

FCC PART 15.247
EMI MEASUREMENT AND TEST REPORT
For
Kingjon Digital Technology Co., Ltd.

Room 827 , Huanan Dianli Building , No. 2050 , Shennan Mid-road , Shenzhen , China

FCC ID: S7O0013EF

April 18, 2005

This Report Concerns: ☒ Original Report	Equipment Type: Bluetooth USB Dongle
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Report No.: RSZ05040101	
Test Date: April 10-12, 2005	
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The Kingjon Digital Technology Co., Ltd.'s product, model number: KJ-B110, LD006, ES-20, KJ-2A, PHX 1116, PHX1117 or the "EUT" as referred to in this report is a Bluetooth USB Dongle. The EUT is measured approximately 5.0 cm L x 2.5cmW x 1.0cmH, rated input voltage: DC 5V.

The series products, model name: KJ-B110, LD006, ES-20, KJ-2A, PHX 1116, PHX1117 have the same circuit diagram, PCB layout, only Appearance is different, so we selected KJ-B110 to test.

** The test data gathered are from production sample, serial number: 000KJB1108, provided by the manufacturer.*

Objective

This Type approval report is prepared on behalf of Kingjon Digital Technology Co., Ltd. in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209, and 15.247 rules.

Related Submittal(s)/Grant(s)

No related submittal(s).

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 Lab Corp. (ShenZhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Lab Corp. (ShenZhen) to collect radiated and conducted emission measurement data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China.

Test site at Bay Area Compliance Lab Corp. (ShenZhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. 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 has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
IBM	Motherboard	ES-8176	F19R0703	DoC
IBM	Switch Power Supply	HIPRO-A2307F3T	M4251101720	DoC
IBM	Hard Disk 80G	24P3783	W2XROOYJ8	N/A
ALPS	3.5" Floppy	06P5226	W25375957	DoC
LITE-ON	CD-ROM	LTN-486S	7819500457-A	DoC
Conexnt	Ethernet	RD01-D270	0325-02-1382	DoC

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
IBM	System PC	IBM8176	99Y5681	DoC
IBM	Keyboard	SK-8815	08532907	DoC
Logitech	Mouse	M-SAM83A	HCA33800404	DoC
IBM	Monitor	6737-66N	23-P3242	BEJT17HD
HP	Laser Jet5L	C3941A	JPTVOB2337	DoC
SAST	Modem	AEM-2100	0293	DoC

External I/O Cable

Cable Description	Length (M)	From/Port	To
Shielded Detachable Keyboard Cable	1.50	Keyboard Port / Host	Keyboard
Shielded Detachable Mouse Cable	1.50	PS/2 Port / Host	Mouse
Shielded Detachable Printer Cable	1.20	Parallel Port / Host	Printer
Shielded Detachable Serial Cable	1.20	Serial Port / Host	Modem
Shielded Detachable VGA Cable	1.50	VGA Port / Host	Monitor
Shielded Detachable Coaxial Cable	1.50	EUT	Spectrum Input
Shielded detachable USB Cable	1.00	EUT	USA Port

SYSTEM TEST CONFIGURATION

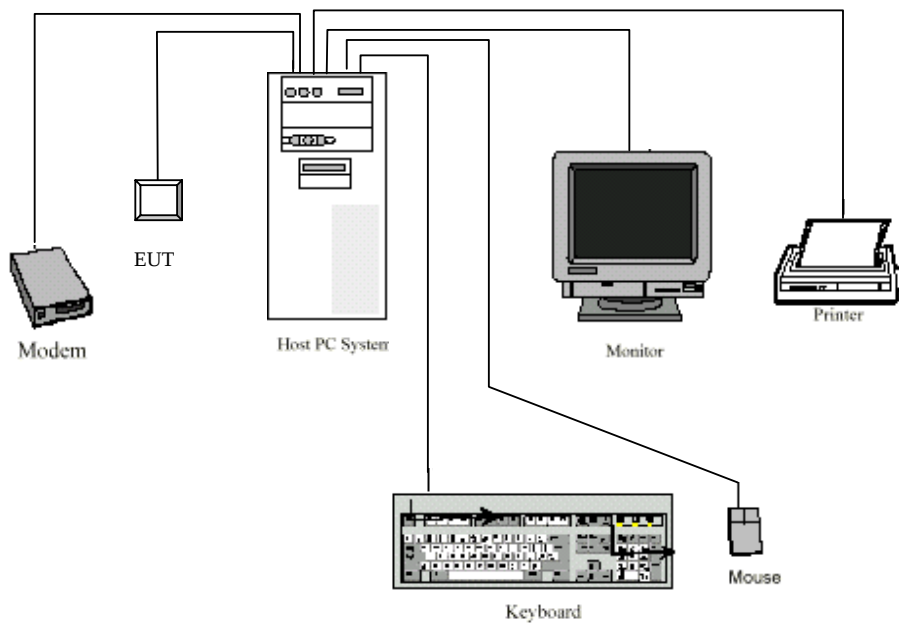
Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user).

