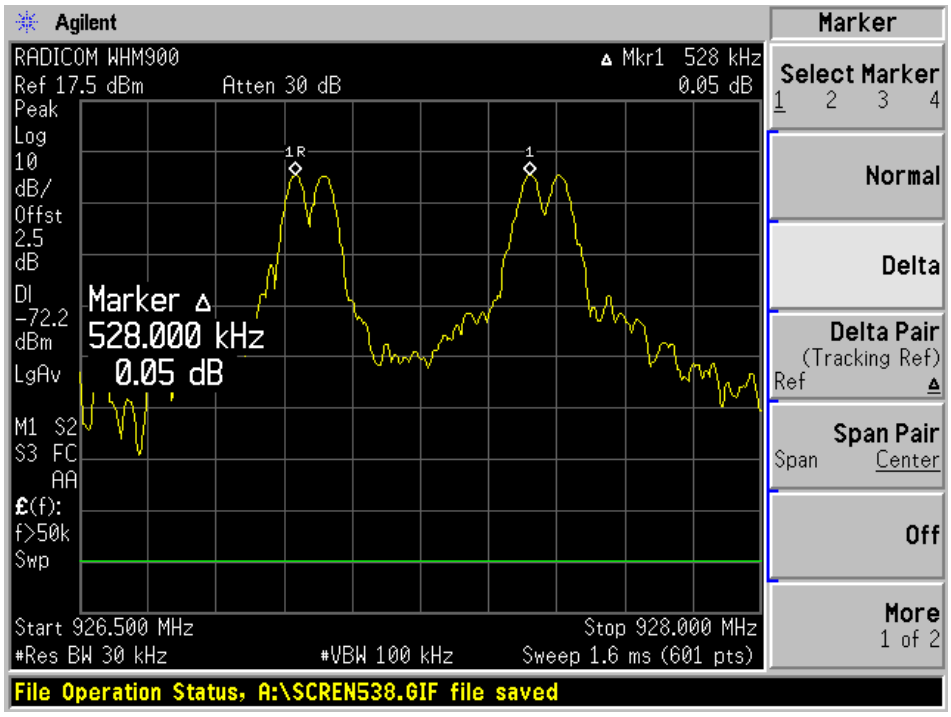
Channel	Frequency MHz	Channel Separation KHz
Low	902.5	566
Mid	915.5	463
High	927.5	528

Plots of Hopping Channel Separation

Please see the following plots






Agilent
Marker
RADICOM WHM900
Ref 17.5 dBm
Atten 30 dB
Mkr1 528 kHz
0.05 dB
Peak
Log
10
dB/
Offst
2.5
dB
Dl
-72.2
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Marker Δ
528.000 kHz
0.05 dB
1R
1
Start 926.500 MHz
#Res BW 30 kHz
#VBW 100 kHz
Stop 928.000 MHz
Sweep 1.6 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN538.GIF file saved

§15.247 (a) (1) - CHANNEL BANDWIDTH

Standard Applicable

According to §15.247(a)(l)(ii), max 20dB bandwidth of hopping channel is 1MHz.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

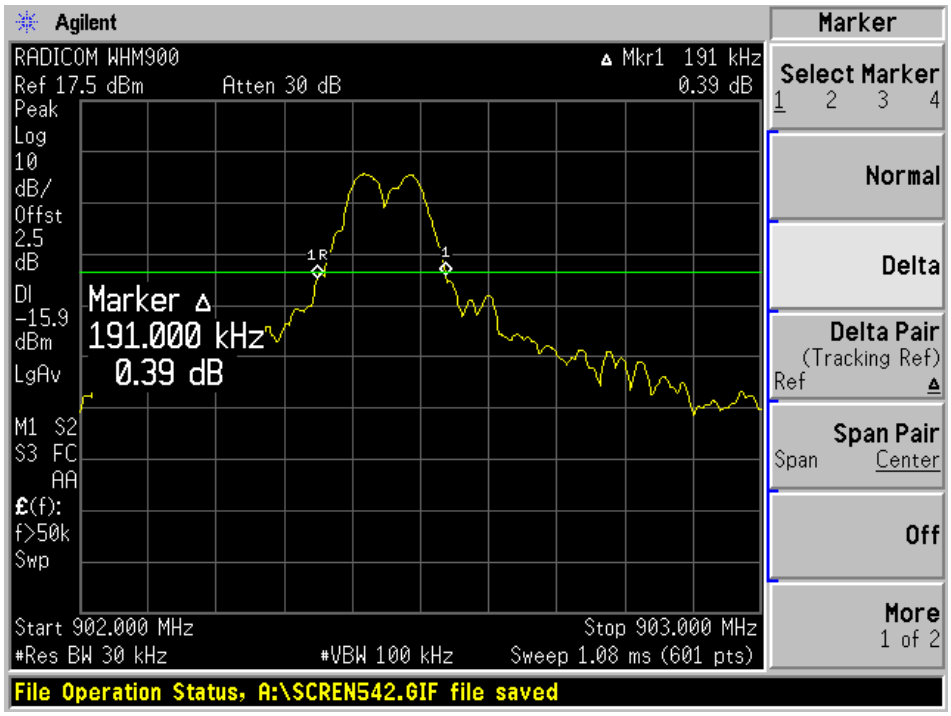
**The testing was performed by Snell Leong on 2005-04-28.*

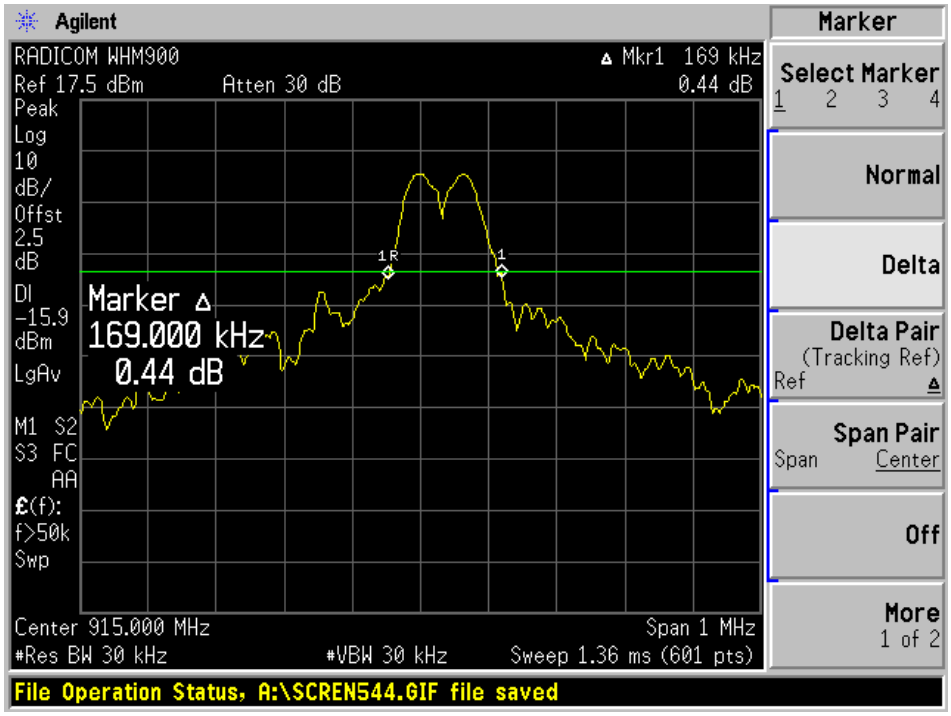
Measurement Result

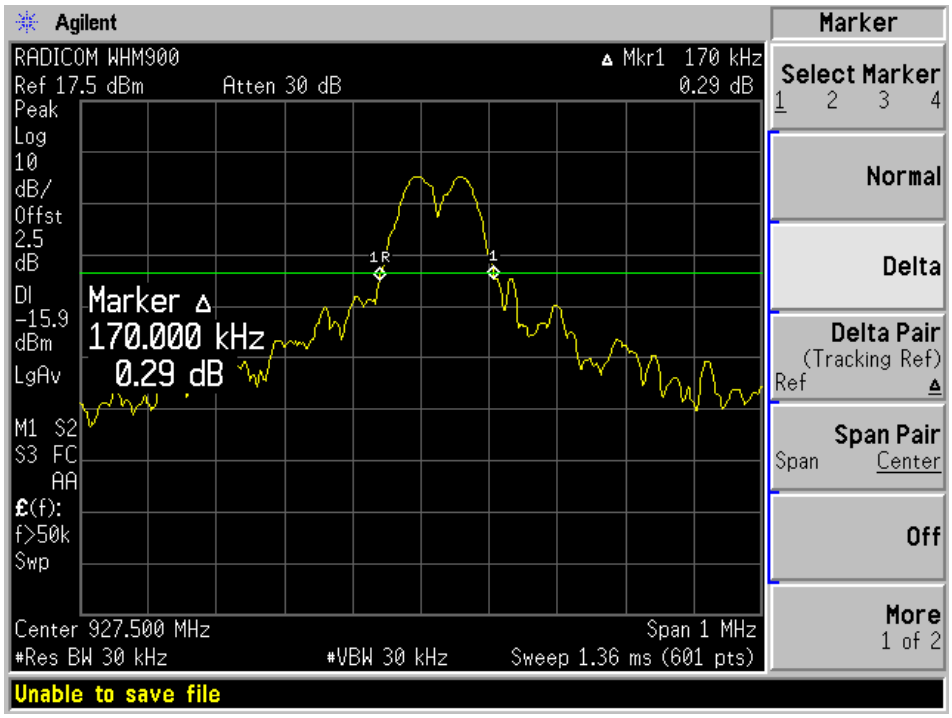
Channel	Frequency MHz	Channel Bandwidth KHz
Low	902.5	191
Mid	915.5	169
High	927.5	170

