FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

CCT R & D Limited

18F., CCT Telecom Building, 11 Wo Shing Street,
Fo Tan, Shatin, N.T.

FCC ID: NC8MD7081H

This Report Concerns:	**Equipment Type:**
☒ Original Report	Digital Cordless Telephone System – Handset

Test Engineer:	Snell Leong
Report No.:	R0502076(H)
Report Date:	2005-03-03
Reviewed By:	Daniel Deng
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *CCT R & D Limited's*, FCC ID: NC8MD7081H, or the "EUT" as referred to in this report is the handset part of a Digital Cordless Telephone, which measures approximately 185mmL x 55mm W x 30mm H. The EUT is a DSS device, which operates at the frequency range of 2401.81 – 2479.40MHz, with the maximum conducted output power of 17.83dBm (60.67mW).

** The test data gathered are from a production sample, S/N: M78JA-USA GA 1046, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *CCT R & D Limited* in accordance 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& TIA/EIA-603.

Test Facility

The Open Area Test site used by BACL 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 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.

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the system components.

Once loaded, set the Tx channel to low, mid and high for testing.

Special Accessories

As shown in following test block diagram, all interface cables used for compliance testing are shielded.

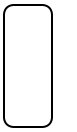
Schematics / Block Diagram

Please refer to Appendix A.

Equipment Modifications

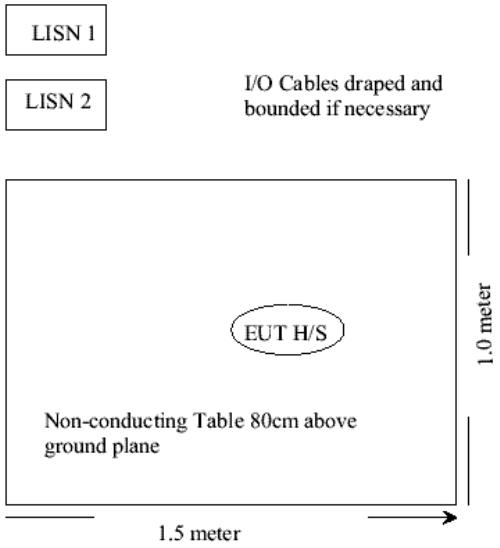
No modifications were made to the EUT.

Configuration of Test System



Handset

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	Compliant
§15.209	Radiated Emission	Compliant
§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 35.2 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 directionalgain of the antenna exceeds 6 dBi.

The gain of antenna used for transmitting is 0 dBi by default, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

§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.

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:

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
HP	Amplifier, Pre, microwave	8449B	3147A00400	2004-06-14
HP	Amplifier, Pre	8447E	1937A01057	2004-08-04
Agilent	Analyzer, Spectrum	E4448A	1030645	2004-10-04
ETS	Antenna, Biconical	3110B	9603-2315	2004-01-11
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	2455-261	2004-08-01
EMCO	Antenna, logperiodic	3146	2101	2003-11-08

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

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

**The testing was performed by Snell Leong on 2005-02-15.*

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 -0.3dB margin, within the measurement uncertainty of ±4.0dB, and had the worst margin of:

-5.4 dB at **1679.51 MHz** in the **Vertical** polarization, Low Channel, 3 meters

-3.4 dB at **2569.43 MHz** in the **Vertical** polarization, Middle Channel, 3 meters

-1.3 dB at **3357.85 MHz** in the **Horizontal** polarization, High Channel, 3 meters

-12.1 dB at **130.00 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											
2401.8100	115.3	90	1.0	v	28.1	2.0	35.8	109.6			Fund/Peak
2401.8100	114.5	0	3.5	h	28.1	2.0	35.8	108.8			Fund/Peak
2401.8100	115.1	180	3.1	v	28.1	2.0	35.8	109.4			Ave
2401.8100	113.3	0	3.5	h	28.1	2.0	35.8	107.6			Ave
1679.5100	57.7	180	2.0	v	25.3	1.9	36.3	48.6	54	-5.4	Ave
2531.1300	51.4	180	2.0	v	29.0	2.4	35.5	47.3	54	-6.7	Ave
2531.1300	50.6	0	3.1	h	29.0	2.4	35.5	46.5	54	-7.5	Ave
3004.6000	46.9	180	2.0	v	30.3	2.5	35.2	44.6	54	-9.4	Ave
1679.5100	53.5	0	3.1	h	25.3	1.9	36.3	44.4	54	-9.6	Ave
3004.6000	46.2	200	3.1	h	30.3	2.5	35.2	43.8	54	-10.2	Ave
4803.6200	42.4	120	2.0	v	32.5	3.1	34.8	43.2	54	-10.8	Ave
2660.8000	46.9	200	3.1	h	29.0	2.4	35.5	42.8	54	-11.2	Ave
2660.8000	45.1	180	2.0	v	29.0	2.4	35.5	41.0	54	-13.0	Ave
7205.4300	33.6	200	3.1	h	36.3	4.3	34.7	39.5	54	-14.5	Ave
7205.4300	32.7	120	1.5	v	36.3	4.3	34.7	38.7	54	-15.3	Ave
4803.6200	57.7	45	2.0	h	32.5	3.1	34.8	58.5	74	-15.5	Peak
4803.6200	35.6	45	2.0	h	32.5	3.1	34.8	36.4	54	-17.6	Ave
4803.6200	54.6	180	2.0	v	32.5	3.1	34.8	55.4	74	-18.6	Peak
3074.8000	71.9	200	3.1	h	30.3	2.5	35.2	69.5	88.8	-19.3	Peak
2531.1300	58.2	200	3.1	h	29.0	2.4	35.5	54.1	74	-19.9	Peak
2531.1300	57.3	180	2.0	v	29.0	2.4	35.5	53.2	74	-20.8	Peak
3004.6000	54.9	180	2.0	v	30.3	2.5	35.2	52.5	74	-21.5	Peak
3004.6000	54.3	200	3.1	h	30.3	2.5	35.2	52.0	74	-22.0	Peak
7205.4300	44.9	200	3.1	h	36.3	4.3	34.7	50.8	74	-23.2	Peak
2660.8000	54.2	200	3.1	h	29.0	2.4	35.5	50.1	74	-23.9	Peak
3112.7500	67.1	200	3.1	h	30.3	2.5	35.2	64.8	88.8	-24.0	Peak
7205.4300	43.5	120	1.5	v	36.3	4.3	34.7	49.4	74	-24.6	Peak
1679.5100	58.6	180	2.0	v	25.3	1.9	36.3	49.4	74	-24.6	Peak
3074.8000	65.9	180	2.0	v	30.3	2.5	35.2	63.6	89.6	-26.0	Peak
3074.8000	63.6	200	3.1	h	30.3	2.5	35.2	61.3	87.6	-26.3	Ave
3271.8200	65.0	180	2.0	v	30.3	2.5	35.2	62.7	89.6	-26.9	Peak
1679.5100	55.9	0	3.1	h	25.3	1.9	36.3	46.8	74	-27.3	Peak
3271.8200	63.7	200	3.1	h	30.3	2.5	35.2	61.3	88.8	-27.5	Peak
2660.8000	49.9	180	2.0	v	29.0	2.4	35.5	45.8	74	-28.3	Peak
3112.7500	60.9	200	3.1	h	30.3	2.5	35.2	58.5	87.6	-29.1	Ave
3112.7500	62.8	180	2.0	v	30.3	2.5	35.2	60.4	89.6	-29.2	Peak
3074.8000	62.0	180	2.0	v	30.3	2.5	35.2	59.6	89.4	-29.8	Ave
3292.1300	61.3	200	3.1	h	30.3	2.5	35.2	59.0	88.8	-29.8	Peak
3292.1300	57.2	200	3.1	h	30.3	2.5	35.2	54.9	87.6	-32.7	Ave
3271.8200	58.0	180	2.0	v	30.3	2.5	35.2	55.6	89.4	-33.8	Ave
3271.8200	55.8	200	3.1	h	30.3	2.5	35.2	53.4	87.6	-34.2	Ave
3292.1300	55.9	180	2.0	v	30.3	2.5	35.2	53.6	89.6	-36.0	Peak
3112.7500	52.9	180	2.0	v	30.3	2.5	35.2	50.6	89.4	-38.8	Ave
3292.1300	48.8	180	2.0	v	30.3	2.5	35.2	46.4	89.4	-43.0	Ave

