

FCC 15.247


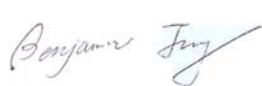
EMI MEASUREMENT AND TEST REPORT

For

INTEC INC.

5255 N.W.159TH STREET
MIAMI FLORIDA 33014

FCC ID: RDDWIRELESSJOYPAD

This Report Concerns: <input checked="checked" type="checkbox"/> Original Report	Equipment Type: Game Cube Wireless Controller
Test Engineer: Snell Leong 	
Report No.: R0409303	
Test Date: 2004-11-12	
Reviewed By: Ming Jin 	
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Note: The test report is specially limited to the above company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the US Government.

TABLE OF CONTENTS

INTEC INC.	1
GENERAL INFORMATION	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S)	4
TEST METHODOLOGY	4
TEST FACILITY	4
SYSTEM TEST CONFIGURATION	6
JUSTIFICATION	6
BLOCK DIAGRAM	6
EQUIPMENT MODIFICATIONS	6
SUPPORT EQUIPMENT LIST AND DETAILS	6
POWER SUPPLY INFORMATION	6
CONFIGURATION OF TEST SYSTEM	7
TEST SETUP BLOCK DIAGRAM	7
SUMMARY OF TEST RESULTS FOR FCC PART 15	8
ANTENNA REQUIREMENT	9
§15.207(A) - CONDUCTED EMISSION	10
MEASUREMENT UNCERTAINTY	10
TEST SETUP	10
SPECTRUM ANALYZER SETUP	10
TEST EQUIPMENT LIST AND DETAILS	10
TEST PROCEDURE	10
ENVIRONMENTAL CONDITIONS	11
SUMMARY OF TEST RESULTS	11
CONDUCTED EMISSIONS TEST DATA	11
PLOT OF CONDUCTED EMISSIONS TEST DATA	11
§15.205 & §15.209 - RADIATED EMISSION	14
MEASUREMENT UNCERTAINTY	14
TEST SETUP	14
SPECTRUM ANALYZER SETUP	14
TEST EQUIPMENT LIST AND DETAILS	14
ENVIRONMENTAL CONDITIONS	15
TEST PROCEDURE	15
CORRECTED AMPLITUDE & MARGIN CALCULATION	15
SUMMARY OF TEST RESULTS	15
§15.247 (A) (1) - HOPPING CHANNEL SEPARATION	17
STANDARD APPLICABLE	17
MEASUREMENT PROCEDURE	17
TEST EQUIPMENT	17
ENVIRONMENTAL CONDITIONS	17
MEASUREMENT RESULTS	17
PLOTS OF HOPPING CHANNEL SEPARATION	18
§15.247 (A) (1) - CHANNEL BANDWIDTH	20
STANDARD APPLICABLE	20
MEASUREMENT PROCEDURE	20
TEST EQUIPMENT	20
ENVIRONMENTAL CONDITIONS	20
MEASUREMENT RESULT	20
PLOT OF CHANNEL BANDWIDTH	20
§15.247 (A) (1) (III) - NUMBER OF HOPPING FREQUENCY USED	23

STANDARD APPLICABLE	23
MEASUREMENT PROCEDURE.....	23
TEST EQUIPMENT	23
ENVIRONMENTAL CONDITIONS	23
MEASUREMENT RESULTS.....	23
PLOTS OF NUMBER OF HOPPING FREQUENCY	23
§15.247 9 (A) (1) (III) - DWELL TIME.....	25
STANDARD APPLICABLE	25
MEASUREMENT PROCEDURE.....	25
TEST EQUIPMENT	25
ENVIRONMENTAL CONDITIONS	25
MEASUREMENT RESULTS.....	25
PLOTS OF DWELL TIME	25
§15.247 (B) (1) - MAXIMUM PEAK OUTPUT POWER.....	29
STANDARD APPLICABLE	29
MEASUREMENT PROCEDURE.....	29
TEST EQUIPMENT	29
ENVIRONMENTAL CONDITIONS	29
MEASUREMENT RESULT	29
§15.247 (C) - 100 KHZ BANDWIDTH OF BAND EDGES	30
STANDARD APPLICABLE	30
MEASUREMENT PROCEDURE.....	30
TEST EQUIPMENT	30
ENVIRONMENTAL CONDITIONS	30
PLOTS OF 100kHz BANDWIDTH OF BAND EDGE	30
SPURIOUS EMISSION AT ANTENNA PORT	32
STANDARD APPLICABLE	32
MEASUREMENT PROCEDURE.....	32
TEST EQUIPMENT	32
ENVIRONMENTAL CONDITIONS	32
MEASUREMENT RESULTS.....	32

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *INTEC INC.*'s product, FCC ID: *RDDWIRELESSJOYPAD*, Model: *G5085/G5086/G9785* or the "EUT" as referred to this report is a Game Cube Wireless Controller which measures approximately 130mmL x 70mmW x 50mmH. The EUT operates at the frequency range of 2402– 2481MHz, with maximum output power of 0.129mW.

** The test data gathered are from typical production sample, serial number: KB034206, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *INTEC INC.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B, C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC 15.247 rules for the FHSS:

- Maximum Peak Output Power
- Hopping Channel Separation
- Number of Hopping Frequency Used
- 20 dB Bandwidth
- Dwell Time on Each Channel
- 100 kHz Bandwidth of Band Edge
- Conducted Emission
- Spurious Emission
- Radiated Emission
- Antenna Requirement

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003.

Test Facility

The Open Area Test site used by BACL Corp. 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 BACL Corp. 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 test methods and procedures 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 scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22:2002, Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods.

SYSTEM TEST CONFIGURATION

Justification

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

The final qualification test was performed with the EUT operating at normal mode.

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

No modifications were made to the EUT.

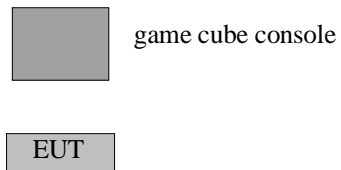
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Nintendo	GameCube Console	GameCube	DS215600781	N/A
Nintendo	Power Supply	DOL-002	02207k3	N/A

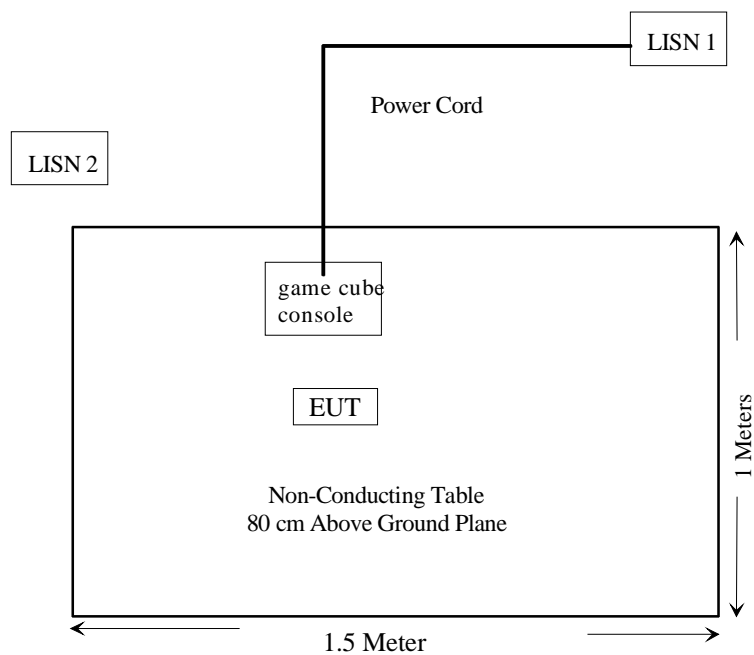
Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
Kirkland	Alkaline Battery (1.5V)	Signature	02ks0419	N/A