Plot of Channel Bandwidth

Please see the following plots


Agilent
Marker
RADICOM WHM900
Ref 17.5 dBm
Atten 30 dB
Mkr1 191 kHz
0.39 dB
Peak
Log
10
dB/
Offst
2.5
dB
Dl
-15.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Marker Δ
191.000 kHz
0.39 dB
Start 902.000 MHz
#Res BW 30 kHz
#VBW 100 kHz
Stop 903.000 MHz
Sweep 1.08 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN542.GIF file saved


Agilent
Marker
RADICOM WHM900
Ref 17.5 dBm
Atten 30 dB
Mkr1 169 kHz
0.44 dB
Peak
Log
10
dB/
Offst
2.5
dB
Dl
-15.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Marker Δ
169.000 kHz
0.44 dB
Center 915.000 MHz
#Res BW 30 kHz
#VBW 30 kHz
Span 1 MHz
Sweep 1.36 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN544.GIF file saved


Agilent
Marker
RADICOM WHM900
Ref 17.5 dBm
Atten 30 dB
Mkr1 170 kHz
0.29 dB
Peak
Log
10
dB/
Offst
2.5
dB
Dl
-15.9
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Marker Δ
170.000 kHz
0.29 dB
Center 927.500 MHz
#Res BW 30 kHz
#VBW 30 kHz
Span 1 MHz
Sweep 1.36 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Unable to save file

§15.247 (a) (1) (i) - NUMBER OF HOPPING FREQUENCY USED

Standard Applicable

Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

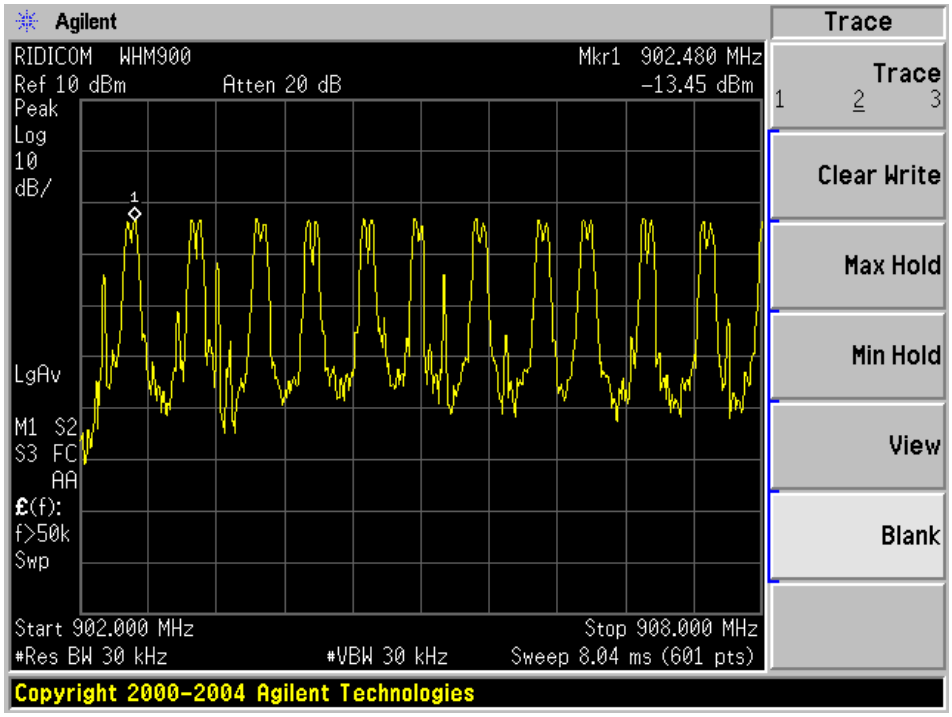
**The testing was performed by Snell Leong on 2005-04-28.*