Middle Channel											
2440.1600	114.5	180	2.0	v	28.1	2.0	35.8	108.8			Fund/Peak
2440.1600	112.7	180	2.0	h	28.1	2.0	35.8	107.0			Fund/Peak
2440.1600	113.5	180	3.1	v	28.1	2.0	35.8	107.8			Ave
2440.1600	112.3	0	3.5	h	28.1	2.0	35.8	106.6			Ave
2569.4300	54.7	120	1.5	v	29.0	2.4	35.5	50.6	54	-3.4	Ave
3151.2500	52.8	120	1.5	v	30.3	2.5	35.2	50.5	54	-3.5	Ave
3128.7300	52.0	200	3.1	h	30.3	2.5	35.2	49.7	54	-4.3	Ave
2569.4300	53.7	200	3.1	h	29.0	2.4	35.5	49.6	54	-4.4	Ave
1729.0000	58.5	200	3.1	h	25.3	1.9	36.3	49.4	54	-4.6	Ave
3311.8800	51.7	120	1.5	v	30.3	2.5	35.2	49.3	54	-4.7	Ave
1736.8500	58.2	200	3.1	h	25.3	1.9	36.3	49.1	54	-4.9	Ave
1550.0000	57.6	200	3.1	h	25.3	1.9	36.3	48.5	54	-5.5	Ave
3155.7000	50.6	200	3.1	h	30.3	2.5	35.2	48.2	54	-5.8	Ave
1561.2000	56.7	200	3.1	h	25.3	1.9	36.3	47.6	54	-6.4	Ave
3043.0700	49.0	120	1.5	v	30.3	2.5	35.2	46.6	54	-7.4	Ave
3120.3000	48.7	200	3.1	h	30.3	2.5	35.2	46.4	54	-7.6	Ave
4880.3200	45.4	120	2.0	v	32.5	3.1	34.8	46.2	54	-7.8	Ave
1679.6300	55.2	120	1.5	v	25.3	1.9	36.3	46.1	54	-7.9	Ave
3128.7300	48.4	120	1.5	v	30.3	2.5	35.2	46.1	54	-7.9	Ave
2310.4300	50.8	200	3.1	h	28.1	2.0	35.8	45.1	54	-8.9	Ave
3120.3000	47.5	120	1.5	v	30.3	2.5	35.2	45.1	54	-8.9	Ave
1679.6300	52.9	200	3.1	h	25.3	1.9	36.3	43.8	54	-10.2	Ave
1729.0000	52.6	120	1.5	v	25.3	1.9	36.3	43.5	54	-10.5	Ave
3151.2500	45.3	200	3.1	h	30.3	2.5	35.2	43.0	54	-11.0	Ave
3155.7000	45.2	120	1.5	v	30.3	2.5	35.2	42.8	54	-11.2	Ave
7320.4800	36.5	45	2.0	h	36.3	4.3	34.7	42.5	54	-11.5	Ave
1561.2000	51.6	120	1.5	v	25.3	1.9	36.3	42.5	54	-11.5	Ave
3311.8800	64.7	200	3.1	h	30.3	2.5	35.2	62.3	74	-11.7	Peak
3311.8800	44.1	200	3.1	h	30.3	2.5	35.2	41.8	54	-12.2	Ave
3151.2500	64.0	200	3.1	h	30.3	2.5	35.2	61.7	74	-12.3	Peak
2310.4300	47.3	120	1.5	v	28.1	2.0	35.8	41.6	54	-12.4	Ave
1561.2000	70.0	120	1.5	v	25.3	1.9	36.3	60.9	74	-13.1	Peak
1736.8500	69.3	200	3.1	h	25.3	1.9	36.3	60.2	74	-13.8	Peak
3043.0700	42.6	200	3.1	h	30.3	2.5	35.2	40.2	54	-13.8	Ave
1550.0000	48.4	120	1.5	v	25.3	1.9	36.3	39.3	54	-14.7	Ave
3128.7300	61.6	200	3.1	h	30.3	2.5	35.2	59.2	74	-14.8	Peak
3151.2500	60.7	120	1.5	v	30.3	2.5	35.2	58.4	74	-15.6	Peak
7320.4800	32.3	120	2.0	v	36.3	4.3	34.7	38.3	54	-15.7	Ave
3311.8800	60.6	120	1.5	v	30.3	2.5	35.2	58.2	74	-15.8	Peak
4880.3200	56.8	45	2.0	h	32.5	3.1	34.8	57.6	74	-16.4	Peak
1550.0000	66.5	200	3.1	h	25.3	1.9	36.3	57.4	74	-16.6	Peak
3115.2700	72.1	200	3.1	h	30.3	2.5	35.2	69.8	87	-17.2	Peak
3120.3000	58.2	200	3.1	h	30.3	2.5	35.2	55.9	74	-18.1	Peak
3128.7300	58.2	120	1.5	v	30.3	2.5	35.2	55.9	74	-18.1	Peak
1729.0000	64.9	200	3.1	h	25.3	1.9	36.3	55.8	74	-18.2	Peak
1561.2000	63.7	200	3.1	h	25.3	1.9	36.3	54.6	74	-19.4	Peak
4880.3200	33.5	45	2.0	h	32.5	3.1	34.8	34.3	54	-19.7	Ave
3043.0700	56.1	120	1.5	v	30.3	2.5	35.2	53.8	74	-20.2	Peak

Middle Channel											
1736.8500	42.8	120	1.5	v	25.3	1.9	36.3	33.7	54	-20.3	Ave
2569.4300	56.8	120	1.5	v	29.0	2.4	35.5	52.7	74	-21.3	Peak
3155.7000	54.7	200	3.1	h	30.3	2.5	35.2	52.4	74	-21.6	Peak
3043.0700	54.3	200	3.1	h	30.3	2.5	35.2	51.9	74	-22.1	Peak
3141.4000	67.2	200	3.1	h	30.3	2.5	35.2	64.9	87	-22.1	Peak
4880.3200	50.8	180	2.0	v	32.5	3.1	34.8	51.6	74	-22.4	Peak
2569.4300	55.7	200	3.1	h	29.0	2.4	35.5	51.6	74	-22.4	Peak
3115.2700	66.6	200	3.1	h	30.3	2.5	35.2	64.2	86.6	-22.4	Ave
1729.0000	59.7	120	1.5	v	25.3	1.9	36.3	50.6	74	-23.4	Peak
3120.3000	52.9	120	1.5	v	30.3	2.5	35.2	50.6	74	-23.4	Peak
7320.4800	42.7	180	2.0	v	36.3	4.3	34.7	48.7	74	-25.3	Peak
1679.6300	57.5	120	1.5	v	25.3	1.9	36.3	48.4	74	-25.6	Peak
1764.7000	70.5	200	3.1	h	25.3	1.9	36.3	61.4	87	-25.6	Peak
2310.4300	54.1	200	3.1	h	28.1	2.0	35.8	48.4	74	-25.6	Peak
1550.0000	57.4	120	1.5	v	25.3	1.9	36.3	48.3	74	-25.7	Peak
7320.4800	42.0	45	2.0	h	36.3	4.3	34.7	48.0	74	-26.0	Peak
3155.7000	49.6	120	1.5	v	30.3	2.5	35.2	47.2	74	-26.8	Peak
3115.2700	63.8	120	1.5	v	30.3	2.5	35.2	61.4	88.8	-27.4	Peak
1679.6300	55.5	200	3.1	h	25.3	1.9	36.3	46.4	74	-27.6	Peak
2310.4300	51.2	120	1.5	v	28.1	2.0	35.8	45.5	74	-28.5	Peak
1736.8500	54.4	120	1.5	v	25.3	1.9	36.3	45.3	74	-28.7	Peak
3115.2700	58.3	120	1.5	v	30.3	2.5	35.2	56.0	87.8	-31.8	Ave
1764.7000	63.4	200	3.1	h	25.3	1.9	36.3	54.3	86.6	-32.3	Ave
3141.4000	56.5	200	3.1	h	30.3	2.5	35.2	54.1	86.6	-32.5	Ave
3141.4000	57.2	120	1.5	v	30.3	2.5	35.2	54.8	88.8	-34.0	Peak
1764.7000	60.0	120	1.5	v	25.3	1.9	36.3	50.9	88.8	-37.9	Peak
1764.7000	53.3	120	1.5	v	25.3	1.9	36.3	44.2	87.8	-43.6	Ave
3141.4000	45.8	120	1.5	v	30.3	2.5	35.2	43.4	87.8	-44.4	Ave

High Channel											
2479.4000	115.0	180	2.0	v	28.1	2.0	35.8	109.3			Fund/Peak
2479.4000	110.6	0	3.8	h	28.1	2.0	35.8	104.9			Fund/Peak
2479.4000	113.7	180	3.1	v	28.1	2.0	35.8	108.0			Ave
2479.4000	108.9	0	3.5	h	28.1	2.0	35.8	103.2			Ave
3357.8500	55.0	200	3.1	h	30.3	2.5	35.2	52.7	54	-1.3	Ave
3349.8000	52.6	180	2.0	v	30.3	2.5	35.2	50.2	54	-3.8	Ave
3369.6000	50.7	180	2.0	v	30.3	2.5	35.2	48.3	54	-5.7	Ave
1679.5500	56.3	120	1.5	v	25.3	1.9	36.3	47.2	54	-6.8	Ave
1609.0000	55.4	180	2.0	v	25.3	1.9	36.3	46.3	54	-7.7	Ave
1779.1700	54.2	200	3.1	h	25.3	1.9	36.3	45.1	54	-8.9	Ave
1609.0000	53.7	200	3.1	h	25.3	1.9	36.3	44.6	54	-9.4	Ave
1804.3000	52.7	180	2.0	v	25.3	1.9	36.3	43.6	54	-10.4	Ave
1588.8200	52.5	200	3.1	h	25.3	1.9	36.3	43.4	54	-10.6	Ave
1768.3000	52.2	200	3.1	h	25.3	1.9	36.3	43.1	54	-10.9	Ave
3349.8000	45.5	200	3.1	h	30.3	2.5	35.2	43.1	54	-10.9	Ave
3357.8500	65.4	180	2.0	v	30.3	2.5	35.2	63.0	74	-11.0	Peak
4958.8000	42.0	120	2.0	v	32.5	3.1	34.8	42.8	54	-11.2	Ave
3369.6000	45.2	200	3.1	h	30.3	2.5	35.2	42.8	54	-11.2	Ave
1804.3000	51.5	200	3.1	h	25.3	1.9	36.3	42.4	54	-11.6	Ave
2608.8000	45.6	180	2.0	v	29.0	2.4	35.5	41.5	54	-12.5	Ave
3349.8000	63.4	200	3.1	h	30.3	2.5	35.2	61.1	74	-12.9	Peak
3369.6000	63.3	200	3.1	h	30.3	2.5	35.2	61.0	74	-13.0	Peak
4958.8000	40.0	45	2.0	h	32.5	3.1	34.8	40.8	54	-13.2	Ave
1679.5500	49.8	200	3.1	h	25.3	1.9	36.3	40.7	54	-13.3	Ave
2262.8000	46.4	180	2.0	v	28.1	2.0	35.8	40.7	54	-13.3	Ave
2349.9000	45.5	180	2.0	v	28.1	2.0	35.8	39.8	54	-14.2	Ave
1804.3000	68.6	200	3.1	h	25.3	1.9	36.3	59.5	74	-14.5	Peak
2262.8000	45.1	200	3.1	h	28.1	2.0	35.8	39.4	54	-14.6	Ave
7438.2000	33.1	200	3.1	h	36.3	4.3	34.7	39.0	54	-15.0	Ave
1588.8200	48.0	180	2.0	v	25.3	1.9	36.3	38.9	54	-15.1	Ave
2608.8000	42.7	200	3.1	h	29.0	2.4	35.5	38.6	54	-15.4	Ave
7438.2000	32.4	120	1.5	v	36.3	4.3	34.7	38.4	54	-15.6	Ave
2349.9000	43.4	200	3.1	h	28.1	2.0	35.8	37.7	54	-16.3	Ave
1790.3000	46.7	200	3.1	h	25.3	1.9	36.3	37.6	54	-16.4	Ave
3349.8000	58.4	180	2.0	v	30.3	2.5	35.2	56.0	74	-18.0	Peak
1779.1700	45.0	180	2.0	v	25.3	1.9	36.3	35.9	54	-18.1	Ave
1779.1700	64.6	200	3.1	h	25.3	1.9	36.3	55.5	74	-18.5	Peak
3357.8500	57.2	200	3.1	h	30.3	2.5	35.2	54.8	74	-19.2	Peak
1790.3000	43.2	120	1.5	v	25.3	1.9	36.3	34.1	54	-19.9	Ave
3357.8500	36.5	180	2.0	v	30.3	2.5	35.2	34.1	54	-19.9	Ave
1768.3000	43.0	180	2.0	v	25.3	1.9	36.3	33.9	54	-20.1	Ave
1609.0000	62.6	180	2.0	v	25.3	1.9	36.3	53.5	74	-20.5	Peak
3369.6000	55.7	180	2.0	v	30.3	2.5	35.2	53.3	74	-20.7	Peak
1609.0000	62.0	200	3.1	h	25.3	1.9	36.3	52.9	74	-21.1	Peak
1588.8200	61.4	200	3.1	h	25.3	1.9	36.3	52.3	74	-21.7	Peak
1768.3000	61.2	200	3.1	h	25.3	1.9	36.3	52.1	74	-21.9	Peak
1804.3000	59.1	180	2.0	v	25.3	1.9	36.3	50.0	74	-24.0	Peak