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§ 15.205	Restricted Bands	N/A
§15.207 (a)	Conducted Emission	Within the uncertainty measurement
§15.209	Radiated Emission	Within the uncertainty measurement
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1)	Channel Bandwidth	Compliant
§15.247 (a) (1) (iii)	Number of Hopping Frequencies Used	Compliant
§15.247 (a) (1) (iii)	Dwell Time of Each Frequency within a 10 Second Period of time (0.4 x Number of Channel)	Compliant
§15.247 (b) (1)	Maximum Peak Output Power	Compliant
§ 15.247 (b)(4) § 2.1093	RF Safety Requirements	Compliant
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant
	Spurious Emission at Antenna Port	Compliant

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 used for transmitting is 1 dBi. It is a monopole antenna, integrated with the PCB, no external connections.

§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 ± 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 Notebook PC 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
Rohde & Schwarz	LISN	ESH2-Z5	871884/039	2004-03-28
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-05-06
Fluke	Calibrated Voltmeter	189	18485-38	2004-07-18

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to 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. Quasi-Peak readings are distinguished with an "QP". Average readings are distinguished with an "Ave".

Environmental Conditions

Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

The testing was performed by Snell Leong on 2004-10-21.

Summary of Test Results

According to the recorded data in following table, the EUT measures within the uncertainty measurement ± 2.4 dB with the *worst* margin reading of:

-0.7 dB at 1.860 MHz in the Neutral conductor

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dB μ V	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dB μ V	Margin dB
1.860	45.3	Ave	Neutral	46.00	-0.7
1.980	43.8	Ave	Line	46.00	-2.2
0.525	40.3	Ave	Neutral	46.00	-5.7
4.890	39.1	Ave	Line	46.00	-6.9
1.860	47.6	QP	Neutral	56.00	-8.4
1.980	47.1	QP	Line	56.00	-8.9
0.150	52.5	QP	Line	66.00	-13.5
0.150	52.4	QP	Neutral	66.00	-13.6
0.525	40.8	QP	Neutral	56.00	-15.2
4.890	40.8	QP	Line	56.00	-15.2
0.150	22.7	Ave	Neutral	56.00	-33.3
0.150	22.5	Ave	Line	56.00	-33.5

Plot of Conducted Emissions Test Data

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

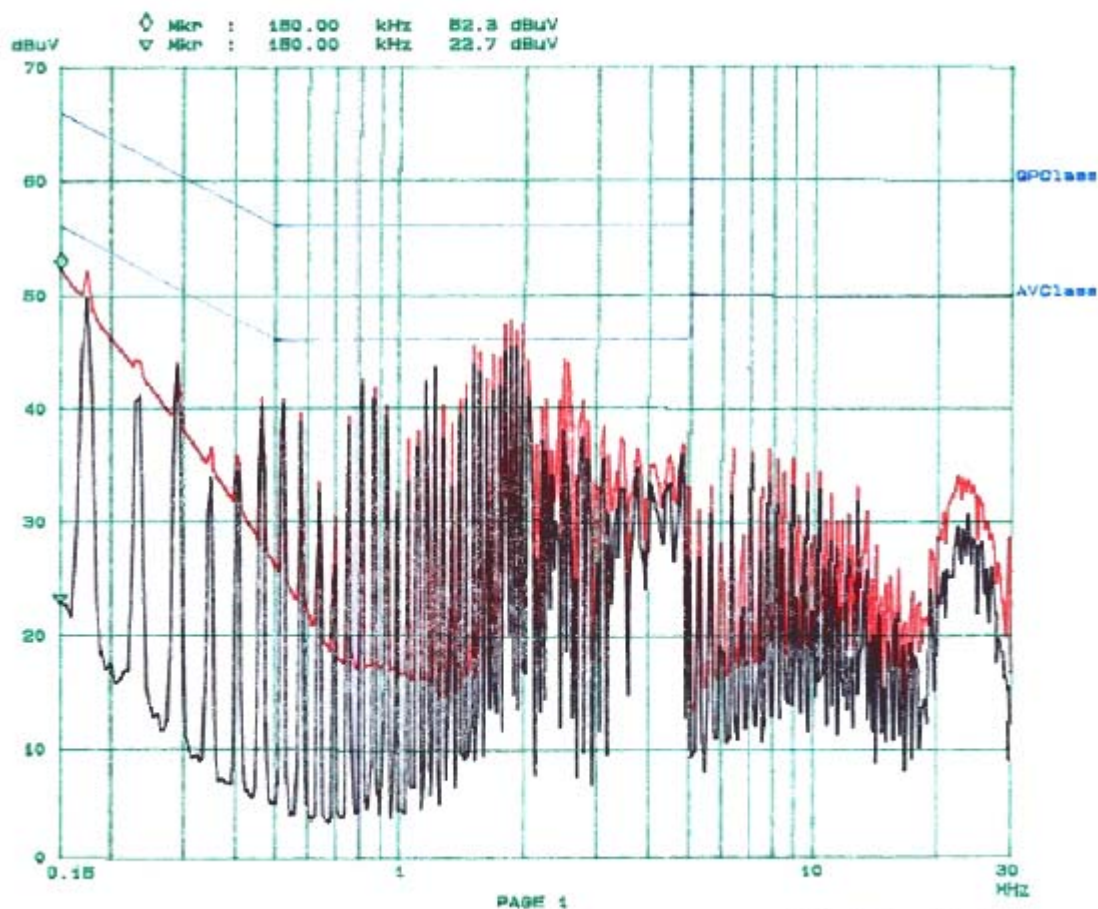
Bay Area Compliance Laboratory Corp
Class B

21. Oct 04 11:18

EUT: GameCube Wireless Controller (88088)
Manuf: INTEC INC
Op Cond: Normal
Operator: BMMJ
Comment: N

Scan Settings (3 Ranges)

Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	18dB LN	OFF
1M	5M	10k	9k	QP+AV	1ms	18dB LN	OFF
5M	30M	100k	9k	QP+AV	1ms	18dB LN	OFF