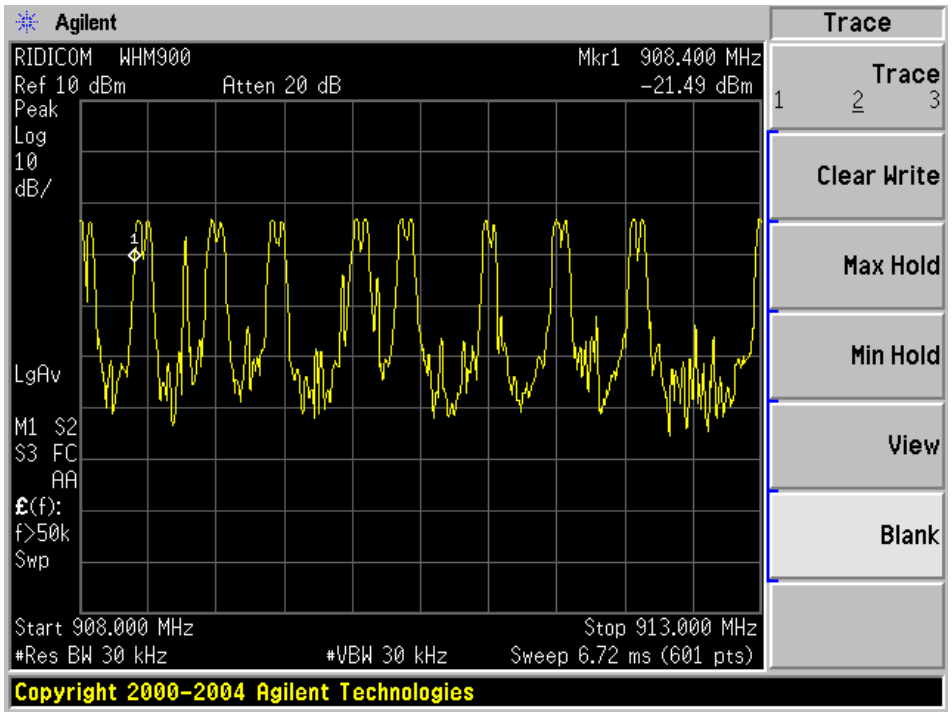
Measurement Results

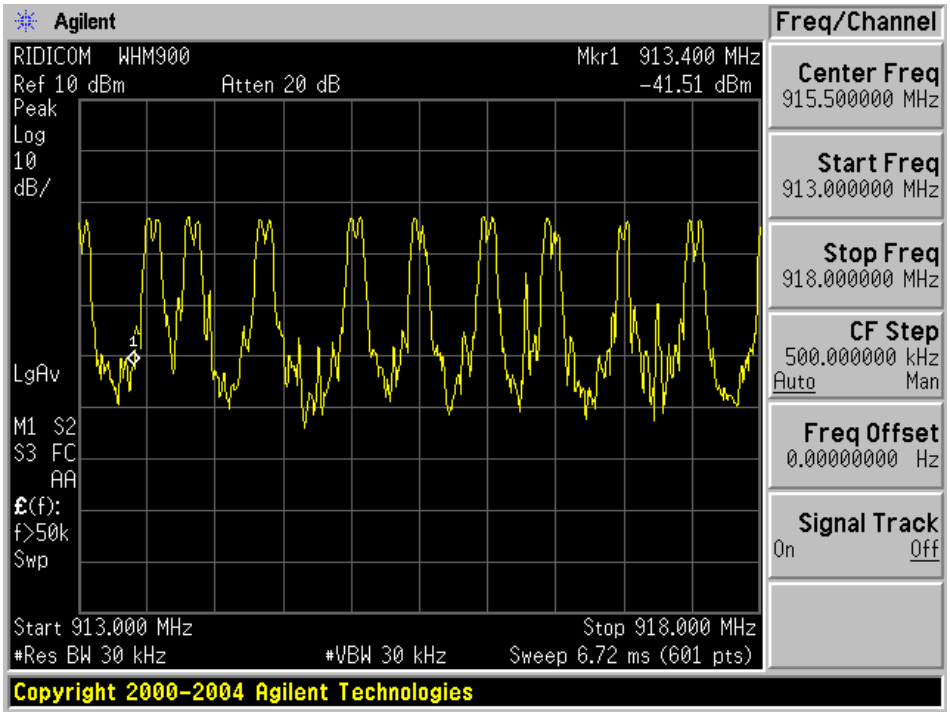
Measurement	Result
50	Compliant

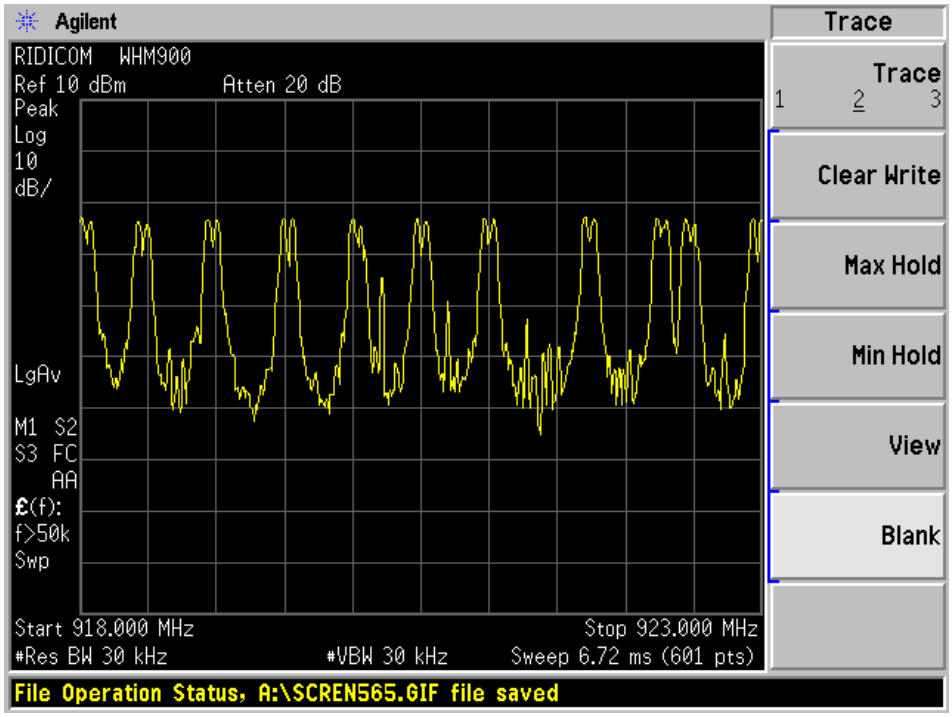
Plots of Number of Hopping Frequency

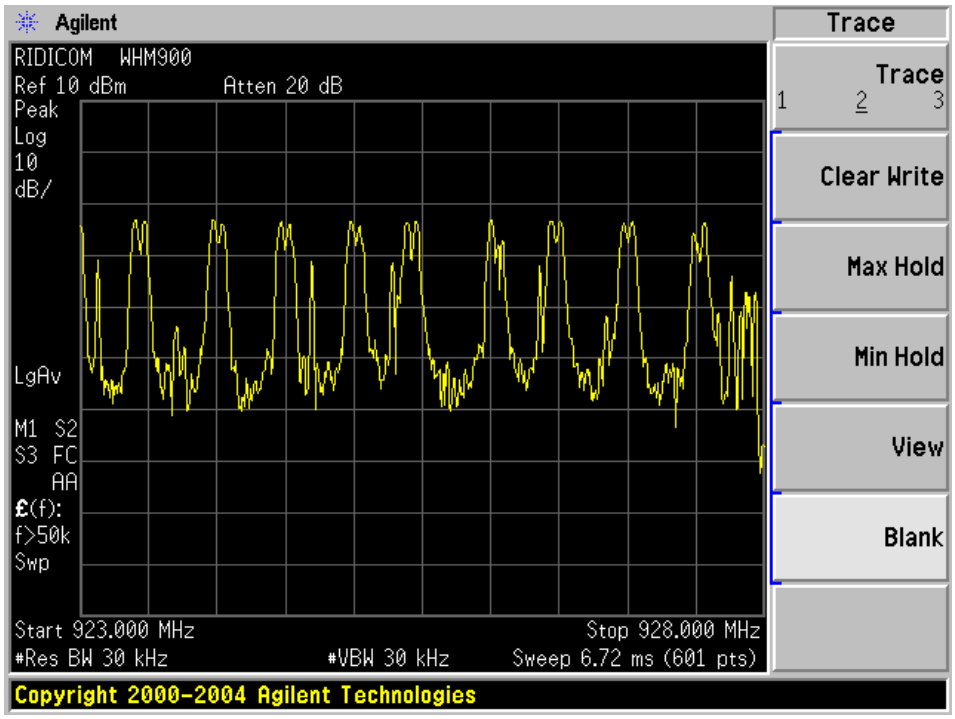
Please refer to the following plots.






Agilent
RIDICOM WHM900
Mkr1 913.400 MHz
Ref 10 dBm
Atten 20 dB
-41.51 dBm
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Start 913.000 MHz
Stop 918.000 MHz
#Res BW 30 kHz
#VBW 30 kHz
Sweep 6.72 ms (601 pts)
Freq/Channel
Center Freq
915.500000 MHz
Start Freq
913.000000 MHz
Stop Freq
918.000000 MHz
CF Step
500.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2004 Agilent Technologies


Agilent
RIDICOM WHM900
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Start 918.000 MHz
Stop 923.000 MHz
#Res BW 30 kHz
#VBW 30 kHz
Sweep 6.72 ms (601 pts)
Trace
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File Operation Status, A:\SCREN565.GIF file saved


Agilent
RIDICOM WHM900
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Start 923.000 MHz
Stop 928.000 MHz
#Res BW 30 kHz
#VBW 30 kHz
Sweep 6.72 ms (601 pts)
Copyright 2000-2004 Agilent Technologies
Trace
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank

§15.247 (a) (1) (i) - DWELL TIME

Standard Applicable

According to §15.247 (a)(1)(i), the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 20 seconds.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

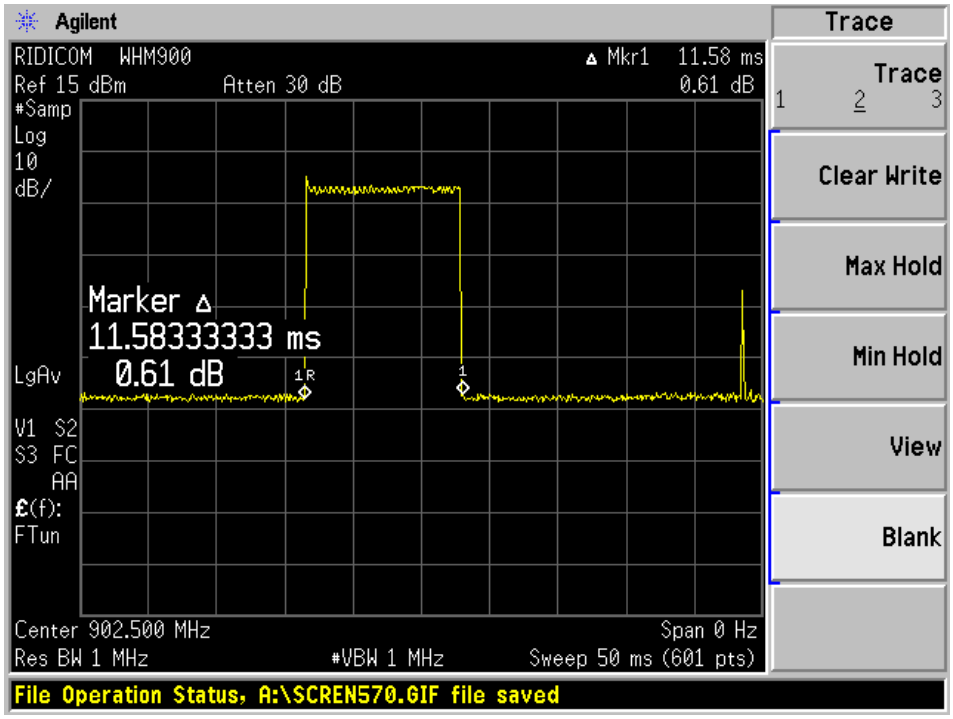
**The testing was performed by Snell Leong on 2005-04-28.*