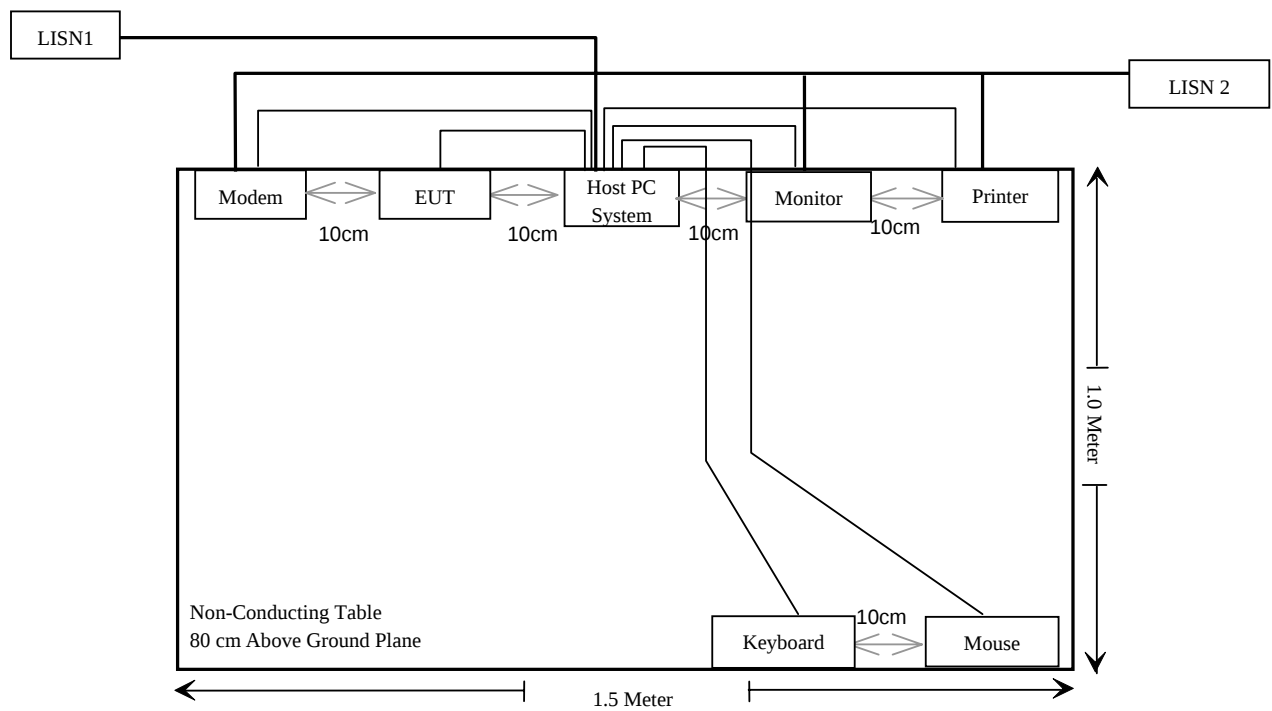
Equipment Modifications

BACL has not done any modification on the EUT.

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.205	Restricted bands	Compliant
§15.207 (a)	Conducted Emission	Compliant
§15.209(a)	Radiated Emission	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)	20dB Bandwidth testing	Compliant
§15.247(a)(1)(iii)	Time of occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band edges testing	Compliant

§15.203 - ANTENNA APPLICATION

Standard Applicable

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

This product has a permanent antenna, fulfill the requirement of this section.

Test Result: Pass

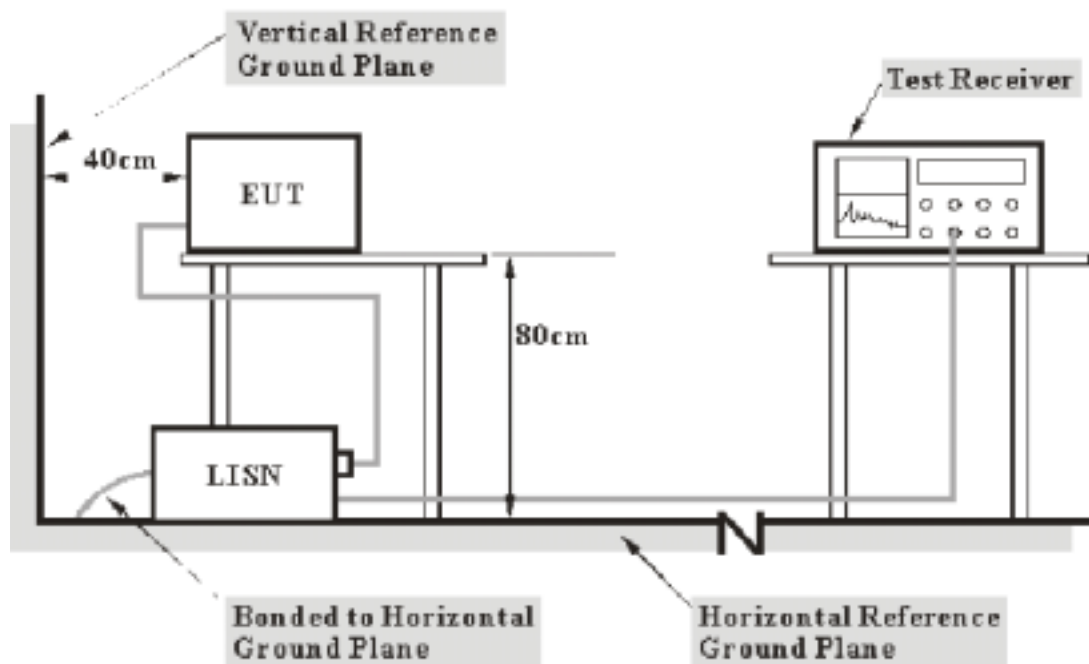
§15.207 (a)- CONDUCTED EMISSION

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.

EUT Setup



- Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The host PC was connected to a 120 VAC/60 Hz power source.

Test Receiver Setup

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

During the conducted emission test, the test receiver was set with the following configurations:

<u>Frequency Range</u>	<u>IFBW</u>
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Com-Power	L.I.S.N.	LI-200	12005	N/A	N/A
Com-Power	L.I.S.N.	LI-200	12008	N/A	N/A
Rohde & Schwarz	Test Receiver	ESCS30	830245/006	2005-1-26	2006-1-26
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2005-2-28	2006-2-27
Rohde & Schwarz	Pulse Limiter	ESH3Z2	DE25985	2004-9-1	2005-8-31

* Com-Power's LISN were used as the supporting equipment.

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

Test Procedure

During the conducted emission test, the host PC System power cord was connected to the outlet of the first LISN, the host PC and all other support equipment power cords were connected to the outlet of the second LISN.

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

All data was recorded in the Quasi-peak and average detection mode.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

High Channel: -17.39 dB at 0.180 MHz in the **Line** conductor mode.
 Middle Channel: -17.19 dB at 0.180 MHz in the **Line** conductor mode.
 Low Channel: -17.29 dB at 0.180 MHz in the **Line** conductor mode.

Test Data**Environmental Conditions**

Temperature:	18 °C
Relative Humidity:	53 %
ATM Pressure:	1015 mbar

The testing was performed by Jandy Su on 2005-4-11

Test mode: Transmitting & Standby

High Channel

LINE CONDUCTED EMISSIONS				FCC Part 15.207	
Frequency MHz	Amplitude dBμV	Detector QP/AV	Phase Line/Neutral	Limit dBμV	Margin dB
0.180	37.10	AV	Line	54.49	-17.39
11.080	30.02	AV	Neutral	50.00	-19.98
4.100	25.50	AV	Neutral	46.00	-20.50
10.480	28.15	AV	Line	50.00	-21.85
0.590	24.13	AV	Neutral	46.00	-21.87
11.080	36.61	QP	Neutral	60.00	-23.39
10.480	35.46	QP	Line	60.00	-24.54
0.180	39.20	QP	Line	64.49	-25.29
4.100	30.18	QP	Neutral	56.00	-25.82
6.400	24.03	AV	Line	50.00	-25.97
6.400	32.77	QP	Line	60.00	-27.23
0.590	28.56	QP	Neutral	56.00	-27.44