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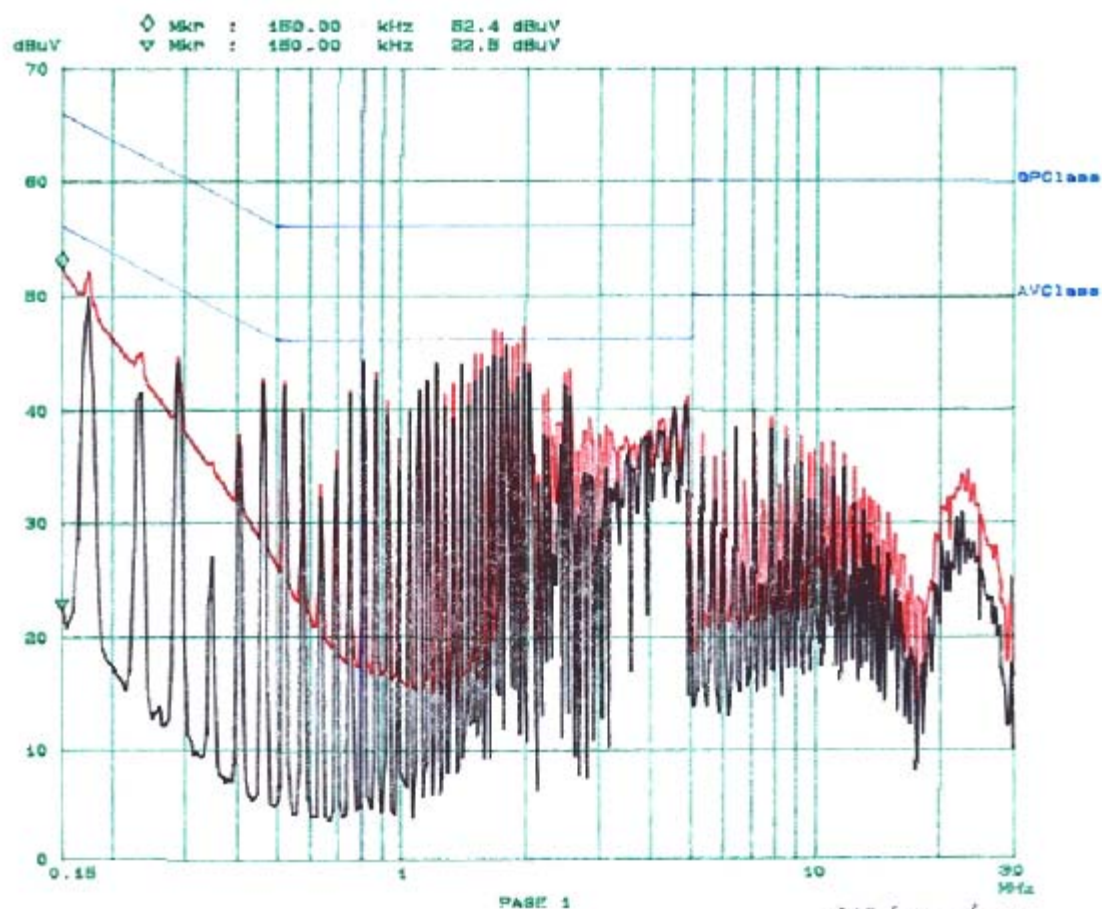
Bay Area Compliance Laboratory Corp
Class B

21. Oct 04 11:37

EUT: GameCube Wireless Controller (GB085)
Manuf: INTEC INC
Op Cond: Normal
Operator: SNELL
Comment: L

Scan Settings (3 Ranges)

Start	Stop	Stop	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dB LN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dB LN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dB LN	OFF

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Shel

§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 25GHz.

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Amplifier, Pre, microwave	8449B	3147A00400	2004-03-14
HP	Amplifier, Pre	8447E	1937A01057	2004-08-04
HP	Analyzer, Spectrum	8565EC	3946A00131	2004-06-30
ETS	Antenna, Biconical	3110B	9603-2315	2004-01-11
A.R.A.	Antenna, Horn, DRG	DRG-118/A	1132	2004-09-30
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	2455-261	2004-08-01
ETS	Antenna, logperiodic	3148	0004-1155	2004-10-11

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

The testing was performed by Snell Leong on 2004-10-21.

Test Procedure

For the radiated emissions test, both the laptop and all peripheral power cords were connected to the AC floor outlet since the power supply used in the laptop did not provide an accessory power outlet.

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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

Summary of Test Results

According to the recorded data in following table, the EUT measures within the measurement uncertainty $\pm 4.0\text{dB}$, and had the worst margin of:

-2.0 dB at 4804.0000 MHz in the Vertical/Horizontal polarization, Low Channel.

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C		
Frequency	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											
2402.0000	88.6	90	1.3	v	28.1	0.9	35.8	71.8			Fund/Peak
2402.0000	95.9	90	1.5	h	28.1	0.9	35.8	79.1			Fund/Peak
4804.0000	61.2	45	2.0	h	32.5	3.1	34.8	52.0	54	-2.0	Ave
7206.0000	53.1	120	1.5	v	36.3	4.3	34.7	49.0	54	-5.0	Ave
7206.0000	51.5	200	2.5	h	36.3	4.3	34.7	47.4	54	-6.6	Ave
7206.0000	70.0	200	2.5	h	36.3	4.3	34.7	65.9	74	-8.1	Peak
4804.0000	74.6	45	2.0	h	32.5	3.1	34.8	65.4	74	-8.6	Peak
7206.0000	69.0	120	1.5	v	36.3	4.3	34.7	64.9	74	-9.1	Peak
4804.0000	50.2	120	2.6	v	32.5	3.1	34.8	41.0	54	-13.0	Ave
4804.0000	64.9	120	2.6	v	32.5	3.1	34.8	55.7	74	-18.3	Peak
Middle Channel											
2440.0000	89.4	90	3.2	v	28.1	0.9	35.8	72.6			Fund/Peak
2440.0000	95.9	90	1.1	h	28.1	0.9	35.8	79.1			Fund/Peak
7320.0000	52.9	100	2.0	v	36.3	4.3	34.7	48.8	54	-5.2	Ave
7320.0000	51.9	0	1.5	h	36.3	4.3	34.7	47.8	54	-6.2	Ave
7320.0000	71.7	100	2.0	v	36.3	4.3	34.7	67.6	74	-6.4	Peak
7320.0000	70.7	0	1.5	h	36.3	4.3	34.7	66.6	74	-7.4	Peak
4880.0000	52.2	45	2.2	v	32.5	3.1	34.8	43.0	54	-11.0	Ave
4880.0000	51.2	0	1.5	h	32.5	3.1	34.8	42.0	54	-12.0	Ave
4880.0000	67.5	45	2.2	v	32.5	3.1	34.8	58.3	74	-15.7	Peak
4880.0000	64.7	0	1.5	h	32.5	3.1	34.8	55.5	74	-18.5	Peak
High Channel											
2481.0000	81.5	90	3.0	v	28.1	0.9	35.8	64.7			Fund/Peak
2481.0000	92.7	0	1.6	h	28.1	0.9	35.8	75.8			Fund/Peak
7443.0000	52.2	0	2.5	v	36.3	4.3	34.7	48.1	54	-5.9	Ave
4962.0000	55.6	0	1.8	h	32.5	3.1	34.8	46.4	54	-7.6	Ave
7443.0000	49.3	0	1.5	h	36.3	4.3	34.7	45.2	54	-8.8	Ave
7443.0000	68.8	0	2.5	v	36.3	4.3	34.7	64.7	74	-9.3	Peak
4962.0000	51.9	90	2.3	v	32.5	3.1	34.8	42.7	54	-11.3	Ave
7443.0000	65.5	0	1.5	h	36.3	4.3	34.7	61.4	74	-12.6	Peak
4962.0000	68.4	90	2.3	v	32.5	3.1	34.8	59.2	74	-14.8	Peak
4962.0000	65.6	0	1.8	h	32.5	3.1	34.8	56.4	74	-17.6	Peak
Unintentional Emission											
207.70	39.60	45	1.7	V	11.5	2.2	28.2	25.1	43	-17.9	Peak
74.90	39.10	90	2.5	V	9.2	1.2	28.8	20.7	40	-19.3	Peak
175.15	36.09	0	2.6	V	13.1	1.9	28.3	22.8	43	-20.2	Peak
223.00	35.20	45	2.5	V	11.8	2.2	28.1	21.1	46	-25.0	Peak