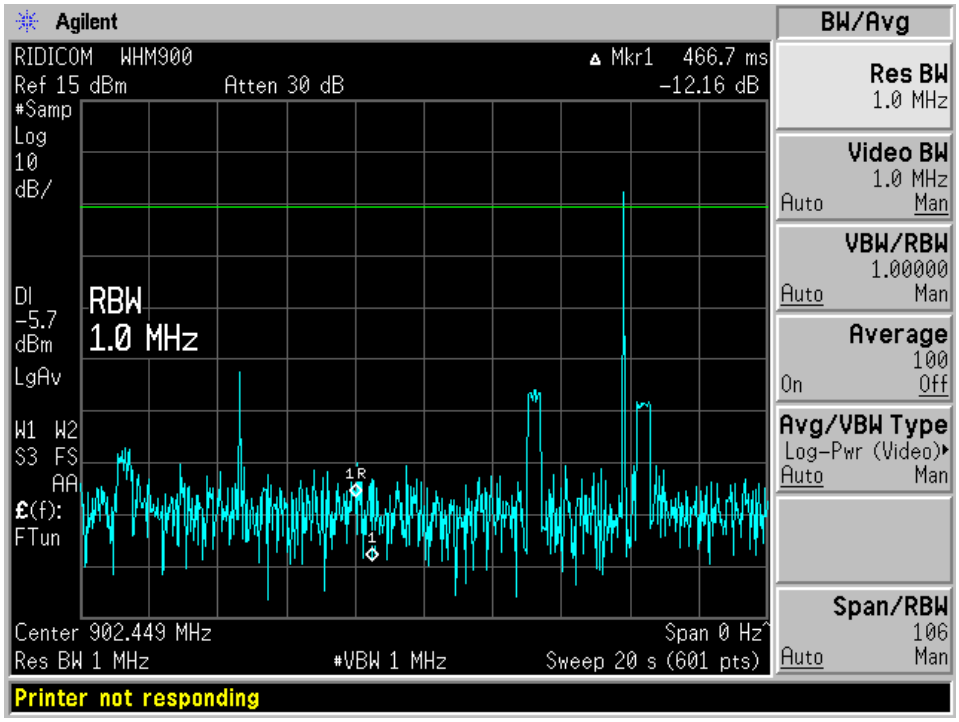
Measurement Results

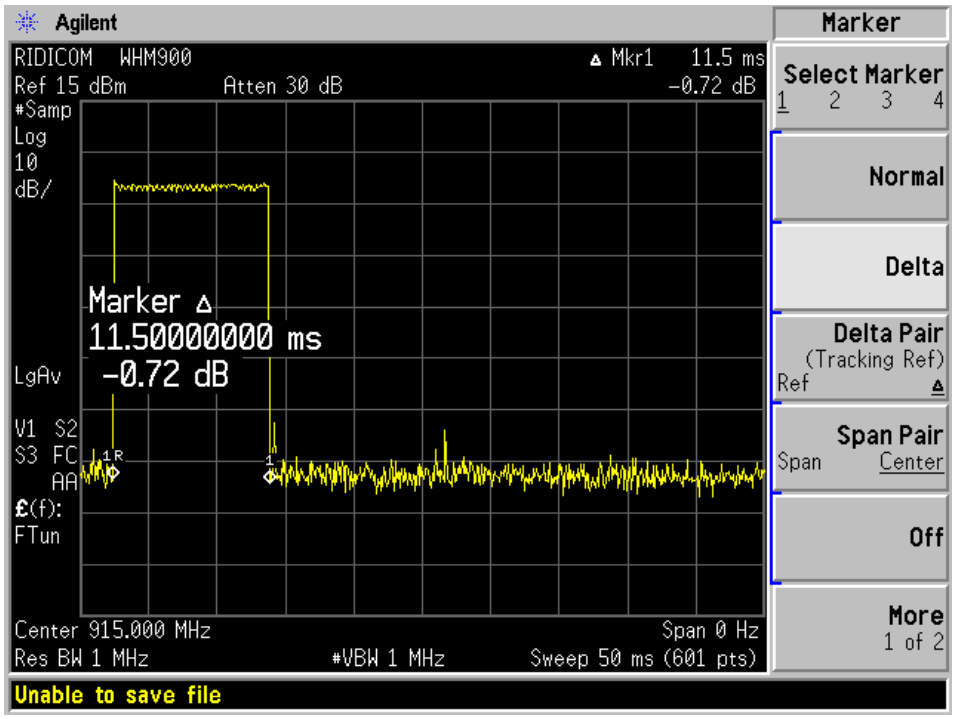
Channel	Frequency MHz	Pulse Wide uSec	Dwell Time Sec	Limit Sec
Low	902.5	11583	0.012	0.4
Mid	915.5	11500	0.012	0.4
High	927.5	11420	0.011	0.4

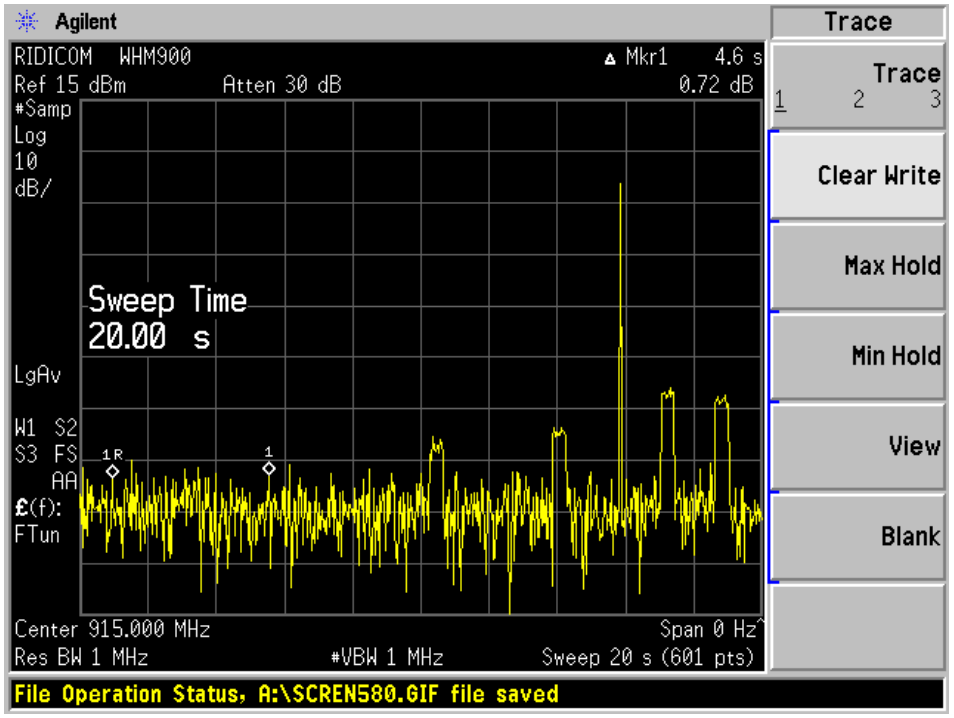
Plots of Dwell Time

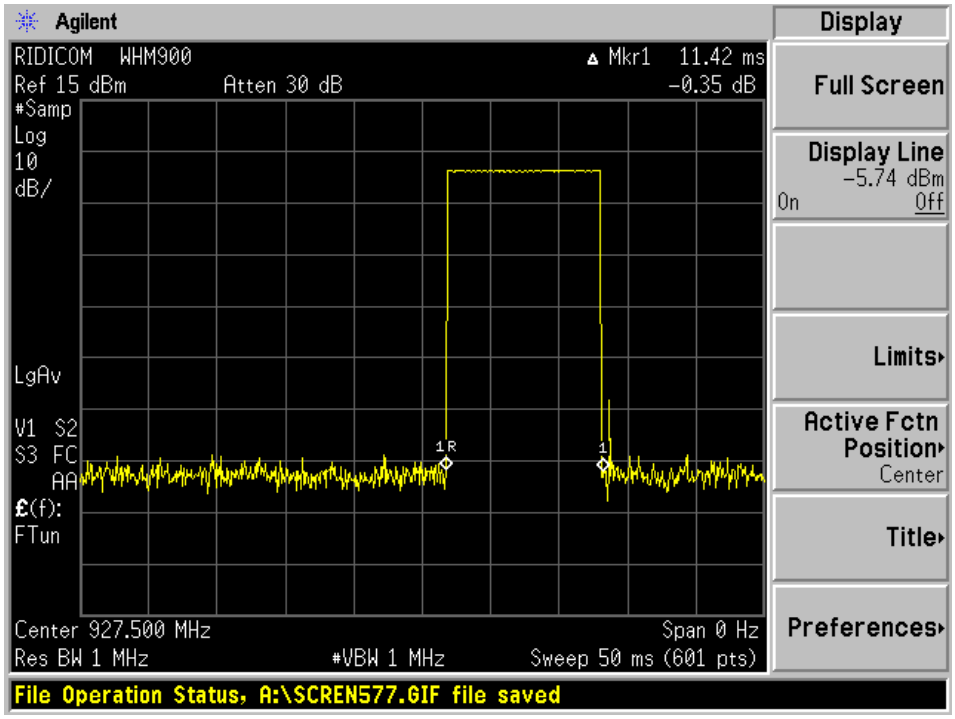
Please refer the following plots.

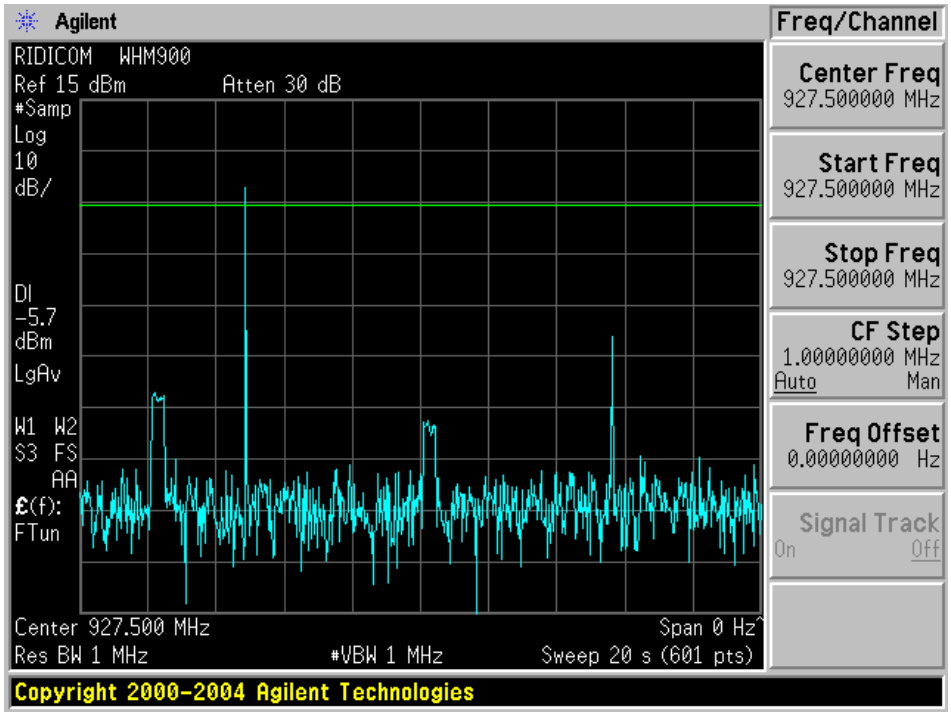

Agilent
RIDICOM WHM900
Ref 15 dBm
Atten 30 dB
Mkr1 11.58 ms
0.61 dB
#Samp
Log
10
dB/
Marker Δ
11.58333333 ms
0.61 dB
LgAv
V1 S2
S3 FC
AA
£(f):
FTun
Center 902.500 MHz
Res BW 1 MHz
#VBW 1 MHz
Span 0 Hz
Sweep 50 ms (601 pts)
Trace
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File Operation Status, A:\SCREN570.GIF file saved