High Channel											
7438.2000	43.1	120	1.5	v	36.3	4.3	34.7	49.1	74	-24.9	Peak
1679.5500	58.2	120	1.5	v	25.3	1.9	36.3	49.1	74	-24.9	Peak
4958.8000	48.1	45	2.0	h	32.5	3.1	34.8	48.9	74	-25.1	Peak
4958.8000	48.0	180	2.0	v	32.5	3.1	34.8	48.8	74	-25.2	Peak
7438.2000	42.4	200	3.1	h	36.3	4.3	34.7	48.3	74	-25.7	Peak
2608.8000	52.2	200	3.1	h	29.0	2.4	35.5	48.1	74	-25.9	Peak
2262.8000	53.3	180	2.0	v	28.1	2.0	35.8	47.6	74	-26.4	Peak
1790.3000	56.6	200	3.1	h	25.3	1.9	36.3	47.5	74	-26.5	Peak
1588.8200	56.1	180	2.0	v	25.3	1.9	36.3	47.0	74	-27.0	Peak
2608.8000	51.1	180	2.0	v	29.0	2.4	35.5	47.0	74	-27.0	Peak
2262.8000	51.7	200	3.1	h	28.1	2.0	35.8	46.0	74	-28.0	Peak
1768.3000	55.0	180	2.0	v	25.3	1.9	36.3	45.9	74	-28.1	Peak
1779.1700	55.0	180	2.0	v	25.3	1.9	36.3	45.9	74	-28.1	Peak
1790.3000	54.5	120	1.5	v	25.3	1.9	36.3	45.4	74	-28.6	Peak
2349.9000	51.1	180	2.0	v	28.1	2.0	35.8	45.4	74	-28.6	Peak
1679.5500	53.5	200	3.1	h	25.3	1.9	36.3	44.4	74	-29.6	Peak
2349.9000	48.9	200	3.1	h	28.1	2.0	35.8	43.2	74	-30.8	Peak

Note:

FUND: Fundemental
AVG: Average

Unintentional Emission

Indicated			Antenna	Antenna		Correction Factor			FCC 15.247	
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
130.00	46.30	90	2.0	V	12.0	1.6	28.5	31.4	43.5	-12.1
130.00	45.20	300	1.8	H	12.0	1.6	28.5	30.3	43.5	-13.2
117.20	43.50	180	1.5	V	11.5	1.6	28.6	28.0	43.5	-15.5
117.20	41.80	180	2.0	H	11.5	1.6	28.6	26.3	43.5	-17.2
75.00	40.60	180	2.6	V	9.4	1.2	28.8	22.3	40	-17.7
75.00	39.50	0	2.0	H	9.4	1.2	28.8	21.2	40	-18.8

§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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

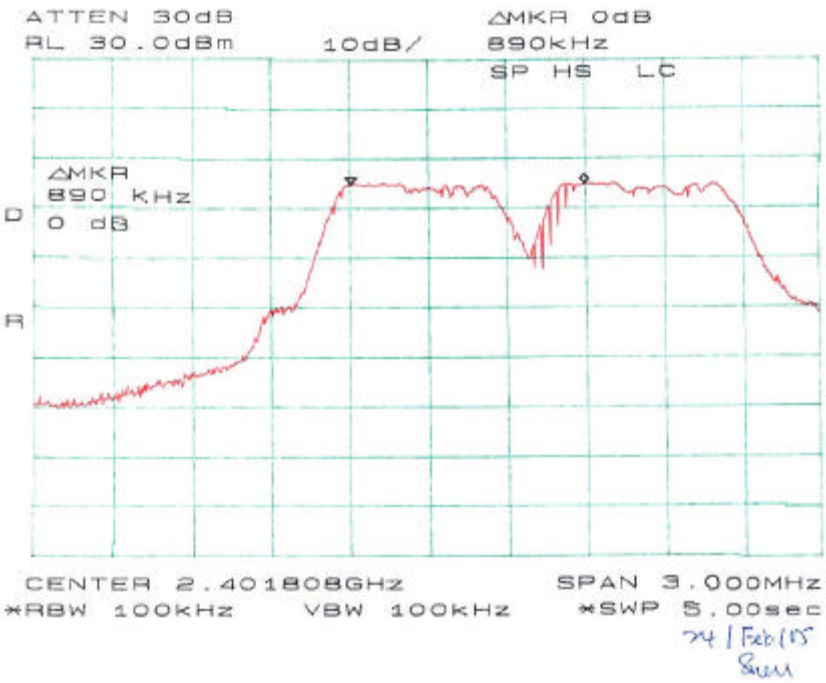
**The testing was performed by Snell Leong on 2005-02-24.*

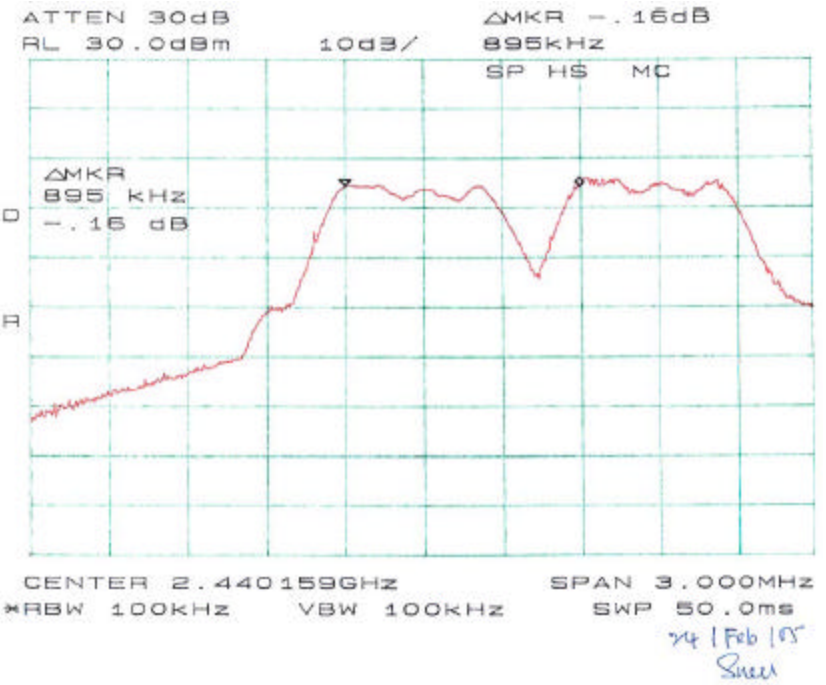
Measurement Results

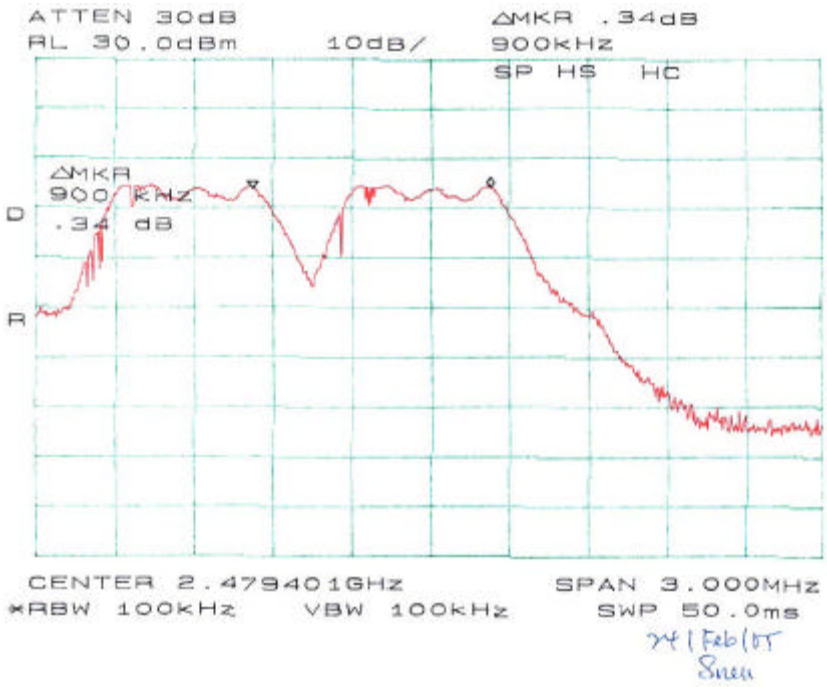
Channel	Frequency MHz	Channel Separation (KHz)
Low	2401.81	890
Mid	2440.16	895
High	2479.4	900

Plots of Hopping Channel Separation

Please refer to the following plots.






ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR .34dB
900kHz
SP HS HC
ΔMKR
900 kHz
.34 dB
D
R
CENTER 2.479401GHz
SPAN 3.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms
24 Feb 05
Screen

§15.247 (a) (1) - CHANNEL BANDWIDTH

Standard Applicable

According to §15.247(a)(l), 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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

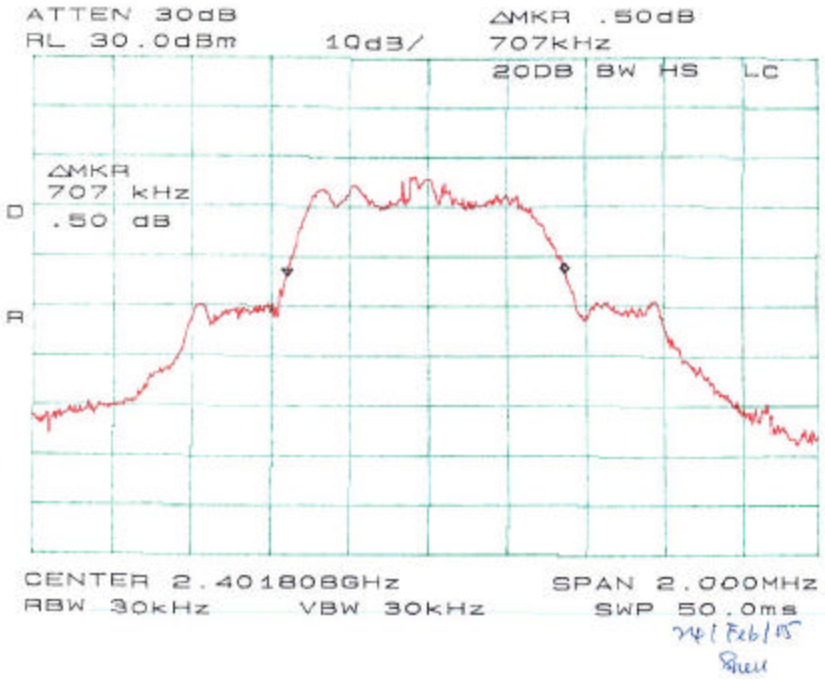
**The testing was performed by Snell Leong on 2005-02-24.*

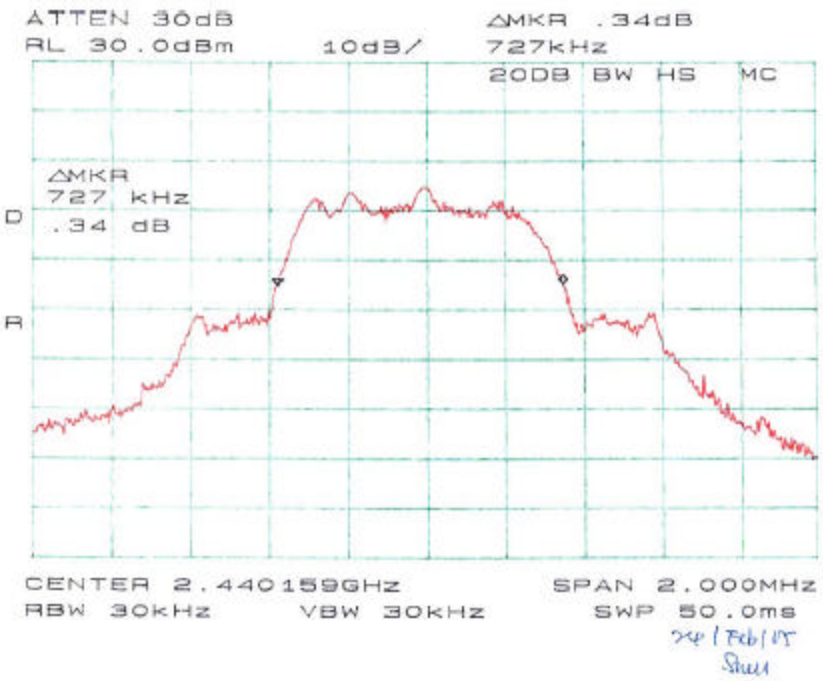
Measurement Result

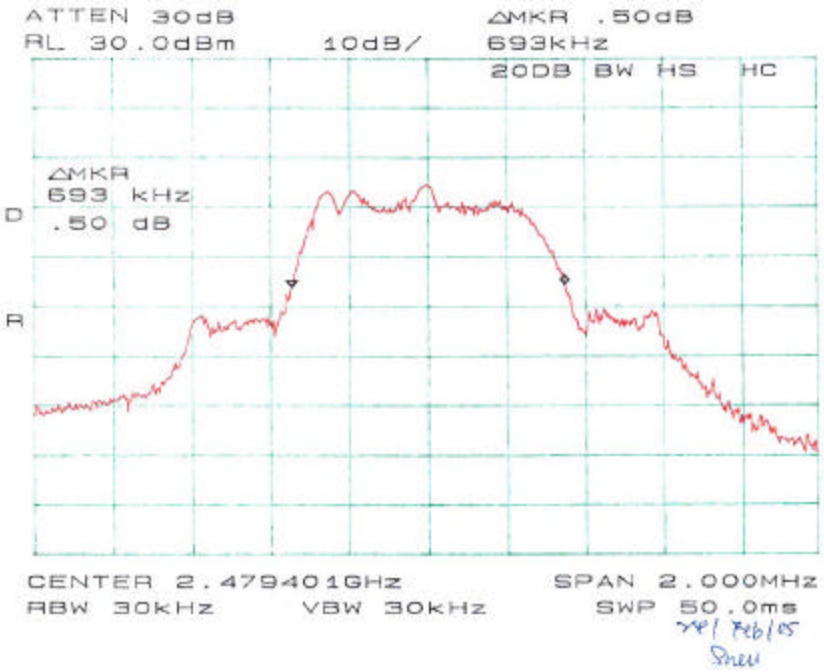
Channel	Frequency MHz	Channel Bandwidth (KHz)
Low	2401.81	707
Mid	2440.16	727
High	2479.4	693

Plot of Channel Bandwidth

Please see the following plots


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR .50dB
707kHz
20DB BW HS LC
ΔMKR
707 kHz
.50 dB
D
R
CENTER 2.401808GHz
SPAN 2.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms
24 Feb 05


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR .34dB
727kHz
20DB BW HS MC
ΔMKR
727 kHz
.34 dB
D
R
CENTER 2.440159GHz
SPAN 2.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms
24 Feb 05


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR .50dB
693kHz
20DB BW HS HC
ΔMKR
693 kHz
.50 dB
D
R
CENTER 2.479401GHz
SPAN 2.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms

§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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

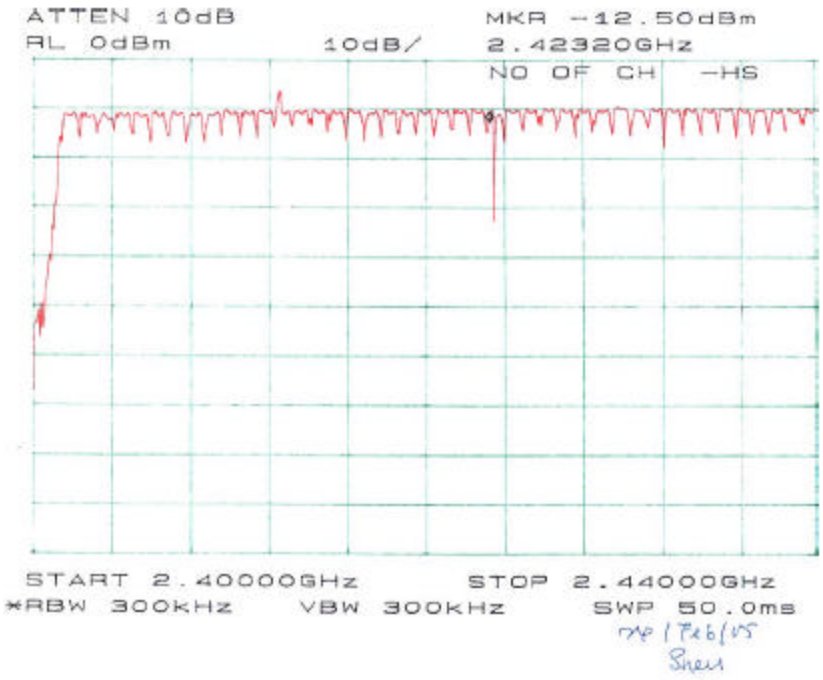
**The testing was performed by Snell Leong on 2005-02-24.*