Note:

FUND: Fundamental

AVG: Average

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

Standard Applicable

According to §15.247(a)(1), 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	Model No.	Description	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	40%
ATM Pressure:	1015 mbar

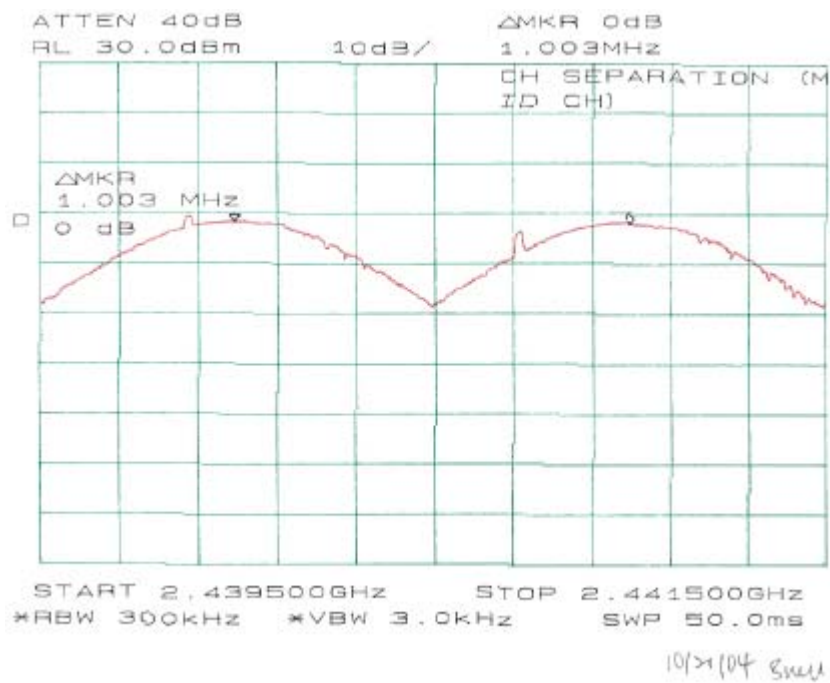
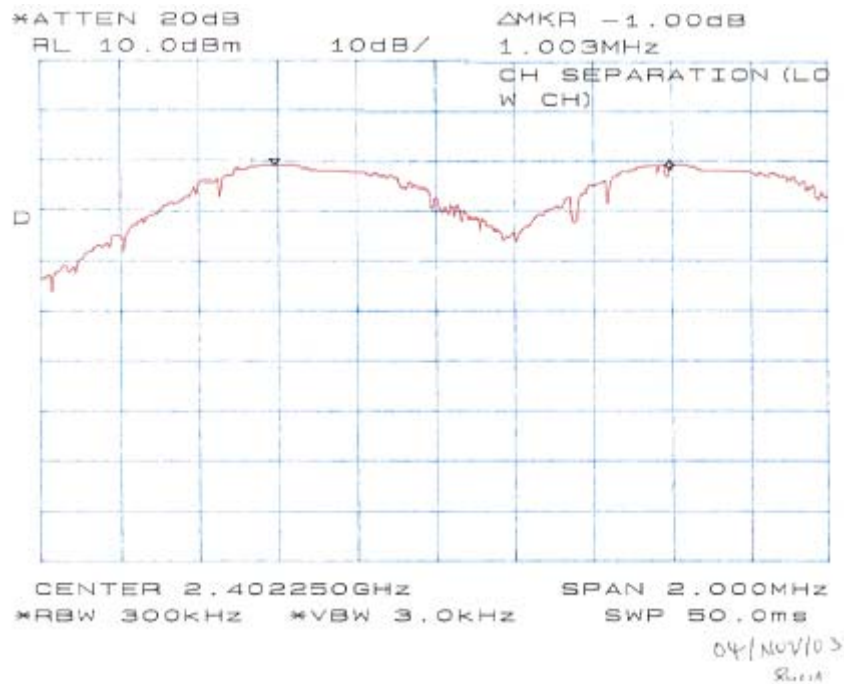
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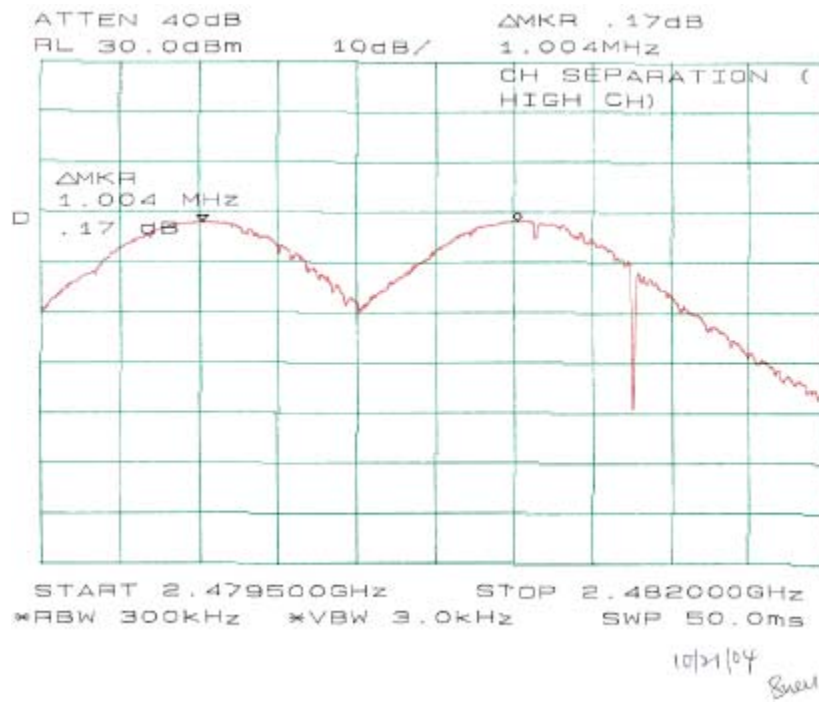
Measurement Results

Channel	Frequency MHz	Channel Separation MHz
Low	2402.25	1.003
Mid	2439.50	1.003
High	2479.50	1.004

Plots of Hopping Channel Separation

Please refer to the following plots.