Middle Channel

LINE CONDUCTED EMISSIONS				FCC Part 15.207	
Frequency MHz	Amplitude dB μ V	Detector QP/AV	Phase Line/Neutral	Limit dB μ V	Margin dB
0.180	37.30	AV	Line	54.49	-17.19
0.600	28.50	AV	Line	46.00	-17.50
11.070	30.00	AV	Line	50.00	-20.00
3.780	25.70	AV	Neutral	46.00	-20.30
0.590	25.62	AV	Neutral	46.00	-20.38
10.500	29.00	AV	Neutral	50.00	-21.00
3.780	33.10	QP	Neutral	56.00	-22.90
11.070	35.80	QP	Line	60.00	-24.20
0.600	31.70	QP	Line	56.00	-24.30
0.590	31.07	QP	Neutral	56.00	-24.93
0.180	39.20	QP	Line	64.49	-25.29
10.500	34.68	QP	Neutral	60.00	-25.32

Low Channel

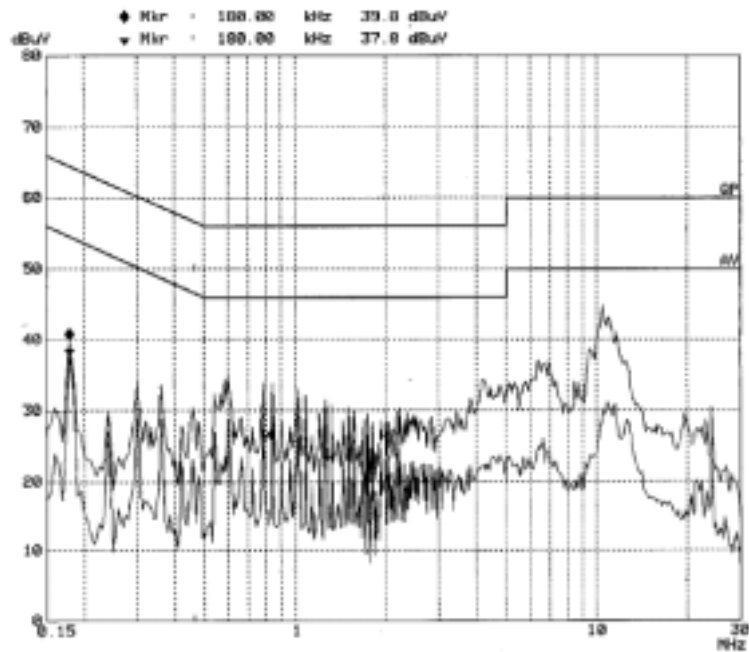
LINE CONDUCTED EMISSIONS				FCC Part 15.207	
Frequency MHz	Amplitude dB μ V	Detector QP/AV	Phase Line/Neutral	Limit dB μ V	Margin dB
0.180	37.20	AV	Line	54.49	-17.29
4.400	35.54	QP	Neutral	56.00	-20.46
4.400	25.30	AV	Neutral	46.00	-20.70
10.490	38.24	QP	Neutral	60.00	-21.76
0.590	23.70	AV	Neutral	46.00	-22.30
10.490	26.10	AV	Neutral	50.00	-23.90
11.500	25.10	AV	Line	50.00	-24.90
0.180	38.90	QP	Line	64.49	-25.59
0.590	29.60	QP	Neutral	56.00	-26.40
4.140	19.26	AV	Line	46.00	-26.74
11.500	31.20	QP	Line	60.00	-28.80
4.140	25.03	QP	Line	56.00	-30.97

Plot(s) of Test Data

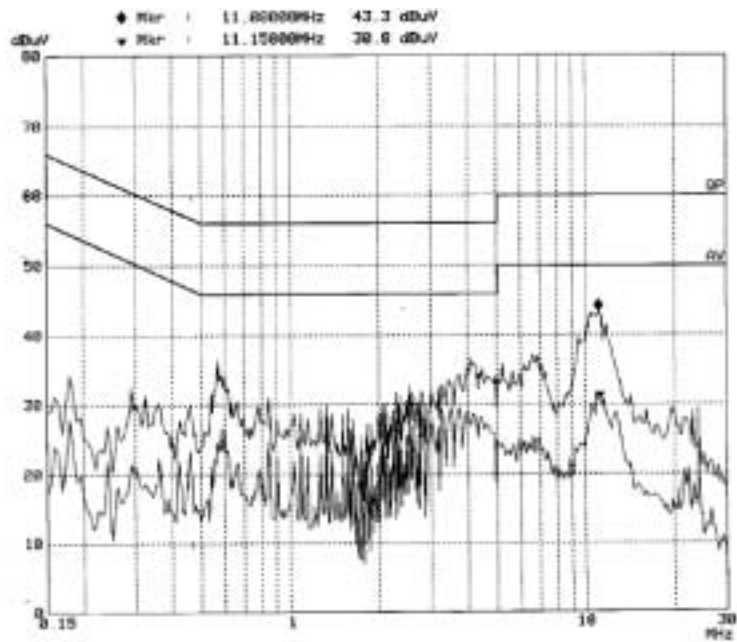
Plot(s) of Test Data is presented hereinafter as reference.

High Channel:

Line:

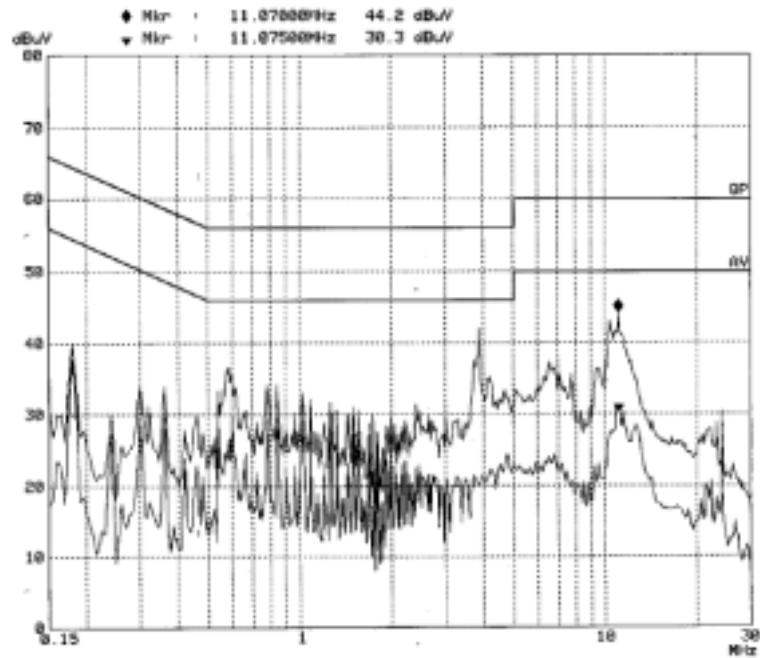


Neutral:

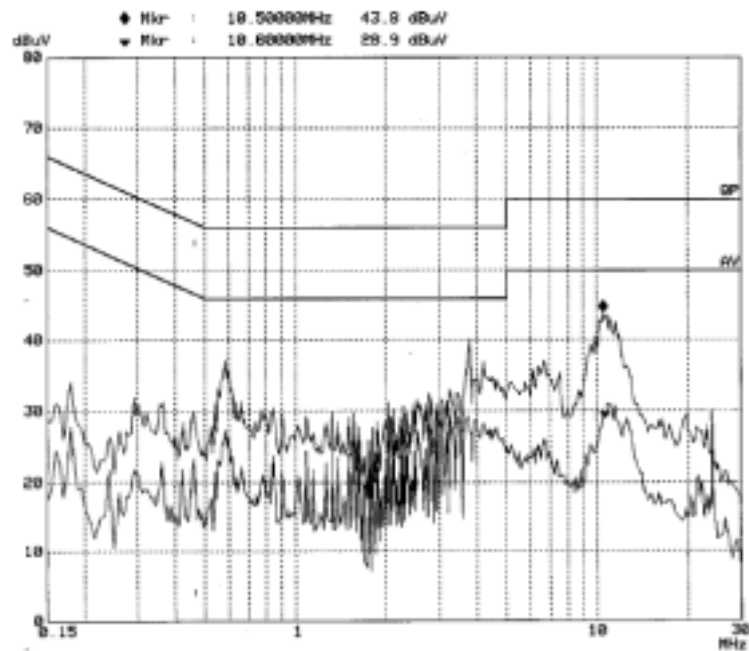


Middle Channel:

Line:

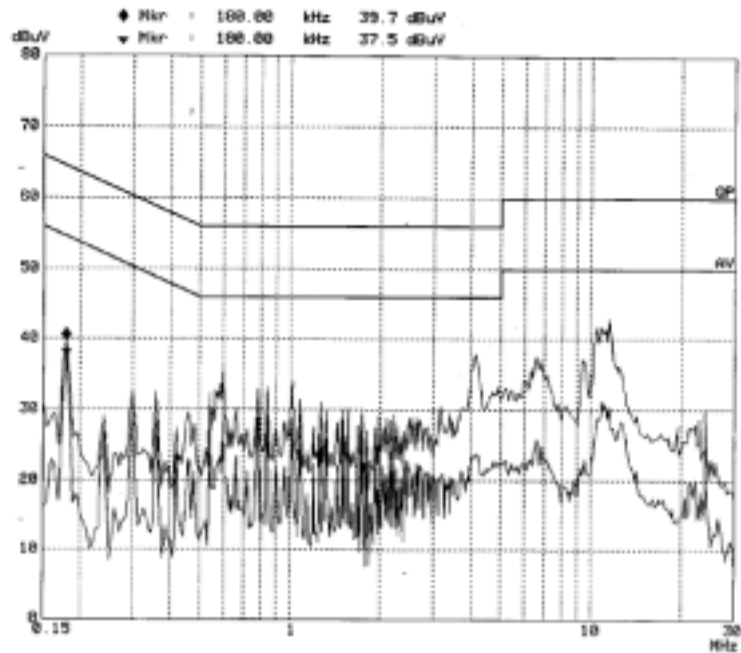


Neutral:

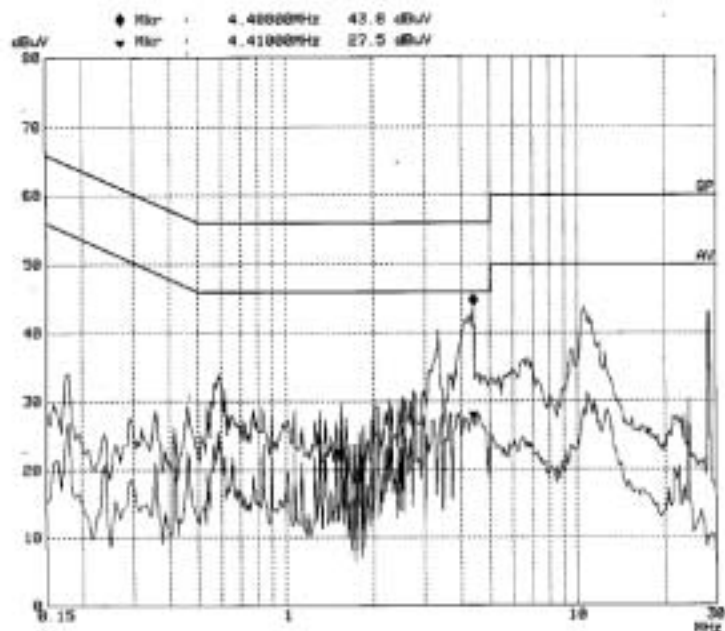


Low Channel:

Line:



Neutral:



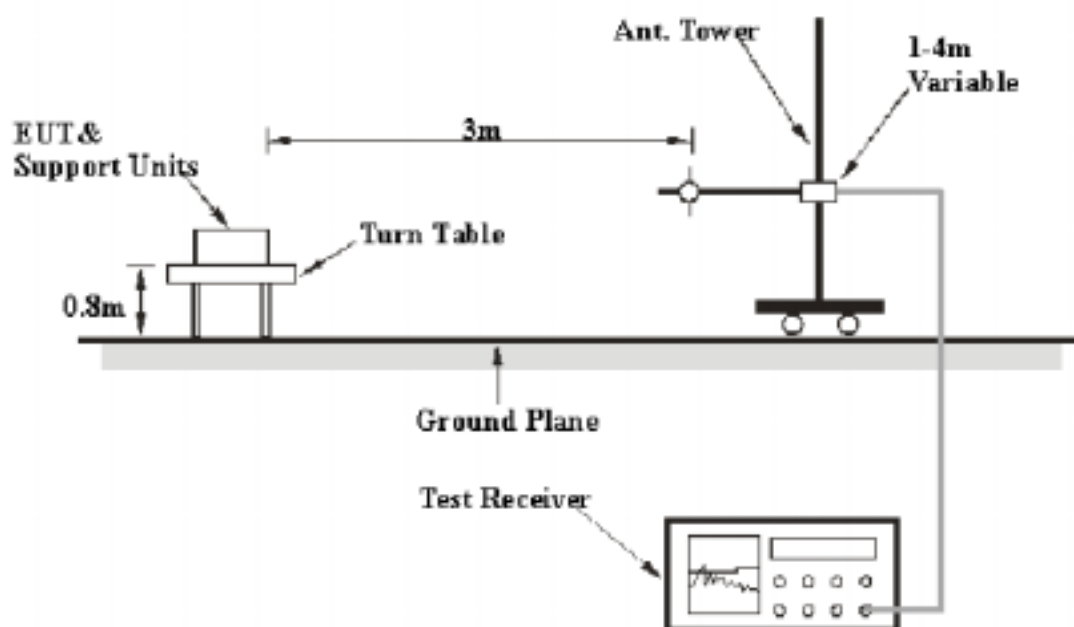
§15.205& §15.209(a)- RADIATED EMISSION

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.