Agilent
RIDICOM WHM900
Ref 15 dBm
Atten 30 dB
Mkr1 466.7 ms
-12.16 dB
#Samp
Log
10
dB/
Dl
-5.7
dBm
RBW
1.0 MHz
LgAv
W1 W2
S3 FS
AA
£(f):
FTun
Center 902.449 MHz
Res BW 1 MHz
#VBW 1 MHz
Span 0 Hz
Sweep 20 s (601 pts)
BW/Avg
Res BW
1.0 MHz
Video BW
1.0 MHz
Auto Man
VBW/RBW
1.00000
Auto Man
Average
100
On Off
Avg/VBW Type
Log-Pwr (Video)
Auto Man
Span/RBW
106
Auto Man
Printer not responding


Agilent
Marker
RIDICOM WHM900
Mkr1 11.5 ms
Ref 15 dBm
Atten 30 dB
-0.72 dB
#Samp
Log
10
dB/
Marker Δ
11.50000000 ms
-0.72 dB
LgAv
V1 S2
S3 FC
AA
£(f):
FTun
Center 915.000 MHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 50 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Unable to save file


Agilent
Trace
RIDICOM WHM900
Mkr1 4.6 s
Ref 15 dBm
Atten 30 dB
0.72 dB
#Samp
Log
10
dB/
Sweep Time
20.00 s
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 915.000 MHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 20 s (601 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File Operation Status, A:\SCREN580.GIF file saved


Agilent
RIDICOM WHM900
Ref 15 dBm
Atten 30 dB
Mkr1 11.42 ms
-0.35 dB
#Samp
Log
10
dB/
LgAv
V1 S2
S3 FC
AA
£(f):
FTun
Center 927.500 MHz
Res BW 1 MHz
#VBW 1 MHz
Span 0 Hz
Sweep 50 ms (601 pts)
Display
Full Screen
Display Line
-5.74 dBm
On Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\SCREN577.GIF file saved


Agilent
RIDICOM WHM900
Ref 15 dBm
Atten 30 dB
#Samp
Log
10
dB/
Dl
-5.7
dBm
LgAv
W1 W2
S3 FS
AA
£(f):
FTun
Center 927.500 MHz
Res BW 1 MHz
#VBW 1 MHz
Span 0 Hz
Sweep 20 s (601 pts)
Freq/Channel
Center Freq
927.500000 MHz
Start Freq
927.500000 MHz
Stop Freq
927.500000 MHz
CF Step
1.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2004 Agilent Technologies

§15.247 (b) (2) - MAXIMUM PEAK OUTPUT POWER

Standard Applicable

According to §15.247(b) (2), for frequency hopping systems employ at least 50 hopping channels in the 902-928 MHz band, the maximum peak output power of the transmitter shall not exceed 1 Watt.

Measurement Procedure

1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

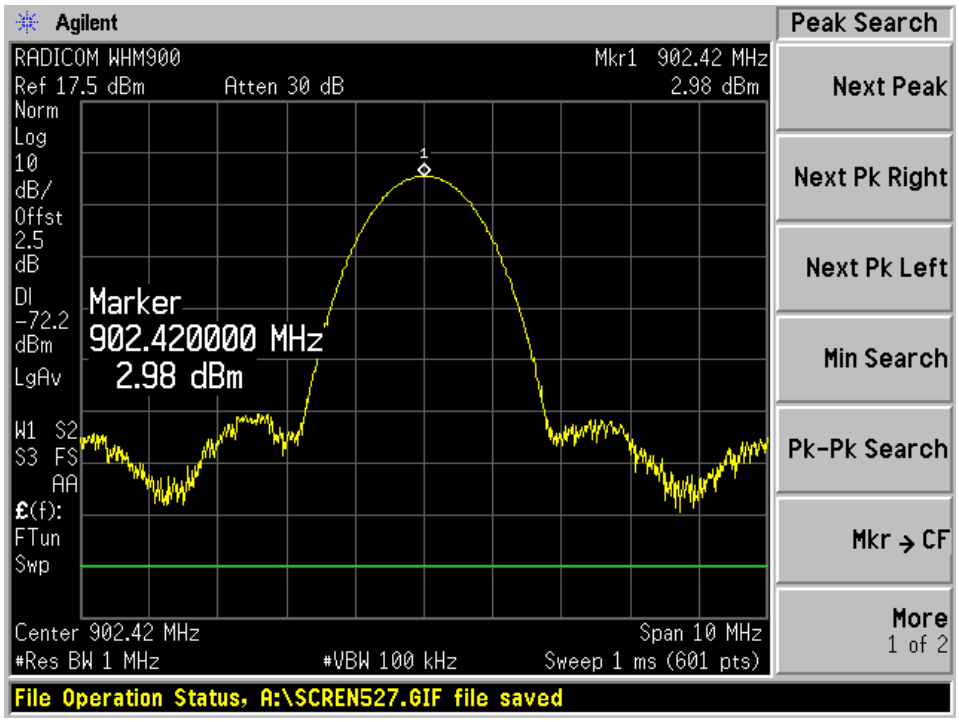
**The testing was performed by Snell Leong on 2005-04-28.*

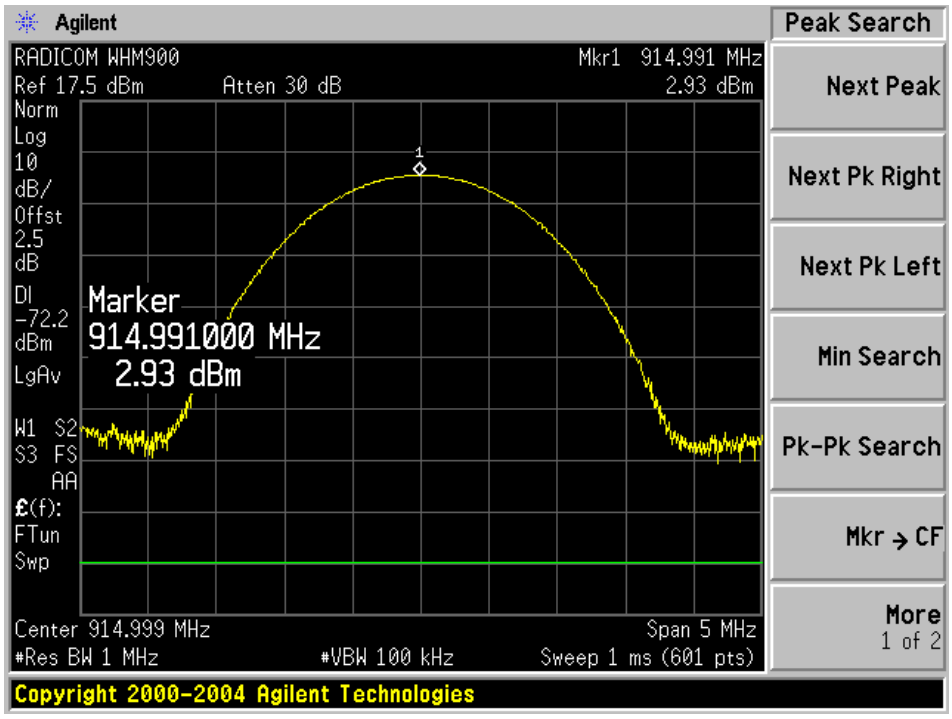
Measurement Result

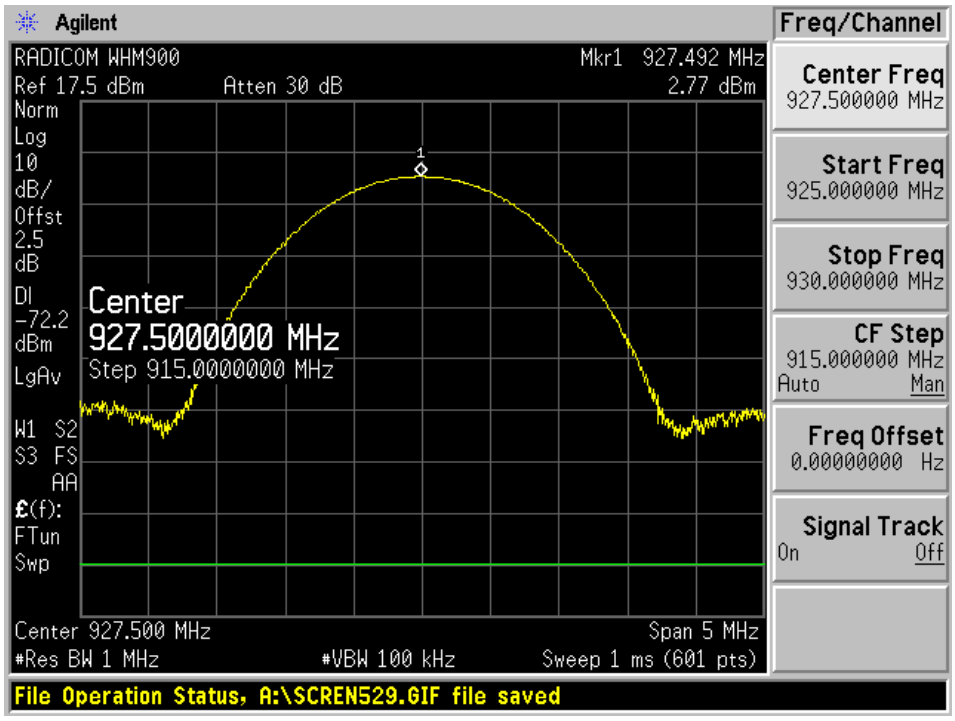
Channel	Frequency MHz	Max Peak Output Power (dBm)	Max Peak Output Power (mW)	Limit (mW)	Result
Low	902.5	2.98	1.99	1000	pass
Mid	915.5	2.93	1.96	1000	pass
High	927.5	2.77	1.89	1000	pass

Plots of Maximum Peak Output Power

Please refer to following plots.