§15.247 (a) (1) - CHANNEL BANDWIDTH

Standard Applicable

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	40%
ATM Pressure:	1015 mbar

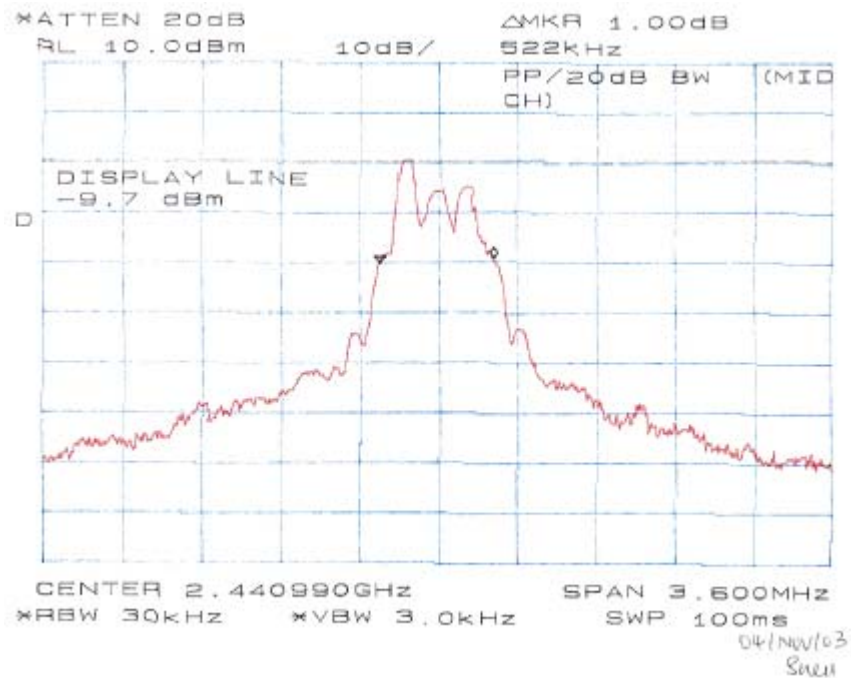
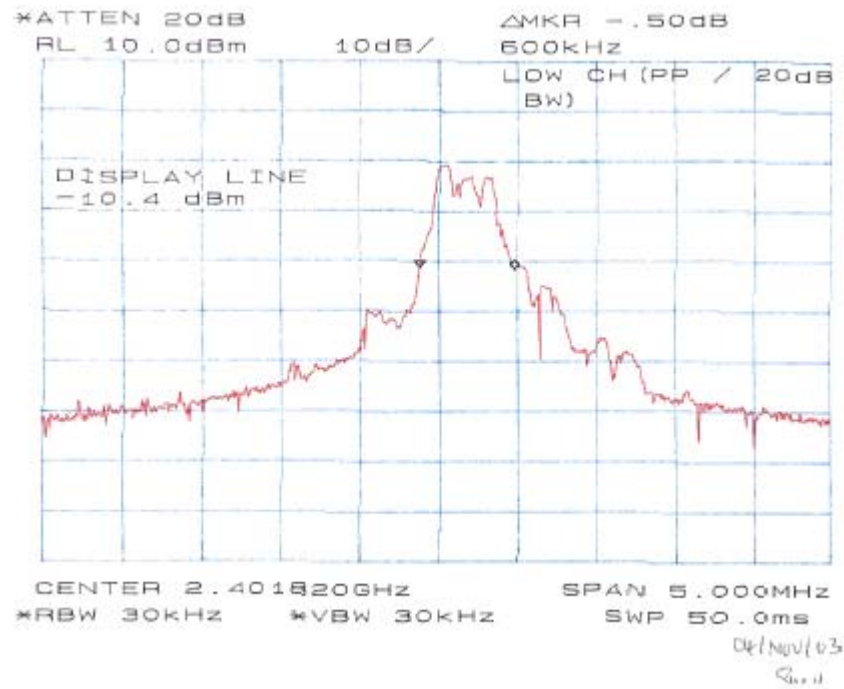
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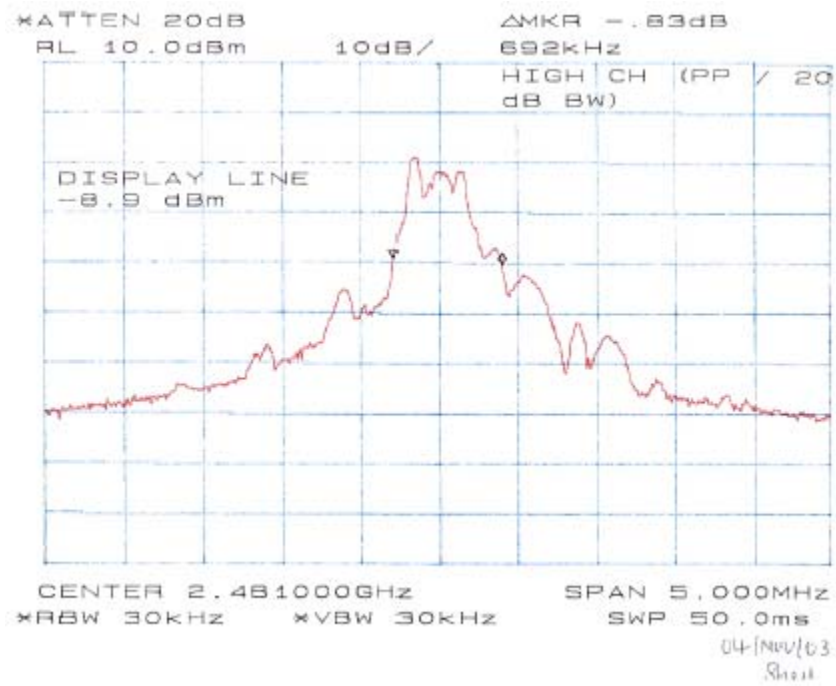
Measurement Result

Channel	Frequency MHz	Measurement (kHz)	Standard	Result
Low	2401.82	600	$\leq 1\text{MHz}$	Compliant
Mid	2440.99	522	$\leq 1\text{MHz}$	Compliant
High	2481.00	692	$\leq 1\text{MHz}$	Compliant

Plot of Channel Bandwidth

Please see the following plots





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

Standard Applicable

According to §15.247(a)(1)(iii), frequency hopping systems operating in the 2400-2483.5Mhz band shall use at least 75 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 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	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	40%
ATM Pressure:	1015 mbar