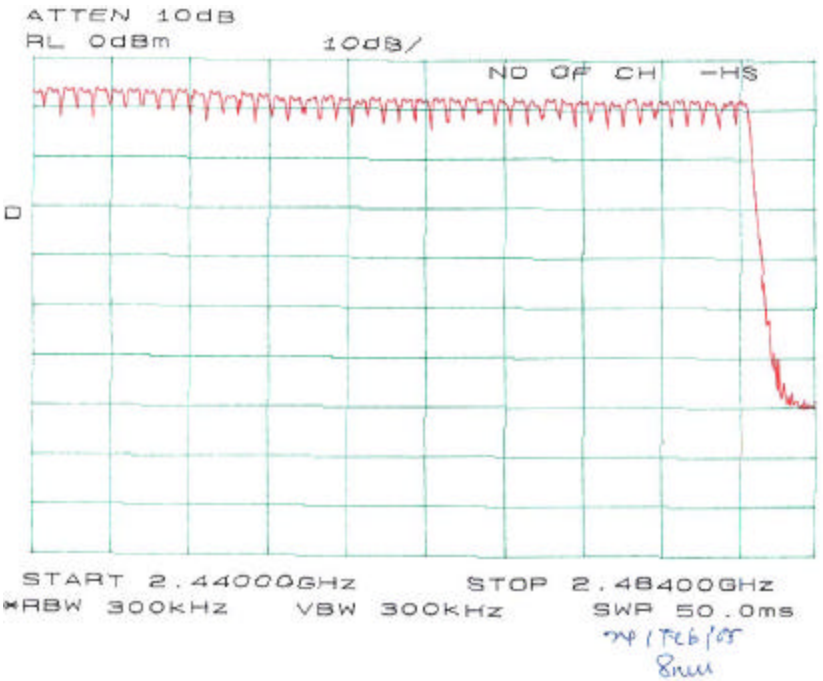
Measurement Results

Measurement	Standard	Result
88	88	Compliant

Plots of Number of Hopping Frequency

Please refer to the attached plots.


ATTEN 10dB
RL 0dBm
10dB/
MKR -12.50dBm
2.42320GHz
NO OF CH -HS
START 2.40000GHz
STOP 2.44000GHz
*RBW 300kHz
VBW 300kHz
SWP 50.0ms
7th Feb 05
Shell


ATTEN 10dB
RL 0dBm
10dB/
NO OF CH -HS
START 2.44000GHz
STOP 2.48400GHz
*RBW 300kHz
VBW 300kHz
SWP 50.0ms
7th Feb 05
Shell

§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	Description	Model No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

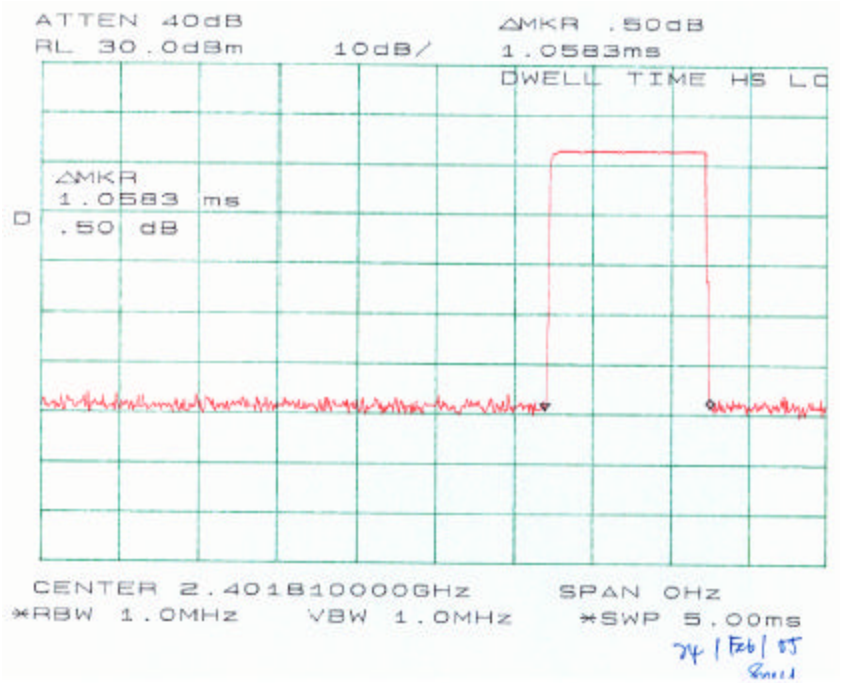
**The testing was performed by Snell Leong on 2005-02-24.*

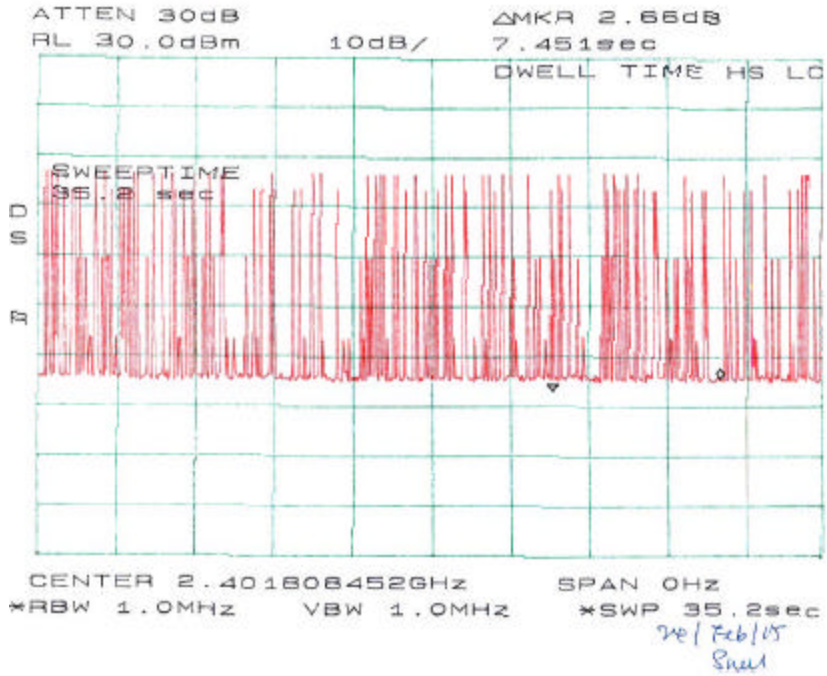
Measurement Results

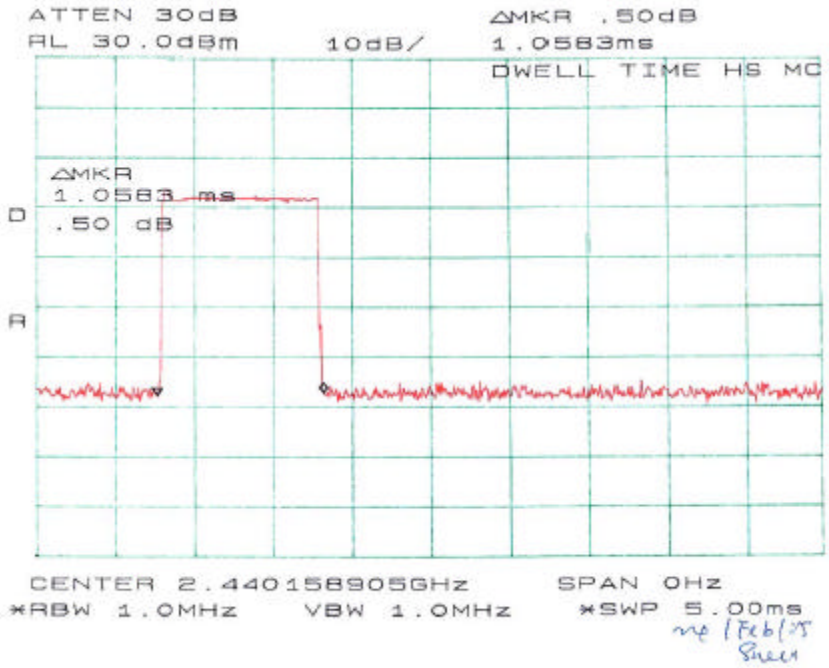
Channel	Frequency MHz	Pulse Wide uSec	Occupied time per Sec	Dwell Time Sec	Limit Sec
Low	2401.81	1058.3	47	0.050	0.4
Mid	2440.16	1058.3	48	0.051	0.4
High	2479.4	1058.3	47	0.050	0.4

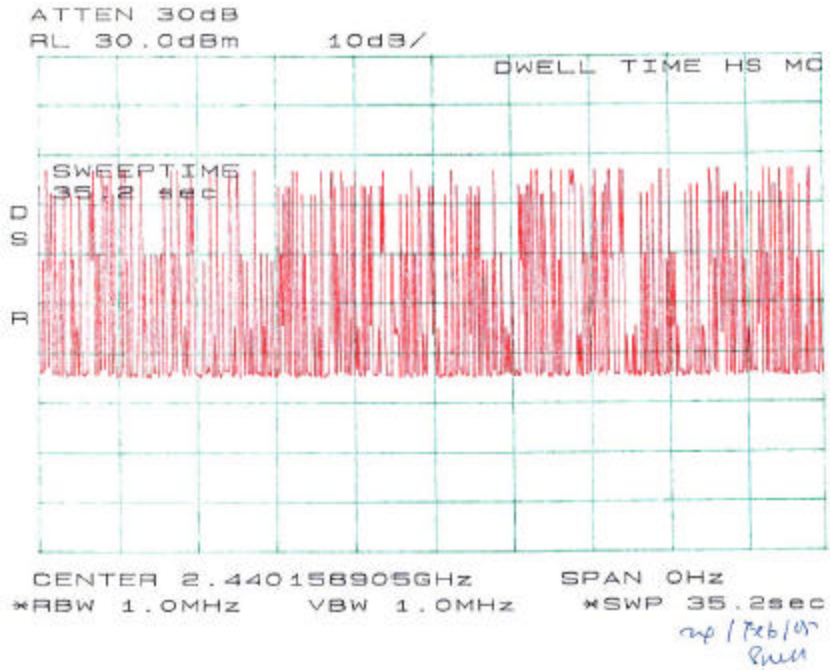
Low CH Dwell time =	1058.3 x 47 =	0.050	micro sec
Mid CH Dwell time =	1058.3 x 48 =	0.051	micro sec
High CH Dwell time =	1058.3 x 47 =	0.050	micro sec