Agilent
RADICOM WHM900
Mkr1 902.42 MHz
Ref 17.5 dBm
Atten 30 dB
2.98 dBm
Norm
Log
10
dB/
Offst
2.5
dB
Dl
-72.2
dBm
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Marker
902.420000 MHz
2.98 dBm
Center 902.42 MHz
Span 10 MHz
#Res BW 1 MHz
#VBW 100 kHz
Sweep 1 ms (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\SCREN527.GIF file saved


Agilent
RADICOM WHM900
Mkr1 914.991 MHz
Ref 17.5 dBm
Atten 30 dB
2.93 dBm
Norm
Log
10
dB/
Offst
2.5
dB
Dl
-72.2
dBm
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Marker
914.991000 MHz
2.93 dBm
Center 914.999 MHz
Span 5 MHz
#Res BW 1 MHz
#VBW 100 kHz
Sweep 1 ms (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Copyright 2000-2004 Agilent Technologies


Agilent
Freq/Channel
RADICOM WHM900
Mkr1 927.492 MHz
Ref 17.5 dBm
Atten 30 dB
2.77 dBm
Norm
Log
10
dB/
Offst
2.5
dB
Dl
-72.2
dBm
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Swp
Center
927.5000000 MHz
Step 915.0000000 MHz
Center Freq
927.500000 MHz
Start Freq
925.000000 MHz
Stop Freq
930.000000 MHz
CF Step
915.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 927.500 MHz
Span 5 MHz
#Res BW 1 MHz
#VBW 100 kHz
Sweep 1 ms (601 pts)
File Operation Status, A:\SCREN529.GIF file saved

§15.247 (d) - 100 KHZ BANDWIDTH OF BAND EDGES

Standard Applicable

According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

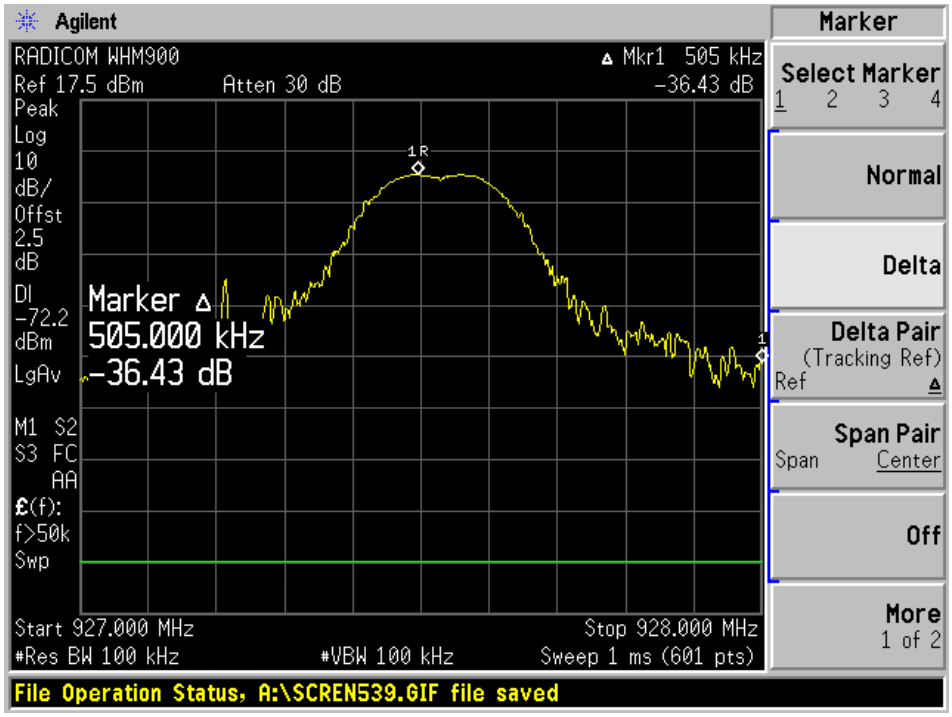
Environmental Conditions

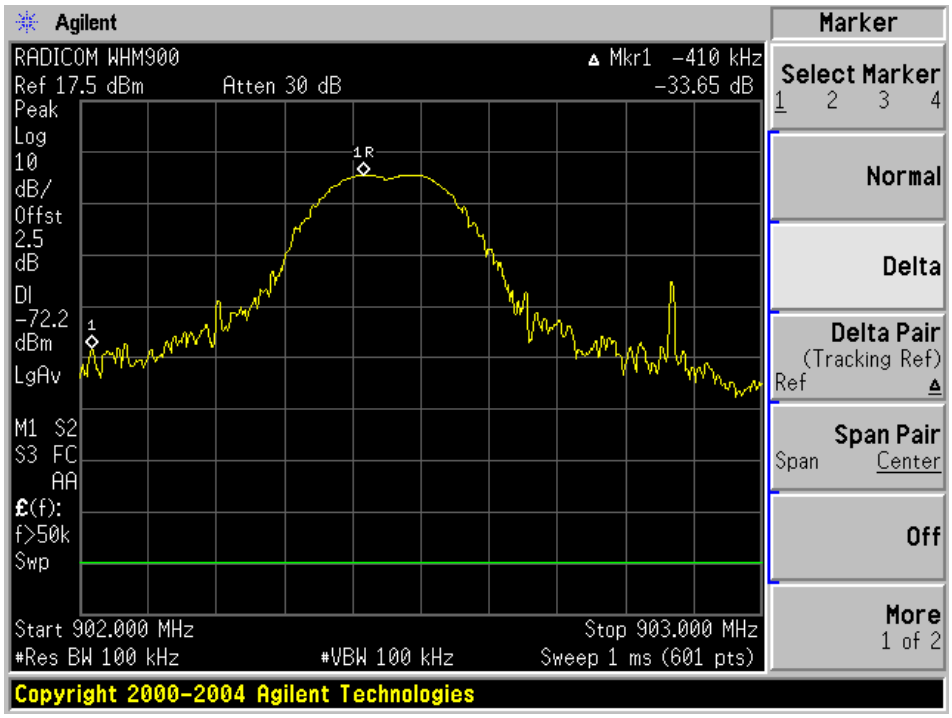
Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

**The testing was performed by Snell Leong on 2005-04-28.*

Plots of 100kHz Bandwidth of Band Edge

Please refer the following plots.


Agilent
Marker
RADICOM WHM900
Ref 17.5 dBm
Atten 30 dB
Mkr1 505 kHz
-36.43 dB
Peak
Log
10
dB/
Offst
2.5
dB
Dl
-72.2
dBm
LgAv
Marker Δ
505.000 kHz
-36.43 dB
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Start 927.000 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 928.000 MHz
Sweep 1 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN539.GIF file saved


Agilent
Marker
RADICOM WHM900
Ref 17.5 dBm
Atten 30 dB
Mkr1 -410 kHz
-33.65 dB
Peak
Log
10
dB/
Offst
2.5
dB
Dl
-72.2
dBm
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Start 902.000 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 903.000 MHz
Sweep 1 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Copyright 2000-2004 Agilent Technologies

§2.1051 - SPURIOUS EMISSION AT ANTENNA PORT

Standard Applicable

According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Position the EUT on a bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.