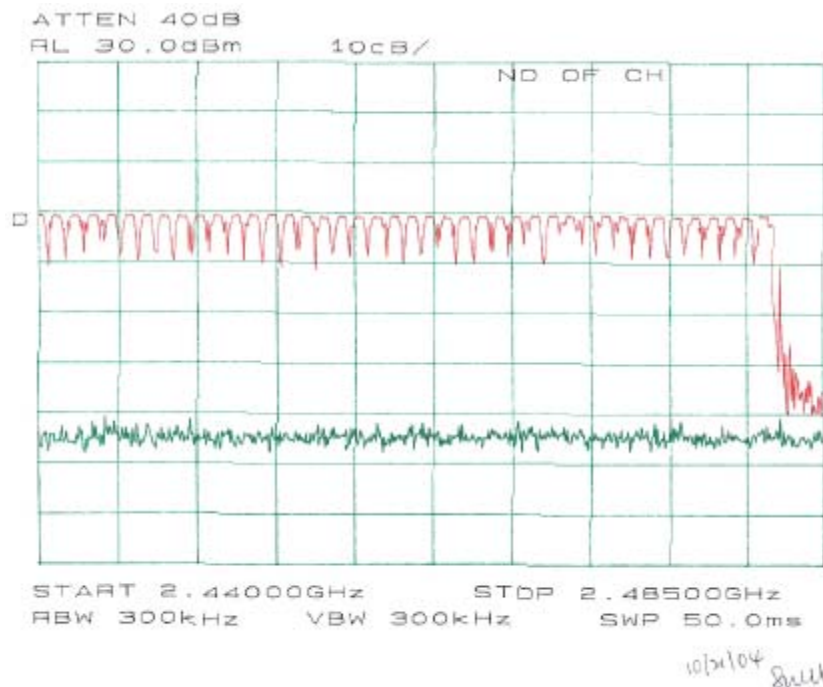
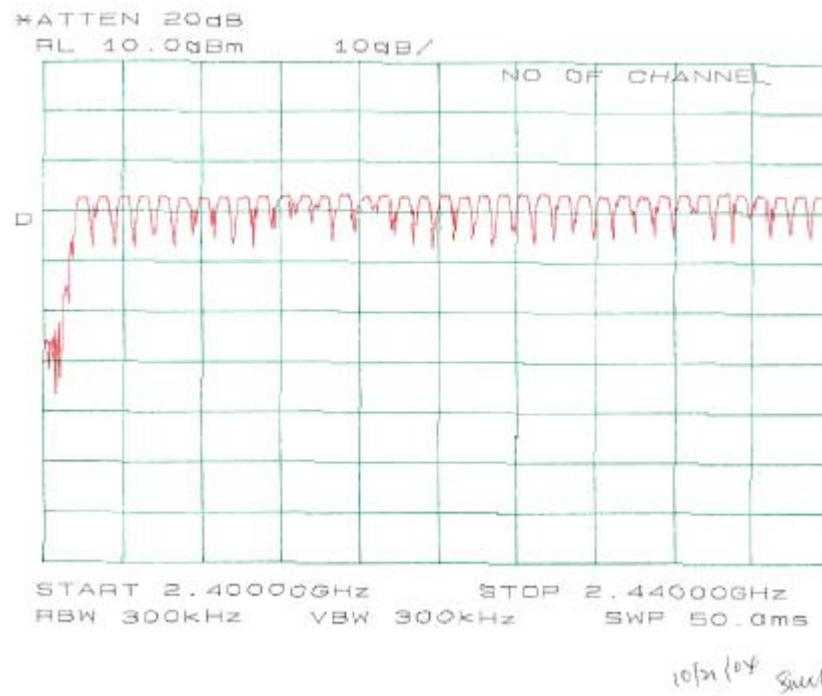
The testing was performed by Snell Leong on 2004-11-03.

Measurement Results

Measurement	Standard	Result
80	75	Compliant

Plots of Number of Hopping Frequency

Please refer to the attached plots.



§15.247 9 (a) (1) (iii) - DWELL TIME

Standard Applicable

According to §15.247 (a)(1)(iii), the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

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	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	40%
ATM Pressure:	1015 mbar

The testing was performed by Snell Leong on 2004-11-03.

Measurement Results

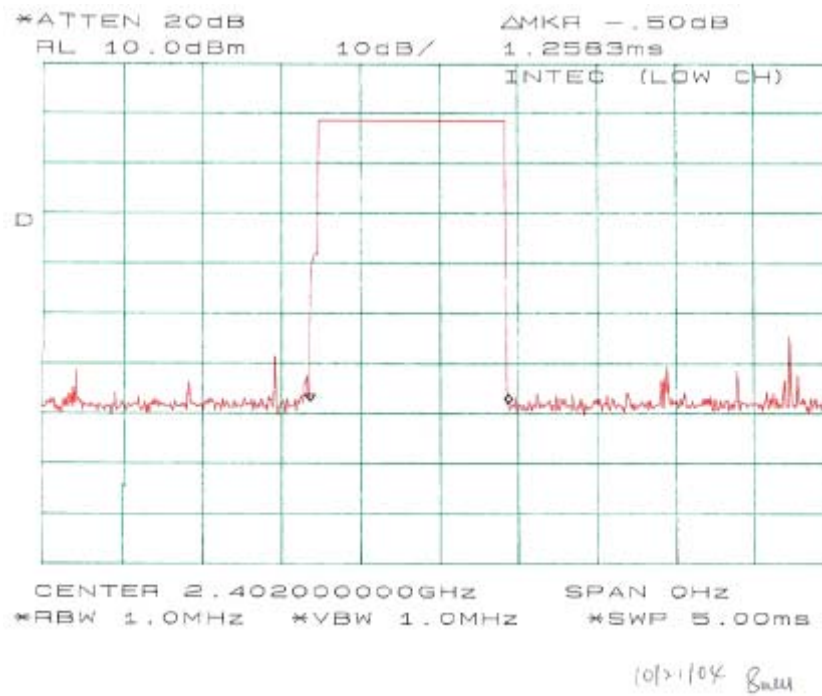
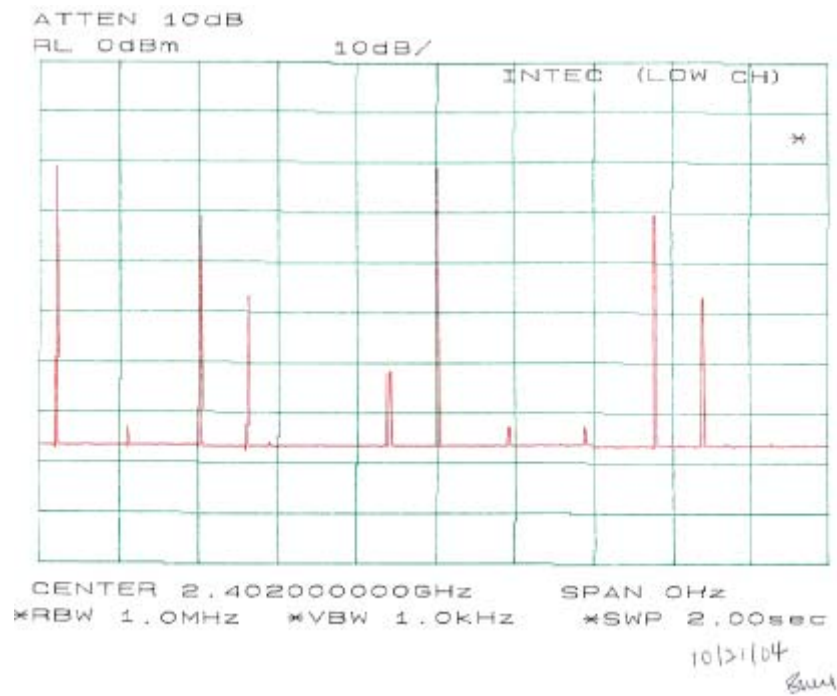
Low Channel: $2 \times 1.2583(\text{ms}) \times [(80 \times 0.4) / 2000 (\text{ms})] = 0.040266 \text{ s} < 0.4 \text{ s}$