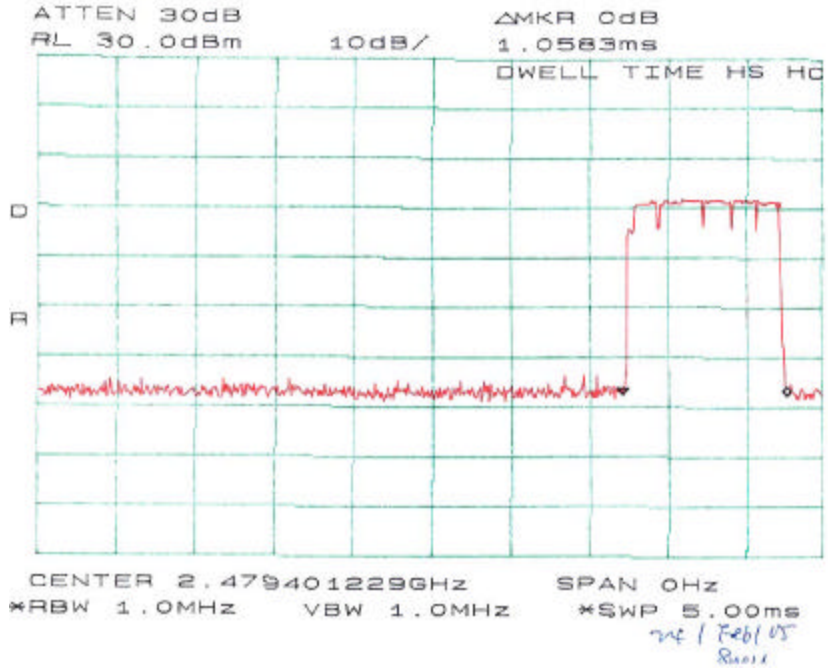
Plots of Dwell Time
Please refer the following plots.

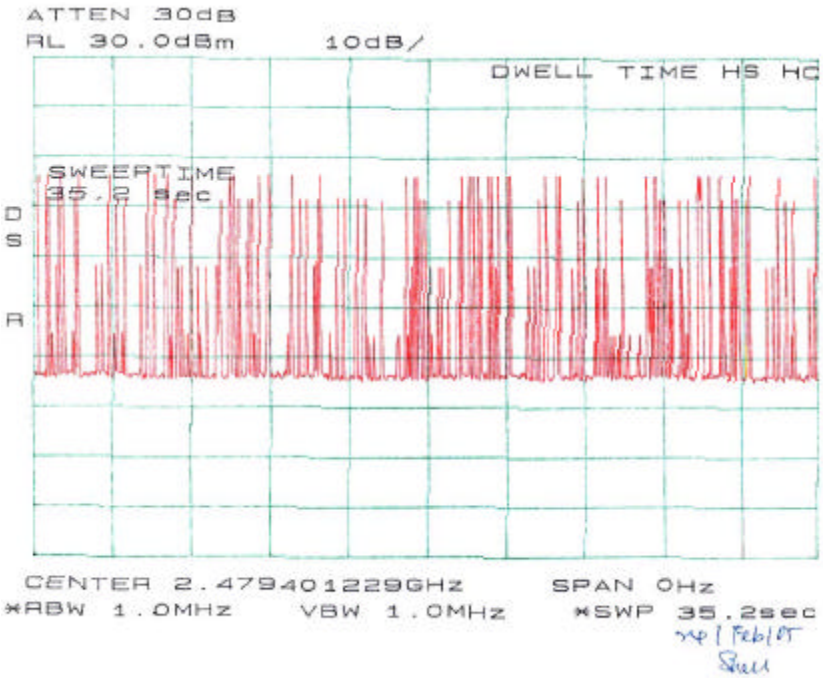





ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR .50dB
1.0583ms
DWELL TIME HS MC
ΔMKR
1.0583 ms
.50 dB
D
R
CENTER 2.440158905GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 5.00ms
mp 17Feb/05
Swept


ATTEN 30dB
RL 30.0dBm
10dB/
DWELL TIME HS MC
SWEEPTIME
35.2 sec
D
S
R
CENTER 2.440158905GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 35.2sec
mp 17Feb/05
Swept


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR 0dB
1.0583ms
DWELL TIME HS HC
D
A
CENTER 2.479401229GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 5.00ms


ATTEN 30dB
RL 30.0dBm
10dB/
DWELL TIME HS HC
SWEEPTIME
35.2 sec
D
S
A
CENTER 2.479401229GHz
SPAN 0Hz
*RBW 1.0MHz
VBW 1.0MHz
*SWP 35.2sec

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

Standard Applicable

According to §15.247(b) (1), for frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all direct sequence systems, 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
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

Environmental Conditions

Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

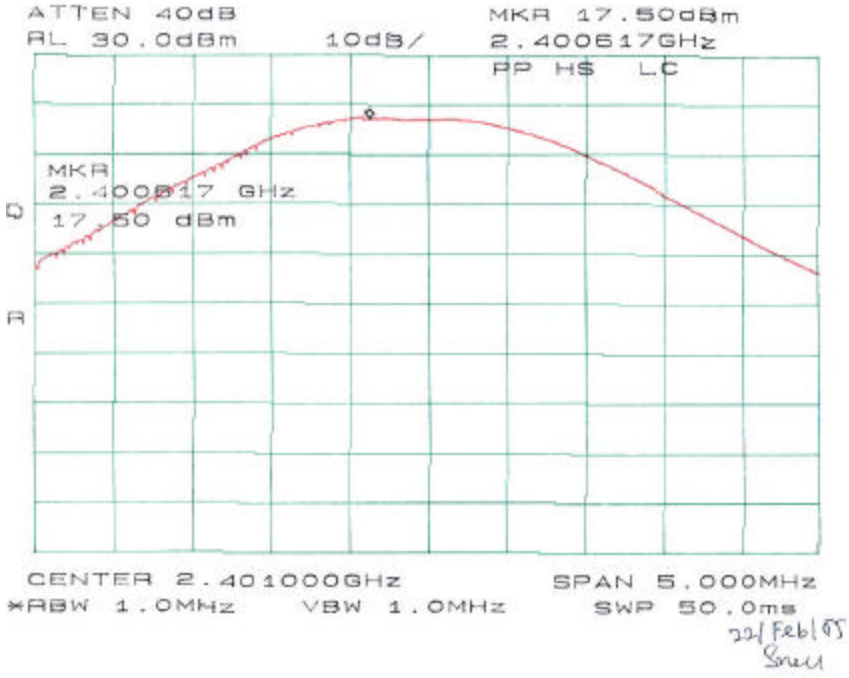
**The testing was performed by Snell Leong on 2005-02-22.*

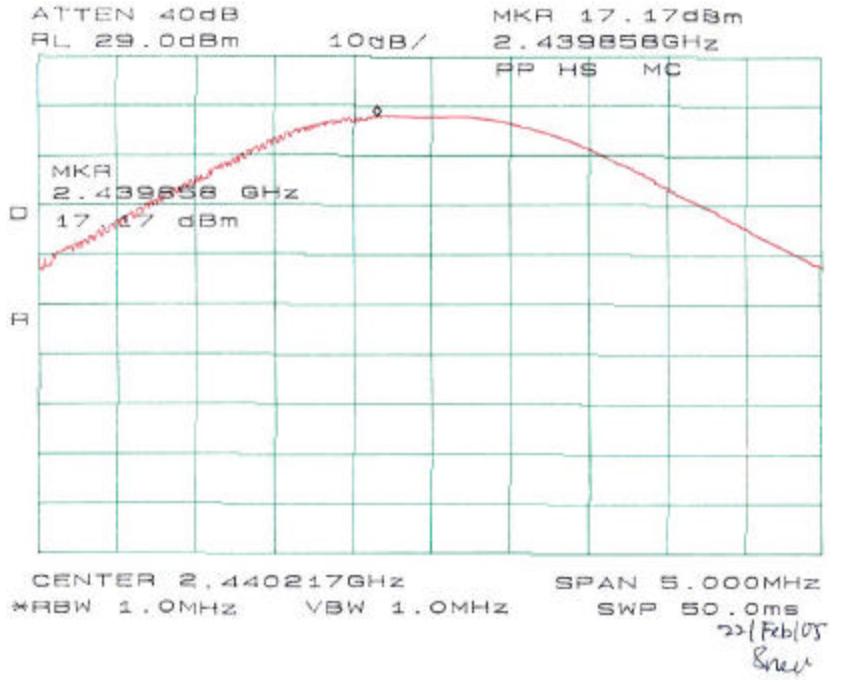
Measurement Result

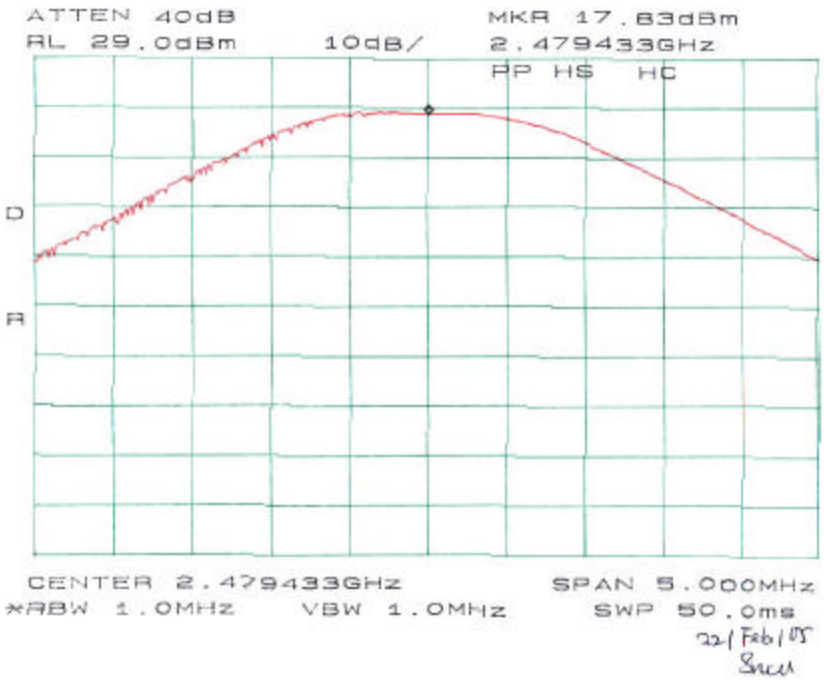
Channel	Frequency	Max Peak Output Power		Limit	Result
	MHz	(dBm)	(m Watt)	(m Watt)	
Low	2401.81	17.5	56.23	1000	pass
Mid	2440.16	17.17	52.12	1000	pass
High	2479.4	17.83	60.67	1000	pass