4. Set the SA on View mode and then plot the result on SA screen.

5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

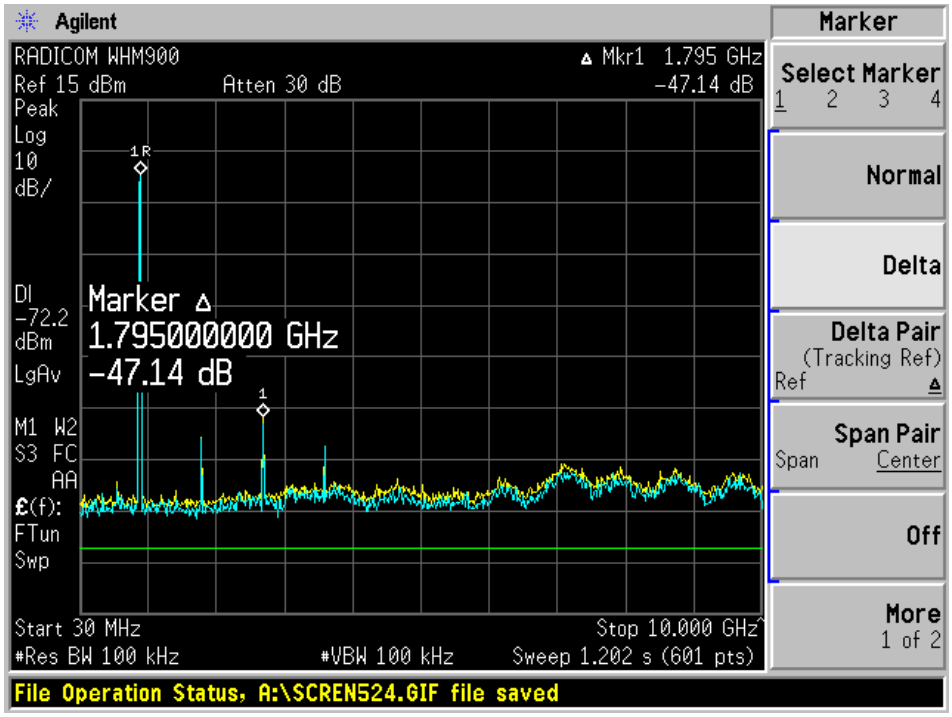
Environmental Conditions

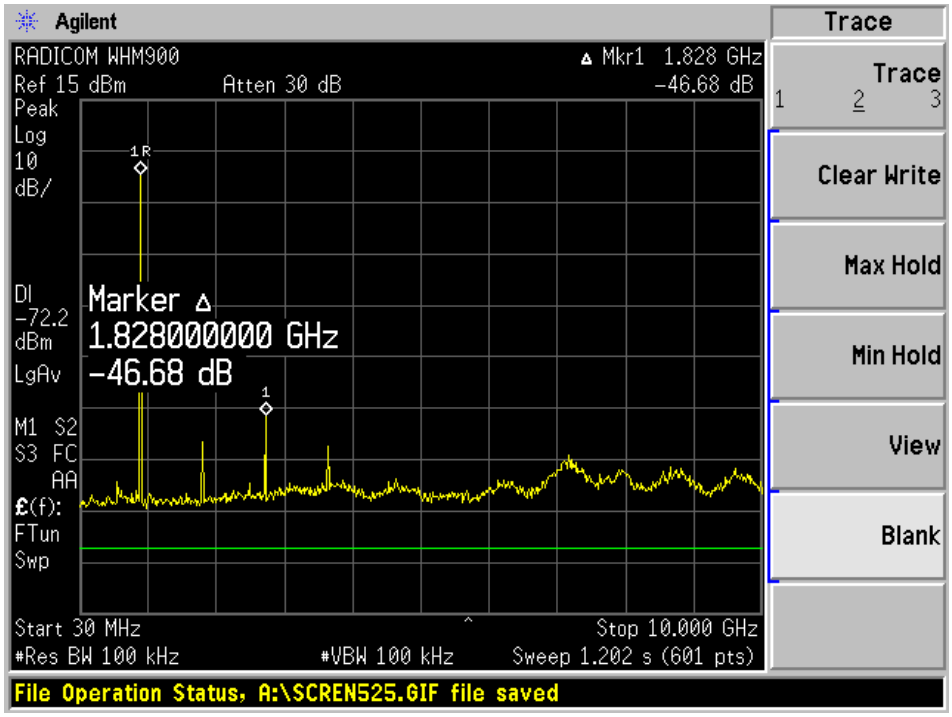
Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

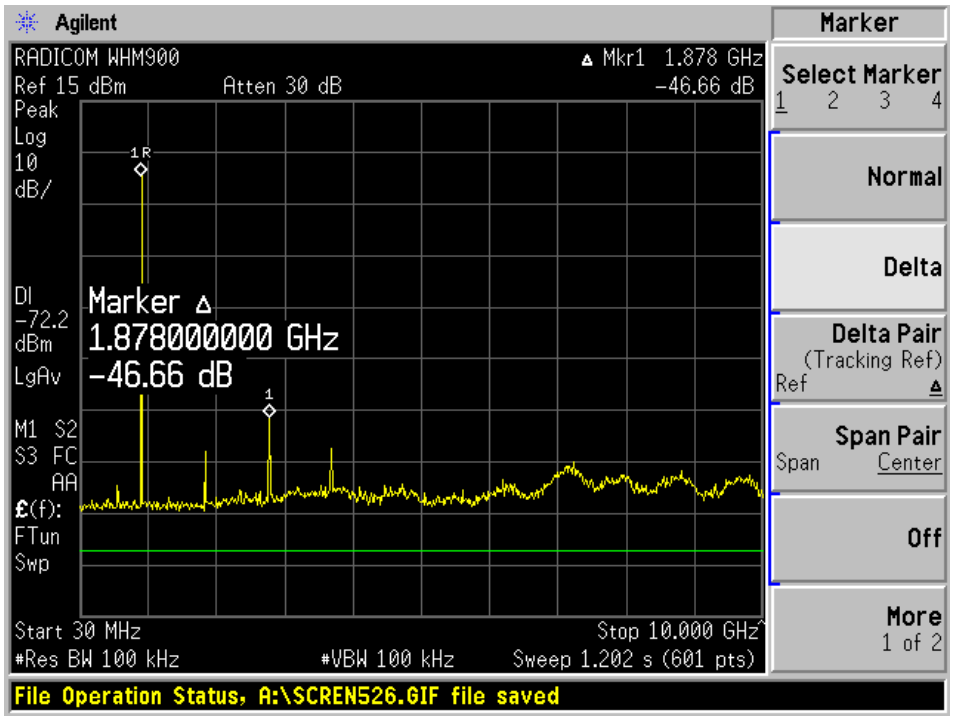
**The testing was performed by Snell Leong on 2005-04-28.*

Measurement Results

Please refer to the following plots.


Agilent
RADICOM WHM900
Ref 15 dBm
Atten 30 dB
Mkr1 1.795 GHz
-47.14 dB
Peak
Log
10
dB/
1R
Marker Δ
1.795000000 GHz
-47.14 dB
Start 30 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 10.000 GHz
Sweep 1.202 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN524.GIF file saved


Agilent
RADICOM WHM900
Ref 15 dBm
Atten 30 dB
Mkr1 1.828 GHz
-46.68 dB
Peak
Log
10
dB/
1R
Marker Δ
1.828000000 GHz
-46.68 dB
Start 30 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 10.000 GHz
Sweep 1.202 s (601 pts)
Trace
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File Operation Status, A:\SCREN525.GIF file saved


Agilent
RADICOM WHM900
Ref 15 dBm
Atten 30 dB
Mkr1 1.878 GHz
-46.66 dB
Peak
Log
10
dB/
1R
Marker Δ
1.878000000 GHz
-46.66 dB
1
Start 30 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 10.000 GHz
Sweep 1.202 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN526.GIF file saved

SUMMARY OF TEST RESULTS FOR FCC 15.249

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band	Compliant
§15.207(a)	Conducted Emission	N/R
§15.209 (a), §15.249 (a)	Radiated Emission	Compliant*
15.249 (d)	Band Edge Testing	Compliant

* within the measurement uncertainty

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Connected Construction

The gain of antenna is 2 dBi by default. Please see EUT photo for details.

§15.205, §15.209 (a), §15.249 (a) - RADIATED EMISSION DATA

Applicable Standard

According to §15.249 (a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

According to §15.249 (d), emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is $\pm$4.0 dB.

EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected to the power adapter, which is connected with 120Vac/60Hz power source

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33 (a) (1), the system was tested to 10GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Sunol Sciences	Antenna	JB1	A03105-3	2/11/2005
HP	Amplifier, Pre	8447D	2944A10198	8/20/2004
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
EMCO	Antenna, Log-Periodic	3148	4-1155	12/14/2004
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	03/14/2004
Wisewave	Antenna, Horn, Std	ARH-2823-02	10555-02	12/13/2004

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

**The testing was performed by Snell Leong on 2005-04-28.*

Test Procedure

For the radiated emissions test, the power cord of the EUT was connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**Qp**" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for applicable limits. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Applicable Limit

Summary of Test Results

According to the recorded data in following table, the EUT measured test data within the measurement uncertainty of ±4.0, and had the worst margin of:

-0.1 dB at 903 MHz in the Vertical polarization at Low Channel
-0.4 dB at 915 MHz in the Vertical polarization at Mid Channel
-0.1 dB at 927 MHz in the Vertical polarization at High Channel
-9.3 dB at 40.03 MHz in the Horizontal polarization at Unintentional Emission

Radiated Emissions Test Result Data

Low Channel

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction reading	FCC	FCC	Comments
MHz	dBuV/m	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	
903.0000	94.9	90	1.0	v	23.6	3.8	28.4	93.9	94	-0.1	Fund/Peak
903.0000	91.1	0	1.2	h	23.6	3.8	28.4	90.1	94	-3.9	Fund/Peak
1806.0000	56.5	180	2.3	h	24.8	1.9	36.3	46.8	54	-7.2	Ave
1806.0000	55.2	270	2.4	v	24.8	1.9	36.3	45.6	54	-8.4	Ave
2709.0000	41.8	180	2.0	v	28.9	2.4	35.5	37.6	54	-16.4	Ave
2709.0000	41.5	90	2.0	h	28.9	2.4	35.5	37.3	54	-16.7	Ave
1806.0000	58.7	180	2.3	h	24.8	1.9	36.3	49.0	74	-25.0	Peak
1806.0000	57.0	270	2.4	v	24.8	1.9	36.3	47.3	74	-26.7	Peak
2709.0000	49.8	90	2.0	v	28.9	2.4	35.5	45.6	74	-28.4	Peak
2709.0000	46.6	180	2.0	h	28.9	2.4	35.5	42.4	74	-31.6	Peak