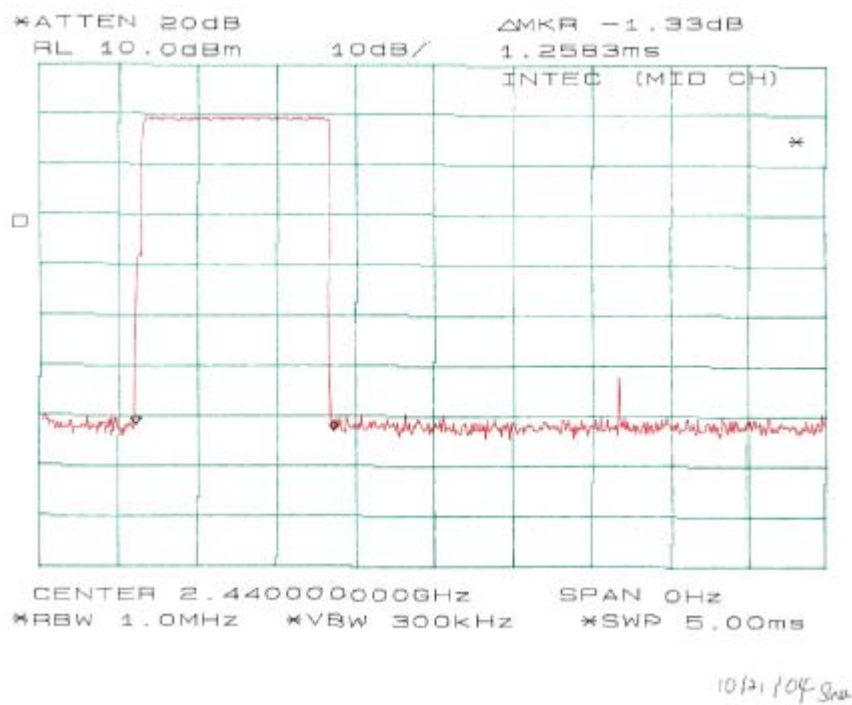
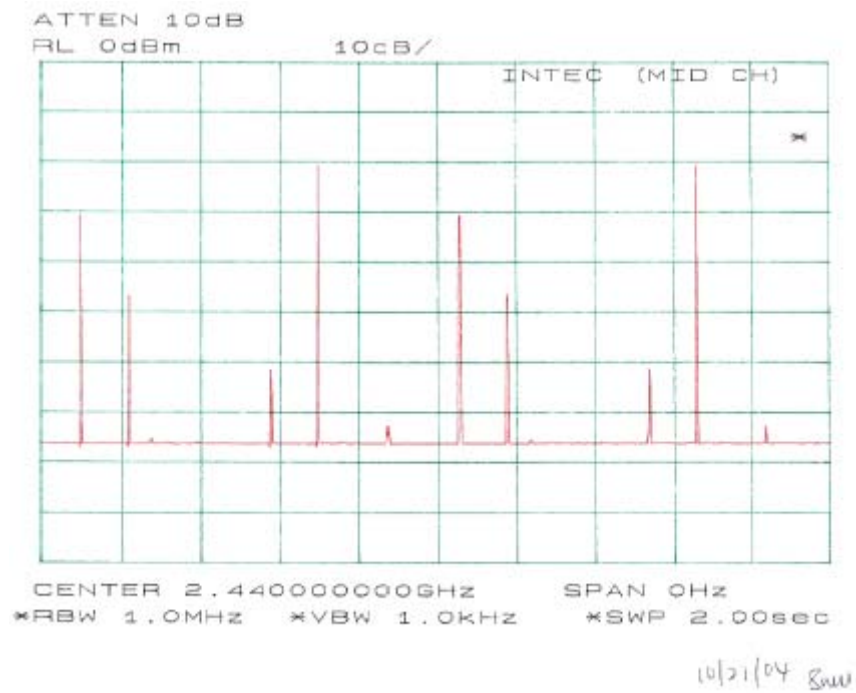
Middle Channel: $2 \times 1.2583(\text{ms}) \times [(80 \times 0.4) / 2000 (\text{ms})] = 0.040266 \text{ s} < 0.4 \text{ s}$