EUT Setup



The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with the ANSI C63.4-2001. The specification used was the FCC 15.209 limits.

Test Receiver Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the Test Receiver was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
30 – 1000 MHz	100 kHz	100 kHz
1000 MHz – 25 GHz	1 MHz	1 MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2004-9-1	2005-8-31
Rohde & Schwarz	Test Receiver	ESCI	100035	2004-9-15	2005-9-14
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2005-4-19	2006-4-18
HP	Amplifier	8447D	2994A09795	2004-9-1	2005-8-31
Sunol Sciences	System Controller	SC99V	033004-1	N/A	N/A

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

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the PK&AV detection mode.

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:

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

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

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

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.247, with the worst margin reading of:

Low Channel: -8.05 dB at 4803.90 MHz in the **horizontal** polarization.
Middle Channel: -6.50 dB at 4881.90 MHz in the **horizontal** polarization.
High Channel: -5.37 dB at 4957.90 MHz in the **horizontal** polarization.

Test Data**Environmental Conditions**

Temperature:	18 °C
Relative Humidity:	53 %
ATM Pressure:	1015 mbar

The testing was performed by Jandy Su on 2005-4-11

Test mode: Transmitting & Standby

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Height Meter	Polar H / V	Antenna Loss dBuV/m	Cable loss dB	Amplifier dB	Correction Amplitude dBuV	FCC 15.247 Limit	FCC 15.247 Margin
Low Channel (1GHz to 24 GHz)											
4803.90	AV	39.65	60	1.2	h	34.1	5.2	33.00	45.95	54	-8.05
4803.90	AV	36.32	60	1.2	v	34.1	5.2	33.00	42.62	54	-11.38
7206.00	AV	31.46	270	1.0	h	37.4	6.1	33.50	41.46	54	-12.54
7206.13	AV	30.22	270	1.0	v	37.4	6.1	33.50	40.22	54	-13.78
1606.00	AV	40.28	45	1.2	h	25.3	2.6	33.86	34.32	54	-19.68
1606.00	AV	38.99	45	1.2	v	25.3	2.6	33.86	33.03	54	-20.97
1203.00	AV	36.74	180	1.2	h	27.8	3.4	35.16	32.78	54	-21.22
4803.90	PK	44.24	180	1.2	h	34.1	5.2	33.00	50.54	74	-23.46
1203.00	AV	33.22	180	1.2	v	27.8	3.4	35.16	29.26	54	-24.74
1301.00	AV	38.62	90	1.2	h	23.9	2.6	36.33	28.79	54	-25.21
4803.90	PK	40.60	180	1.2	v	34.1	5.2	33.00	46.90	74	-27.10
7206.00	PK	35.11	45	1.0	h	37.4	6.1	33.50	45.11	74	-28.89
1732.00	AV	34.67	90	1.2	v	23.9	2.6	36.33	24.84	54	-29.16
7206.13	PK	34.50	45	1.0	v	37.4	6.1	33.50	44.50	74	-29.50
1606.00	PK	46.7	60	1.0	h	25.3	2.6	33.86	40.74	74	-33.26
1606.00	PK	44.51	60	1.0	v	25.3	2.6	33.86	38.55	74	-35.45
1203.00	PK	42.13	180	1.2	h	27.8	3.4	35.16	38.17	74	-35.83
1203.00	PK	39.56	180	1.2	v	27.8	3.4	35.16	35.60	74	-38.40
1301.00	PK	42.82	45	1.2	h	23.9	2.6	36.33	32.99	74	-41.01
1732.00	PK	41.84	45	1.2	v	23.9	2.6	36.33	32.01	74	-41.99
2402.01	PK (FUND)	85.38	45	1.0	h	29.1	3.7	34.00	84.18		
2402.01	AV (FUND)	83.24	45	1.0	h	29.1	3.7	34.00	82.04		
2402.01	PK (FUND)	83.81	45	1.0	v	29.1	3.7	34.00	82.61		
2402.01	AV (FUND)	81.27	45	1.0	v	29.1	3.7	34.00	80.07		

Continues

Middle Channel (1GHz to 24 GHz)											
4881.90	AV	41.25	60	1.2	h	34.1	5.2	33.00	47.60	54	-6.50
4882.00	AV	40.35	60	1.2	v	34.1	5.2	33.00	46.65	54	-7.35
7323.27	AV	31.52	270	1.0	h	37.4	6.1	33.50	41.50	54	-12.50
7323.33	AV	30.25	270	1.0	v	37.4	6.1	33.50	40.25	54	-13.75
1634.00	AV	41.22	45	1.2	h	25.3	2.6	33.86	35.30	54	-18.70
4881.90	PK	48.19	180	1.2	h	34.1	5.2	33.00	54.50	74	-19.50
1634.00	AV	39.87	45	1.2	v	25.3	2.6	33.86	33.91	54	-20.09
4882.00	PK	46.05	180	1.2	v	34.1	5.2	33.00	52.35	74	-21.65
1469.00	AV	35.24	180	1.2	h	27.8	3.4	35.16	31.30	54	-22.70
1203.00	AV	35.26	180	1.2	v	27.8	3.4	35.16	31.30	54	-22.70
1301.00	AV	36.78	90	1.2	h	23.9	2.6	36.33	27.00	54	-27.10
1301.00	AV	36.45	90	1.2	v	23.9	2.6	36.33	26.62	54	-27.38
7323.27	PK	36.65	45	1.0	h	37.4	6.1	33.50	46.70	74	-27.40
7323.33	PK	34.14	45	1.0	v	37.4	6.1	33.50	44.14	74	-29.86
1634.00	PK	47.53	60	1.0	h	25.3	2.6	33.86	41.60	74	-32.40
1634.00	PK	44.48	60	1.0	v	25.3	2.6	33.86	38.52	74	-35.48
1469.00	PK	40.64	180	1.2	h	27.8	3.4	35.16	36.70	74	-37.30
1203.00	PK	40.66	180	1.2	v	27.8	3.4	35.16	36.70	74	-37.30
1301.00	PK	42.30	45	1.2	v	23.9	2.6	36.33	32.47	74	-41.53
1301.00	PK	41.66	45	1.2	h	23.9	2.6	36.33	31.80	74	-42.20
2441.01	PK (FUND)	87.10	45	1.0	h	29.1	3.7	34.00	85.90		
2441.01	AV (FUND)	85.46	45	1.0	h	29.1	3.7	34.00	84.30		
2441.01	PK (FUND)	86.65	45	1.0	v	29.1	3.7	34.00	85.45		
2441.01	AV (FUND)	84.15	45	1.0	v	29.1	3.7	34.00	82.95		