Mid Channel

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction reading	FCC	FCC	Comments
MHz	dBuV/m	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	
915.0000	94.8	0	1.5	v	23.2	3.9	28.4	93.6	94	-0.4	Fund/QP
1830.0000	61.5	270	2.4	v	24.8	1.9	36.3	51.8	54	-2.2	Ave
915.0000	91.4	0	1.5	h	23.2	3.9	28.4	90.2	94	-3.8	Fund/Peak
1830.0000	59.1	180	2.2	h	24.8	1.9	36.3	49.4	54	-4.6	Ave
2543.0000	49.5	180	2.3	h	28.9	2.4	35.5	45.3	54	-8.7	Ave
2745.0000	42.5	270	2.4	v	28.9	2.4	35.5	38.3	54	-15.7	Ave
2543.0000	41.2	270	2.4	v	28.9	2.4	35.5	37.0	54	-17.0	Ave
2745.0000	41.0	180	2.2	h	28.9	2.4	35.5	36.8	54	-17.2	Ave
1830.0000	63.2	270	2.4	v	24.8	1.9	36.3	53.5	74	-20.5	Peak
1830.0000	60.1	180	2.2	h	24.8	1.9	36.3	50.5	74	-23.6	Peak
2543.0000	54.5	180	2.1	h	28.9	2.4	35.5	50.3	74	-23.7	Peak
2543.0000	49.6	270	2.4	v	28.9	2.4	35.5	45.4	74	-28.6	Peak
2745.0000	47.1	180	2.3	h	28.9	2.4	35.5	42.9	74	-31.1	Peak
2745.0000	45.8	270	2.4	v	28.9	2.4	35.5	41.6	74	-32.4	Peak

High Channel

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction reading	FCC	FCC	Comments
MHz	dBuV/m	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	
927.0000	94.8	0	1.3	v	23.4	4.0	28.3	93.9	94	-0.1	Fund/QP
1854.0000	58.0	90	2.1	h	24.8	1.9	36.3	48.3	54	-5.7	Ave
927.0000	88.6	0	1.5	h	23.4	4.0	28.3	87.7	94	-6.3	Fund/Peak
2781.0000	47.5	270	2.4	v	28.9	2.4	35.5	43.3	54	-10.7	Ave
2781.0000	45.0	90	2.1	h	28.9	2.4	35.5	40.8	54	-13.2	Ave
1854.0000	50.1	270	2.4	v	24.8	1.9	36.3	40.4	54	-13.6	Ave
1854.0000	58.9	90	2.1	h	24.8	1.9	36.3	49.2	74	-24.8	Peak
2781.0000	49.9	90	2.1	h	28.9	2.4	35.5	45.7	74	-28.3	Peak
2781.0000	49.8	270	2.4	v	28.9	2.4	35.5	45.6	74	-28.4	Peak
1854.0000	51.3	270	2.4	v	24.8	1.9	36.3	41.6	74	-32.4	Peak

Unintentional Emission

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction reading	FCC	FCC
MHz	dBuV/m	Degree	Meter	H/V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB
40.03	46.56	280	2.8	H	11.9	1.2	28.9	30.7	40	-9.3
40.03	46.30	250	1.0	V	11.9	1.2	28.9	30.5	40	-9.5
545.59	42.77	270	2.1	H	19.3	2.9	28.9	36.1	46	-9.9
545.59	36.34	330	1.2	V	19.3	2.9	28.9	29.6	46	-16.4
516.10	36.00	75	1.8	V	18.4	3.1	28.9	28.6	46	-17.4
516.10	34.80	270	3.2	H	18.4	3.1	28.9	27.4	46	-18.6

§15.249 (d) – BAND-EDGE TESTING

Standard Applicable

Requirements: FCC 15.249 (d), the emission power at the START and STOP frequencies shall be at least 50 dB below the level of the fundamental or to the general radiated emission limits in FCC 15.209, whichever is the lesser attenuation.

Test Procedure

With the EUT's antenna attached, the EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

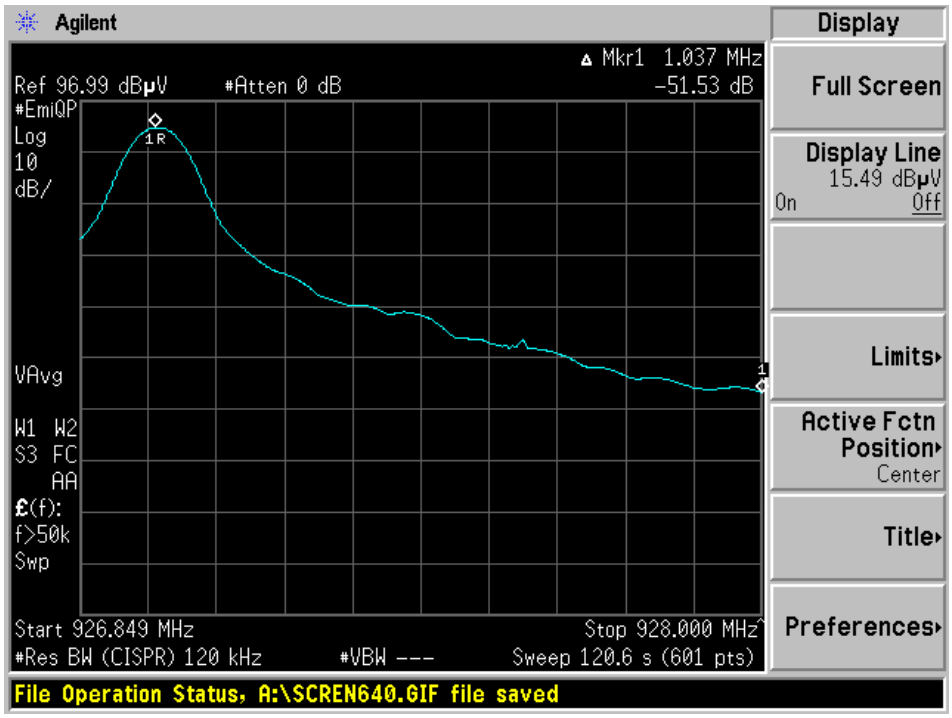
Environmental Conditions

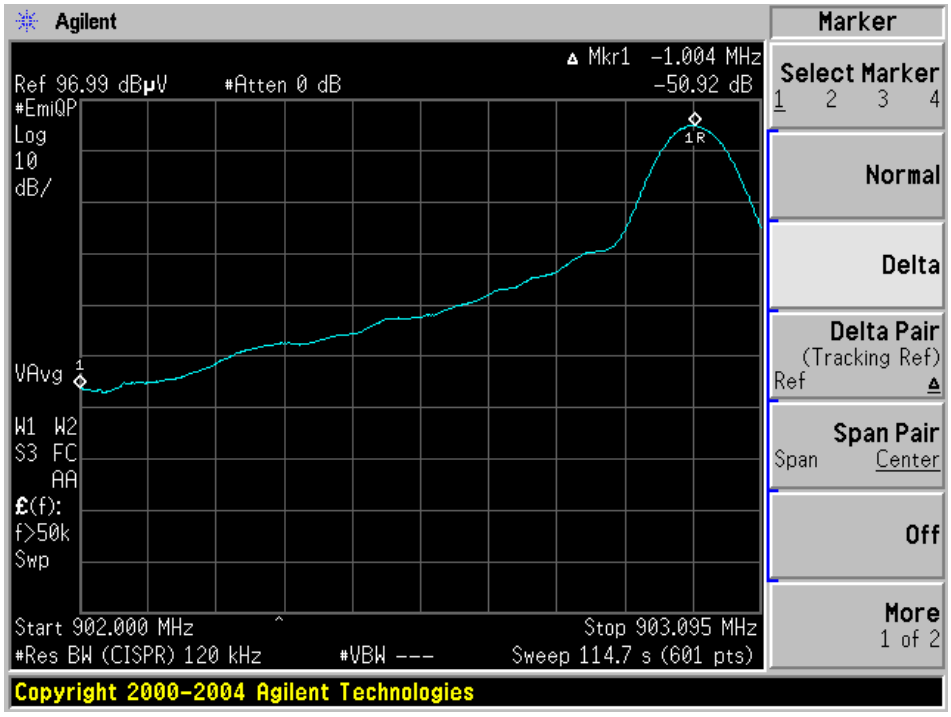
Temperature:	23° C
Relative Humidity:	63%
ATM Pressure:	1025 mbar

**The testing was performed by Snell Leong on 2005-04-28.*

Test Results

Refer to the attached plots.


Agilent
Display
Mkr1 1.037 MHz
Ref 96.99 dBµV
#Atten 0 dB
-51.53 dB
#EmiQP
Log
10
dB/
1R
VAvg
W1 W2
S3 FC
AA
£(f):
f>50k
Swp
Start 926.849 MHz
Stop 928.000 MHz
#Res BW (CISPR) 120 kHz
#VBW ---
Sweep 120.6 s (601 pts)
Full Screen
Display Line
15.49 dBµV
On Off
Limits
Active Fctn
Position
Center
Title
Preferences
File Operation Status, A:\SCREN640.GIF file saved


Agilent
Marker
Mkr1 -1.004 MHz
Ref 96.99 dBµV
#Atten 0 dB
-50.92 dB
#EmiQP
Log
10
dB/
1R
VAvg
W1 W2
S3 FC
AA
£(f):
f>50k
Swp
Start 902.000 MHz
Stop 903.095 MHz
#Res BW (CISPR) 120 kHz
#VBW ---
Sweep 114.7 s (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Copyright 2000-2004 Agilent Technologies