Plots of Maximum Peak Output Power

Please see the following plots


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 17.50dBm
2.400617GHz
PP HS LC
MKR
2.400617 GHz
17.50 dBm
CENTER 2.401000GHz
SPAN 5.000MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms
22 Feb 05


ATTEN 40dB
RL 29.0dBm
10dB/
MKR 17.17dBm
2.439858GHz
PP HS MC
MKR
2.439858 GHz
17.17 dBm
CENTER 2.440217GHz
SPAN 5.000MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms
22 Feb 05


ATTEN 40dB
RL 29.0dBm
10dB/
MKR 17.83dBm
2.479433GHz
PP HS HC
D
R
CENTER 2.479433GHz
SPAN 5.000MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms
22/Feb/05

§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 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
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

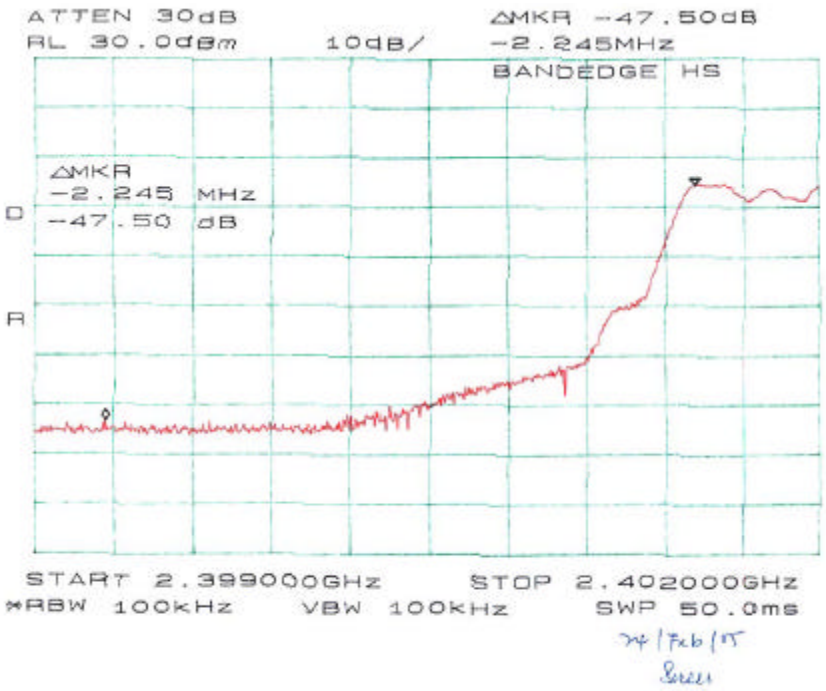
Environmental Conditions

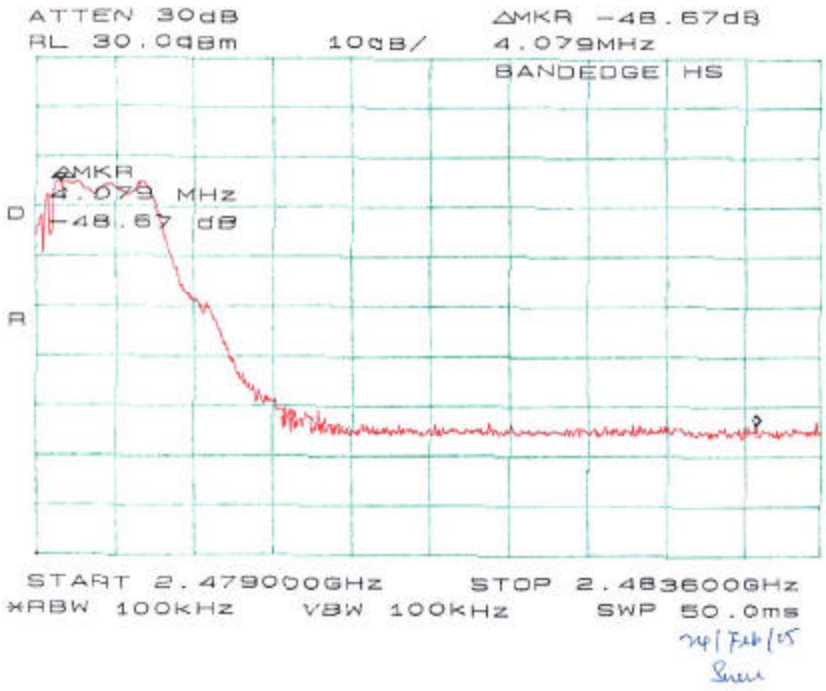
Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

**The testing was performed by Snell Leong on 2005-02-24.*

Plots of 100kHz Bandwidth of Band Edge

Please refer the following plots.


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR -47.50dB
-2.245MHz
BANDEDGE HS
ΔMKR
-2.245 MHz
-47.50 dB
D
R
START 2.399000GHz
STOP 2.402000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms
24 Feb 15
Green


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR -48.67dB
4.079MHz
BANDEDGE HS
ΔMKR
4.079 MHz
-48.67 dB
D
R
START 2.479000GHz
STOP 2.483600GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms
24 Feb 15
Green

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 No.	Serial No.	Calibration Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-08-06

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

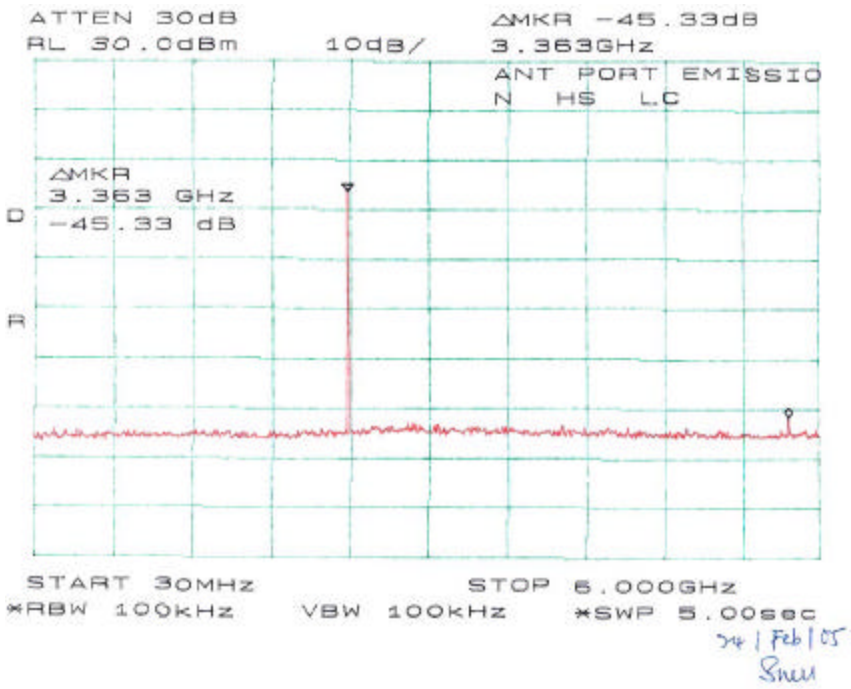
Environmental Conditions

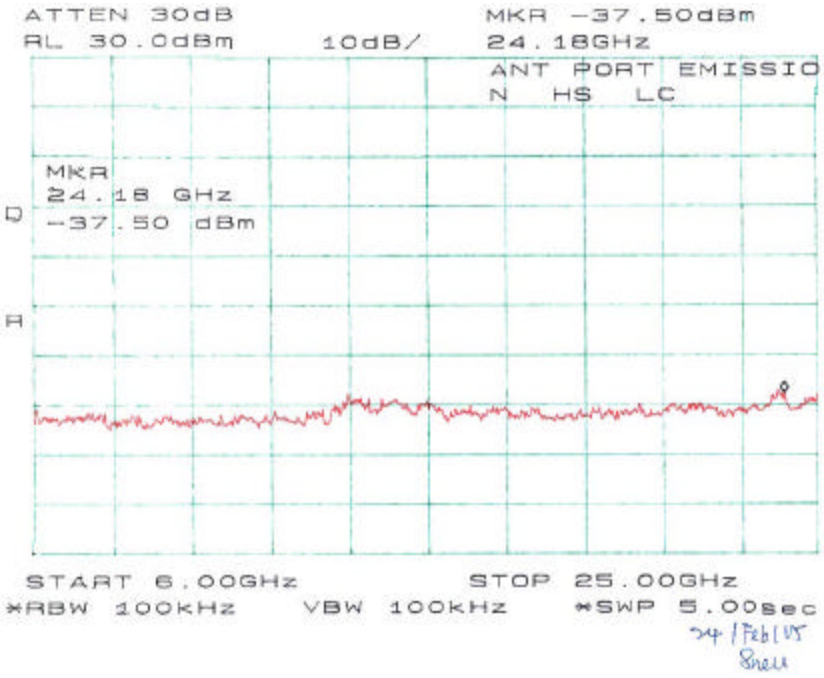
Temperature:	18° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