Continues

High Channel (1GHz to 24 GHz)											
4957.90	AV	42.33	60	1.2	h	34.1	5.2	33.00	48.63	54	-5.37
4958.05	AV	38.26	60	1.2	v	34.1	5.2	33.00	44.60	54	-9.40
7433.81	AV	32.15	270	1.0	h	37.4	6.1	33.50	42.15	54	-11.85
7434.11	AV	29.68	270	1.0	v	37.4	6.1	33.50	39.70	54	-14.30
4957.90	PK	51.06	180	1.2	h	34.1	5.2	33.00	57.36	74	-16.64
4958.05	PK	45.29	180	1.2	v	34.1	5.2	33.00	51.59	74	-22.41
1658.00	AV	36.58	45	1.2	h	25.3	2.6	33.86	30.62	54	-23.38
1800.00	AV	30.20	180	1.2	h	27.8	3.4	35.16	26.24	54	-27.76
7433.81	PK	36.19	45	1.0	h	37.4	6.1	33.50	46.19	74	-27.81
1658.00	AV	31.44	45	1.2	v	25.3	2.6	33.86	25.50	54	-28.50
7434.11	PK	35.37	45	1.0	v	37.4	6.1	33.50	45.40	74	-28.60
1300.00	AV	26.30	180	1.2	v	27.8	3.4	35.16	22.30	54	-31.70
1200.00	AV	30.10	90	1.2	h	23.9	2.6	36.33	20.27	54	-33.73
1658.00	PK	45.39	60	1.0	h	25.3	2.6	33.86	39.43	74	-34.57
1658.00	PK	43.89	60	1.0	v	25.3	2.6	33.86	37.93	74	-36.07
1100.00	AV	25.32	90	1.2	v	23.9	2.6	36.33	15.50	54	-38.50
1300.00	PK	37.41	180	1.2	v	27.8	3.4	35.16	33.50	74	-40.60
1800.00	PK	33.42	180	1.2	h	27.8	3.4	35.16	29.46	74	-44.54
1100.00	PK	38.90	45	1.2	v	23.9	2.6	36.33	29.06	74	-44.94
1200.00	PK	33.78	45	1.2	h	23.9	2.6	36.33	23.95	74	-50.05
2479.01	PK (FUND)	87.09	45	1.0	h	29.1	3.7	34.00	85.89		
2479.01	AV (FUND)	86.02	45	1.0	h	29.1	3.7	34.00	84.82		
2479.10	PK (FUND)	86.29	45	1.0	v	29.1	3.7	34.00	85.09		
2479.10	AV (FUND)	84.52	45	1.0	v	29.1	3.7	34.00	83.30		

§15.247(a)(1)-CHANNEL SEPARATION TEST

Standard Applicable

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB 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 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Test Receiver	ESCI	100035	2004-9-15	2005-9-14

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

Test Procedure

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 100 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another truce
3. Measure the channel separation.

Limit

FCC Part 15, Subpart C Section 15.247(a)(1). 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.

FREQUENCY RANGE (MHz)	Limit (kHz)
902-928	>25kHz
2400-2483.5	>25kHz
5725-5850	>25kHz

Test Data

Environmental Conditions

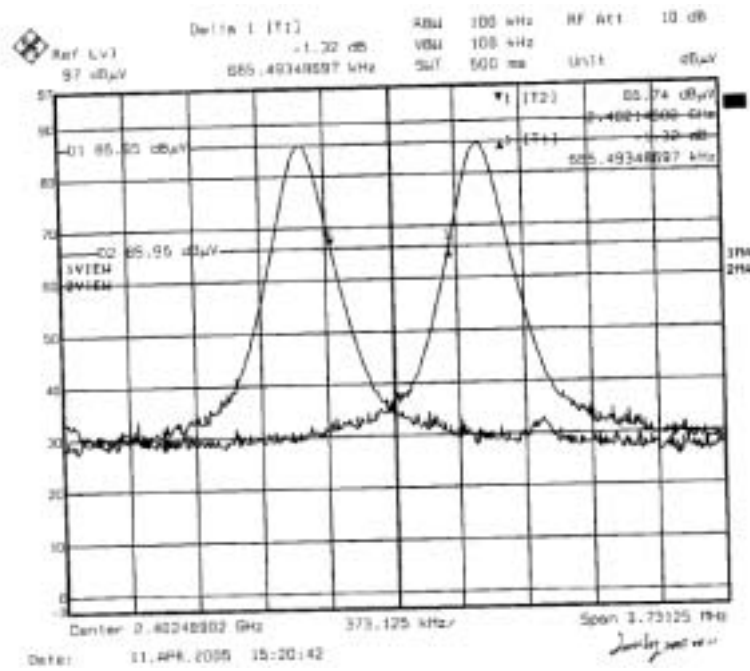
Temperature:	16° C
Relative Humidity:	85%
ATM Pressure:	1016 mbar

The testing was performed by Jandy Su on 2005-4-12

Test Result: Pass

The result has been complied with the §15.247a(1), see the following plot:

CHANNEL	CHANNEL FREQUENCY (MHz)	SEPARATION READ VALUE (kHz)	SEPARATION LIMIT (kHz)
Low Channel	2402.00	665.49	>25
Adjacency Channel	2403.00		>25



§15.247(a)(1) 20dB BANDWIDTH TESTING**Standard Applicable**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB Bandwidth of the hopping channel, whichever is greater.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447D	2994A09795	2004-9-1	2005-8-31
Rohde & Schwarz	Test Receiver	ESCI	100028	2004-9-6	2005-9-5
Sunol Sciences	Bilog Antenna	JB1	A040904-1	2004-4-19	2005-4-18
Sunol Sciences	System Controller	SC99V	033004-1	N/A	N/A