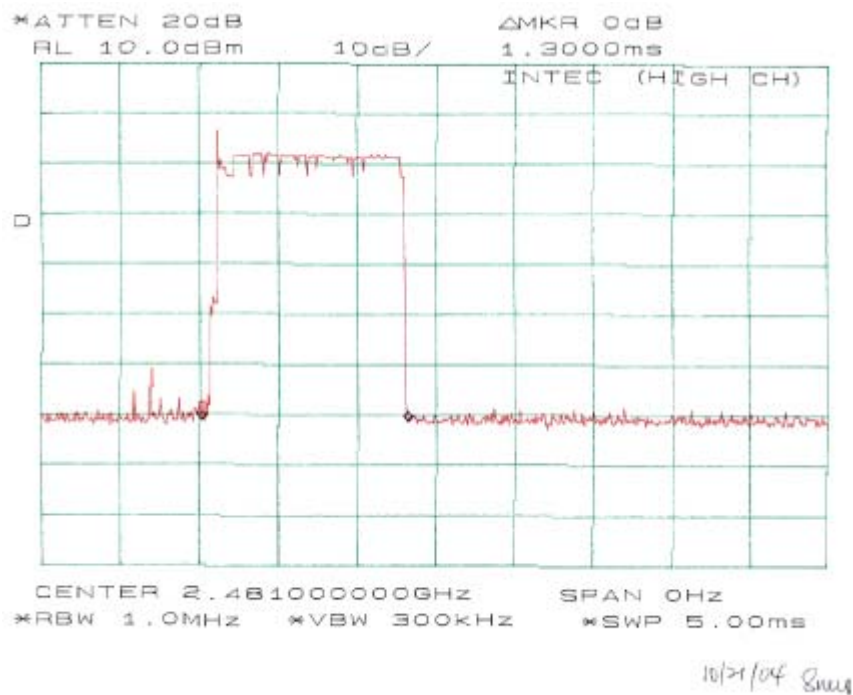
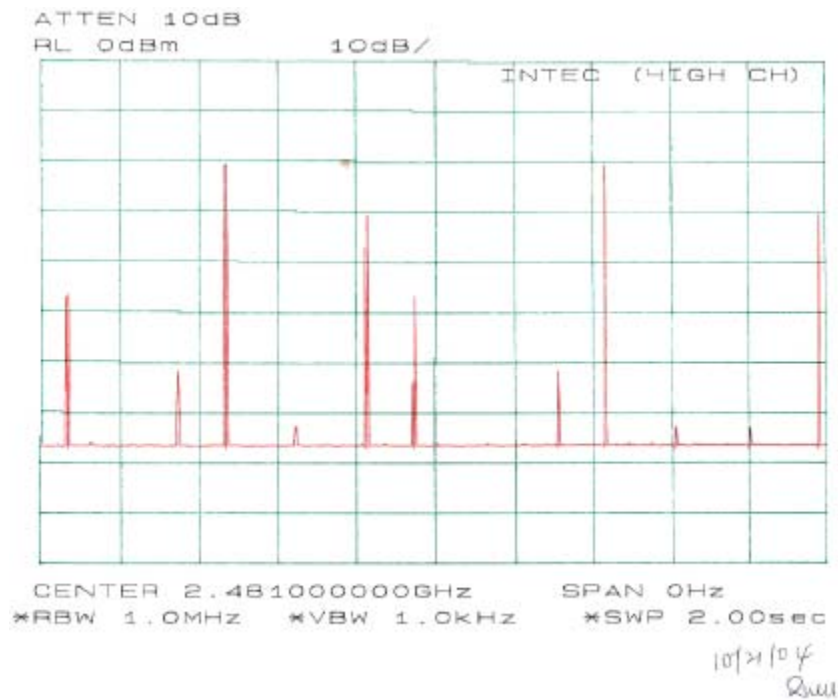
High Channel: $2 \times 1.300(\text{ms}) \times [(80 \times 0.4) / 20000 (\text{ms})] = 0.0416 \text{ s} < 0.4 \text{ s}$

Plots of Dwell Time

Please refer the following plots.







§15.247 (b) (1) - MAXIMUM PEAK OUTPUT POWER

Standard Applicable

According to §15.247(b) (1), for frequency hopping systems in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 Watt. For all other frequency hopping systems in the 2400-2483.5 band: 0.125 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	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	40%
ATM Pressure:	1015 mbar

The testing was performed by Snell Leong on 2004-11-03.

Measurement Result

Channel	Frequency MHz	Max Peak Output Power (dBm) (mWatt)		Limit	Result
Low	2402.03	-10.4	0.091201084	1 W	pass
Mid	2441.03	-9.7	0.107151931	1 W	pass
High	2481.05	-8.9	0.128824955	1 W	pass

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

Standard Applicable

According to §15.247(c), 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 300 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	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

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

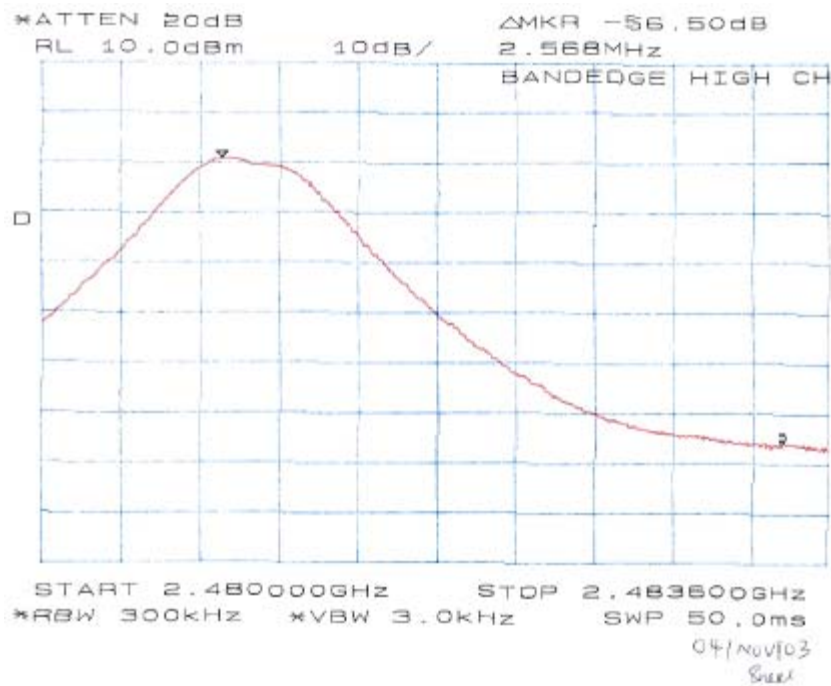
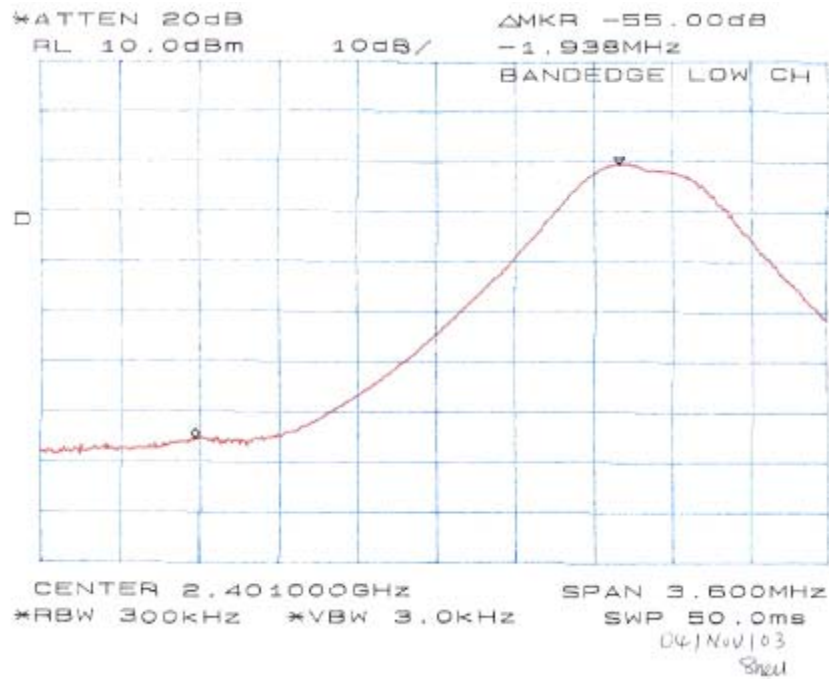
Environmental Conditions

Temperature:	24° C
Relative Humidity:	40%
ATM Pressure:	1015 mbar

The testing was performed by Snell Leong on 2004-11-03.

Plots of 100kHz Bandwidth of Band Edge

Please refer the following plots.



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	Model No.	Serial No.	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-08-01

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	40%
ATM Pressure:	1015 mbar

The testing was performed by Snell Leong on 2004-11-03.

Measurement Results

Please refer to the following plots.