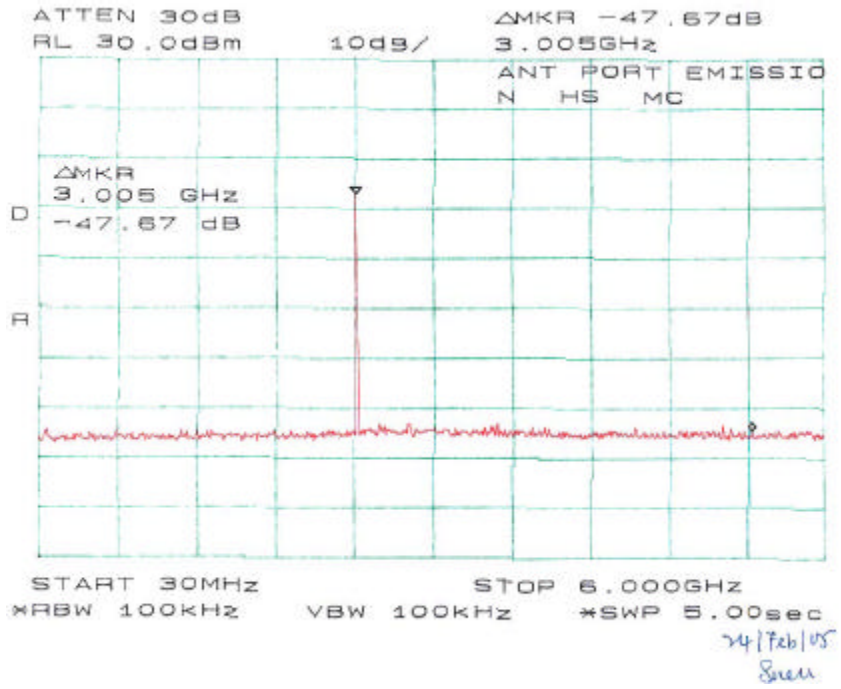
**The testing was performed by Snell Leong on 2005-02-24.*

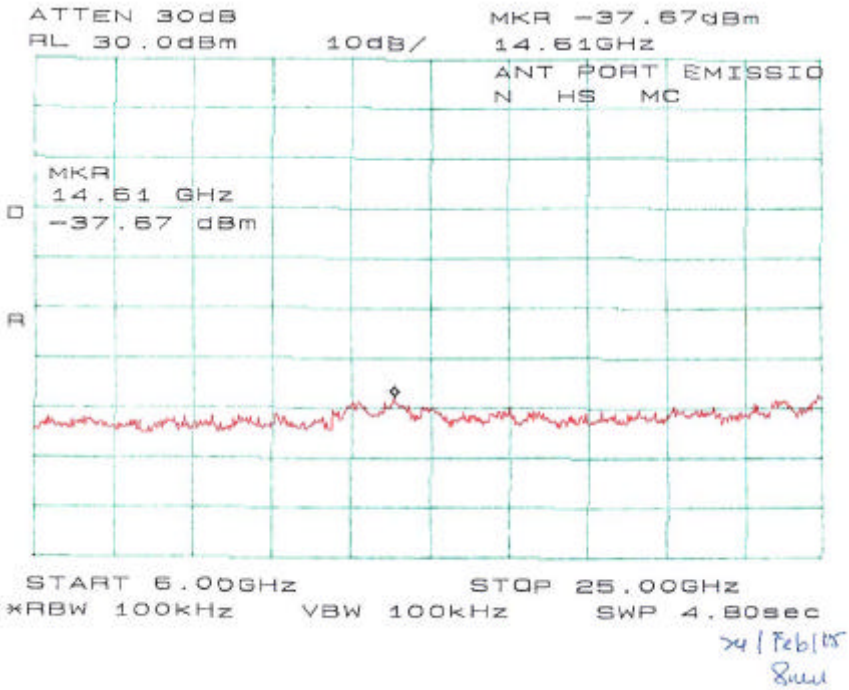
Measurement Results

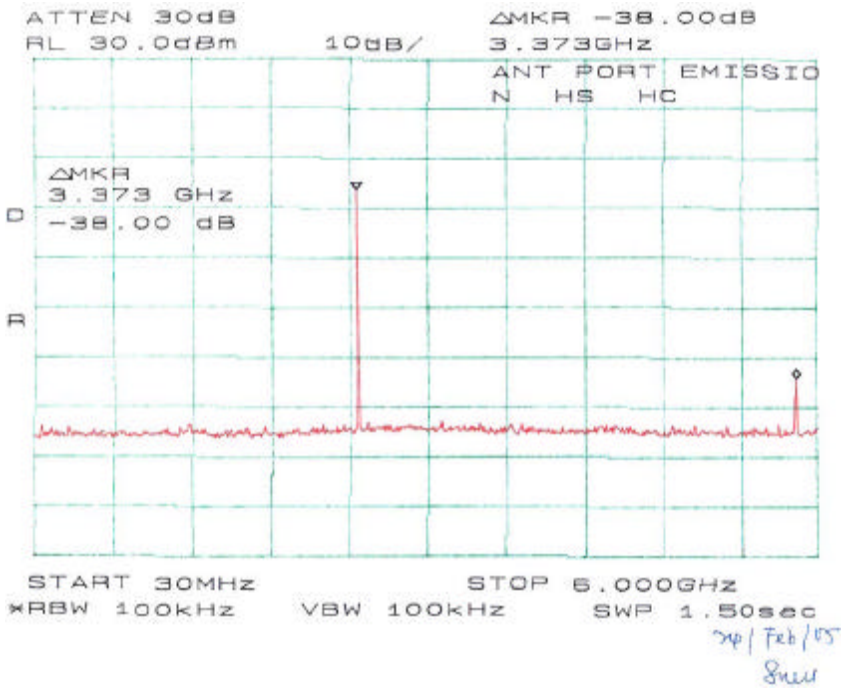
Please refer to the following plots.

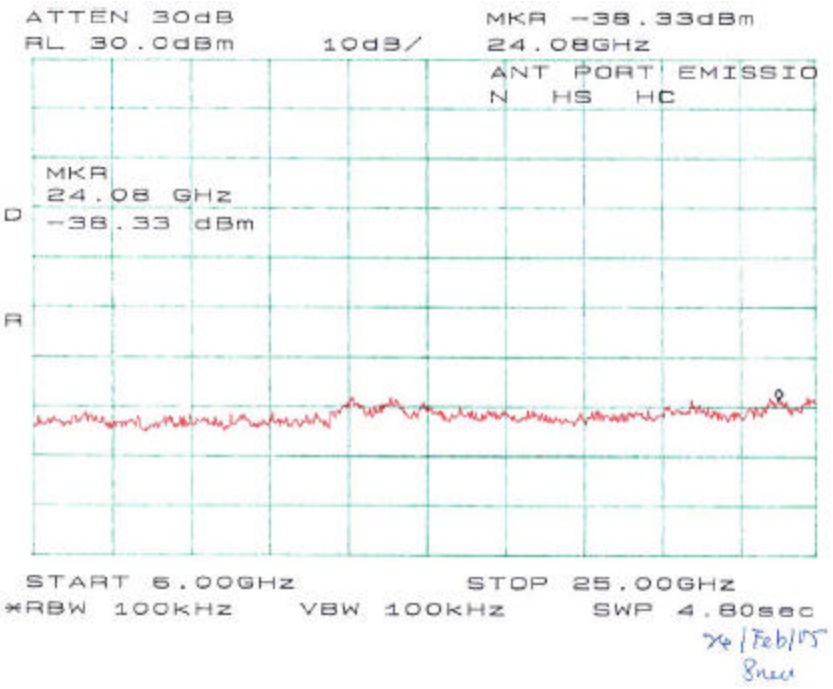

ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR -45.33dB
3.363GHz
ANT PORT EMISSIO
N HS LC
ΔMKR
3.363 GHz
-45.33 dB
D
R
START 30MHz
STOP 6.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 5.00sec
24 Feb 05


ATTEN 30dB
RL 30.0dBm
10dB/
MKR -37.50dBm
24.18GHz
ANT PORT EMISSIO
N HS LC
MKR
24.18 GHz
-37.50 dBm
D
R
START 6.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 5.00sec
24 Feb 05


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR -47.67dB
3.005GHz
ANT PORT EMISSIO
N HS MC
ΔMKR
3.005 GHz
-47.67 dB
START 30MHz
STOP 6.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 5.00sec
24 Feb 05


ATTEN 30dB
RL 30.0dBm
10dB/
MKR -37.67dBm
14.61GHz
ANT PORT EMISSIO
N HS MC
MKR
14.61 GHz
-37.67 dBm
START 6.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
SWP 4.80sec
24 Feb 05


ATTEN 30dB
RL 30.0dBm
10dB/
ΔMKR -38.00dB
3.373GHz
ANT PORT EMISSIO
N HS HC
ΔMKR
3.373 GHz
-38.00 dB
D
R
START 30MHz
STOP 6.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.50sec
7th / Feb / 05
Sneel


ATTEN 30dB
RL 30.0dBm
10dB/
MKR -38.33dBm
24.08GHz
ANT PORT EMISSIO
N HS HC
MKR
24.08 GHz
-38.33 dBm
D
R
START 6.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
SWP 4.80sec
7th / Feb / 05
Sneel