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

Test Procedure

1. Check the calibration of the measuring instrument using a known signal from an external generator.
2. Position the EUT without connection to the tunable table. Turn on the EUT. 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 Data**Environmental Conditions**

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1032mbar

The testing was performed by Jandy Su on 2005-4-12

Test Result: Pass

Channel	Channel frequency (MHz)	20dB Bandwidth (KHz)	Limit (KHz)
Low channel	2402	266.00	<1000
Middle channel	2441	266.00	<1000
High channel	2479	266.00	<1000

HIGH CH
 Ref 0 dBm At t 30 dB
 RBW 100 kHz
 VBW 100 kHz
 SWT 500 ms
 Marker 1 [T1] -14.18 dBm
 2.478992000 GHz

1 PK
 MAXH

ndB [T1] 20.00 dB
 BW 200.00000000 kHz
 Temp 1 [T1 ndB] -34.13 dBm
 2.478866000 GHz
 Temp 2 [T1 ndB] -33.98 dBm
 2.479132000 GHz

Center 2.479 GHz 100 kHz/ Span 1 MHz

MID. CH

Ref 0 dBm

At t 30 dB

RBW 100 kHz

VBW 100 kHz

SWT 500 ms

Marker 1 [T1]

-16.25 dBm

2.441002000 GHz

1 PK MAX

dB [T1] 20.00 dB

BW 266.00000000 kHz

Temp 1 [T1 nB]

-36.24 dBm

2.440860000 GHz

Temp 2 [T1 nB]

-36.20 dBm

2.441320000 GHz

PS

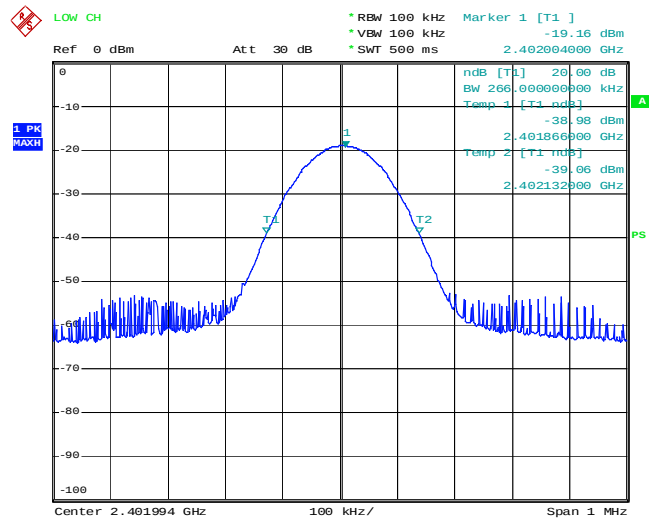
Center 2.441 GHz

100 kHz/

Span 1 MHz

FCC Part 15.247 Test Report

Low Channel



Date: 8.APR.2005 16:17:04

§15.247(a)(1)(iii)-QUANTITY OF HOPPING CHANNEL TEST

Standard Applicable

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Test Receiver	ESCI	100035	2004-9-15	2005-9-14

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

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in transmitting mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

Limit

FCC Part 15, Subpart C Section 15.247

FREQUENCY RANGE (MHz)	Limit (Quantity of Hopping Channel)			
	20 dB bandwidth <250 kHz	20 dB bandwidth >250 kHz	20 dB bandwidth <1 MHz	20 dB bandwidth >1 MHz
902-928	50	25	N/A	N/A
2400-2483.5	N/A	N/A	15	15
5725-5850	N/A	N/A	75	N/A

Test Data**Environmental Conditions**

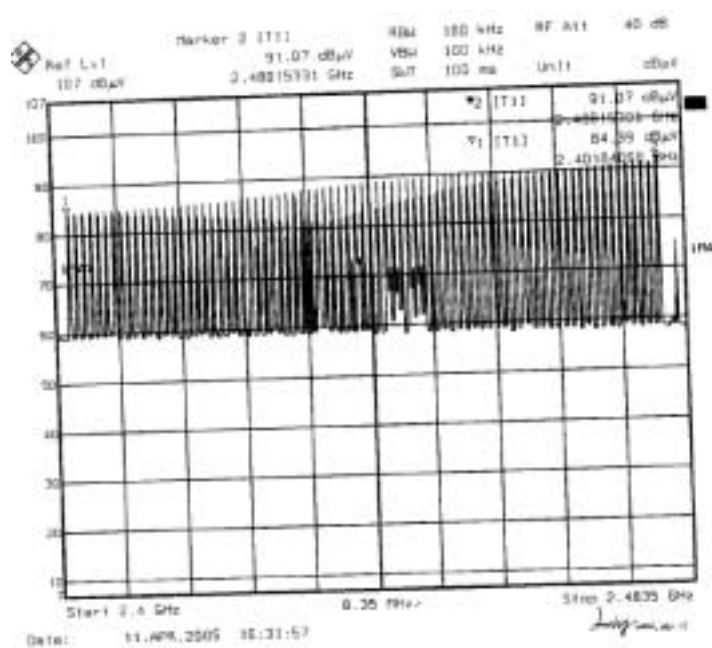
Temperature:	16° C
Relative Humidity:	85%
ATM Pressure:	1016 mbar

The testing was performed by Jandy Su on 2005-4-12

Test Result: Pass

The frequency hopping systems operating in 2.4~2.4835 GHz band employ 78 nonoverlapping channels.

HOPPING CHANNEL FREQUENCY RANGE	QUANTITY OF HOPPING CHANNEL READ VALUE	QUANTITY OF HOPPING CHANNEL LIMIT
2402 ~ 2480	78	15



§15.247(a)(1)(iii) - TIME OF OCCUPANCY (DWELL TIME)**Standard Applicable**

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2004-11-10	2005-11-9

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

Test Procedure

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 X channel no.(s), The quantity of False was get from single sweep. In addition, the time of single Pluses was tested.

Limit

FCC Part 15, Subpart C Section 15.247.

FREQUENCY RANGE (MHz)	LIMIT (ms)		
	20dB bandwidth <250kHz (50 Channel)	20dB bandwidth >250kHz (50 Channel)	20dB bandwidth <1 MHz (75 Channel)
902-928	400(20s)	400(10s)	N/A
2400-2483.5	N/A	N/A	400(30s)
5725-5850	N/A	N/A	400(30s)

Test Data**Environmental Conditions**

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	1032mbar

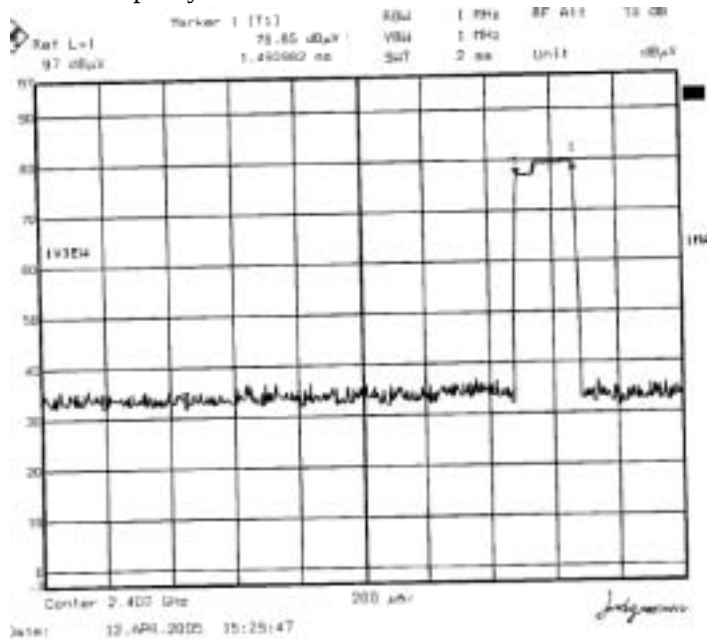
The testing was performed by Jandy Su on 2005-4-12

Test Result: Pass

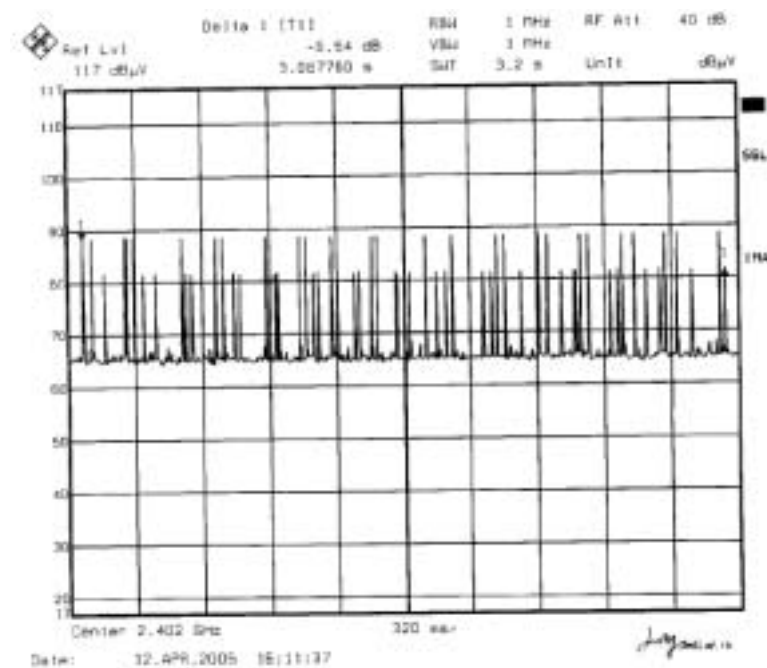
The result has been complied with the §15.247(a)(1)(iii), see the following plot:

Channel	Frequency MHz	Pulse Wide m Sec	Quantity Pulse per 3.2 Sec	Dwell Time m Sec	Limit Sec
Low channel	2402	0.174	58	10.09	0.4
Middle channel	2441	0.174	59	10.27	0.4
High channel	2479	0.180	36	6.48	0.4

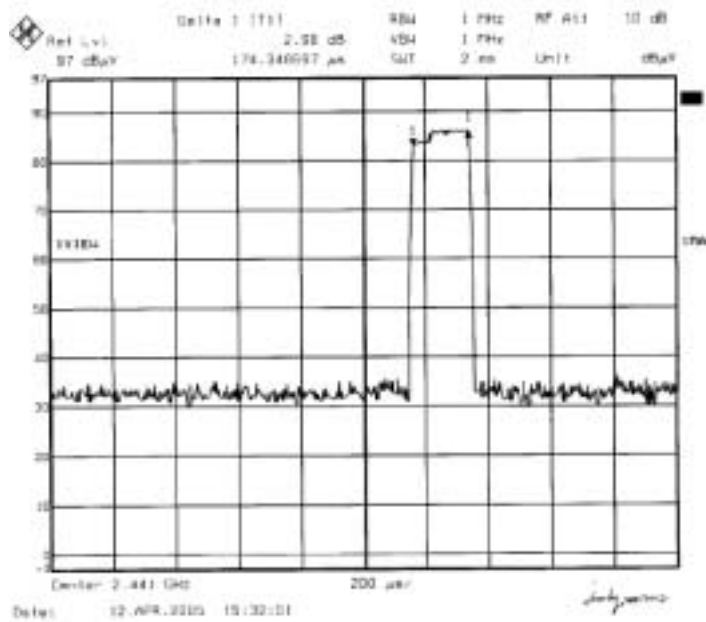
Pulse occupancy time low channel



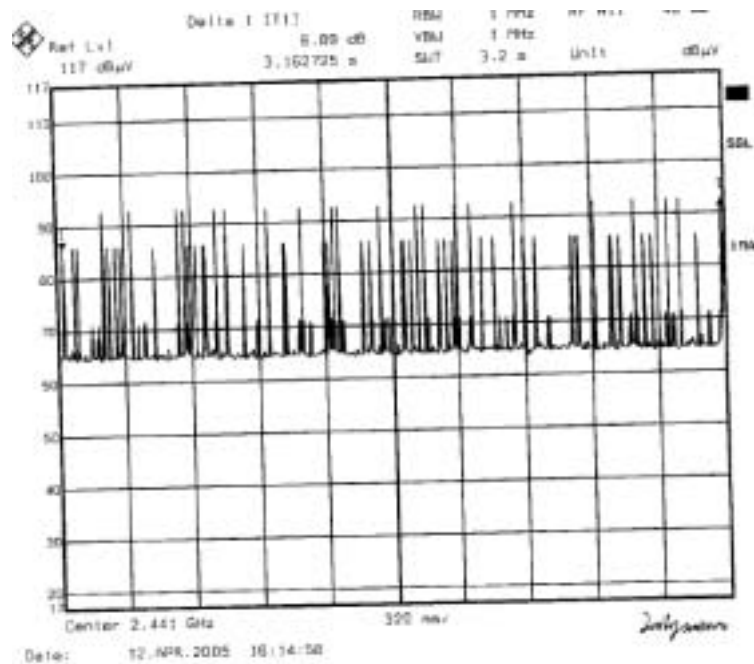
Time of Occupancy (Dwell Time) low channel



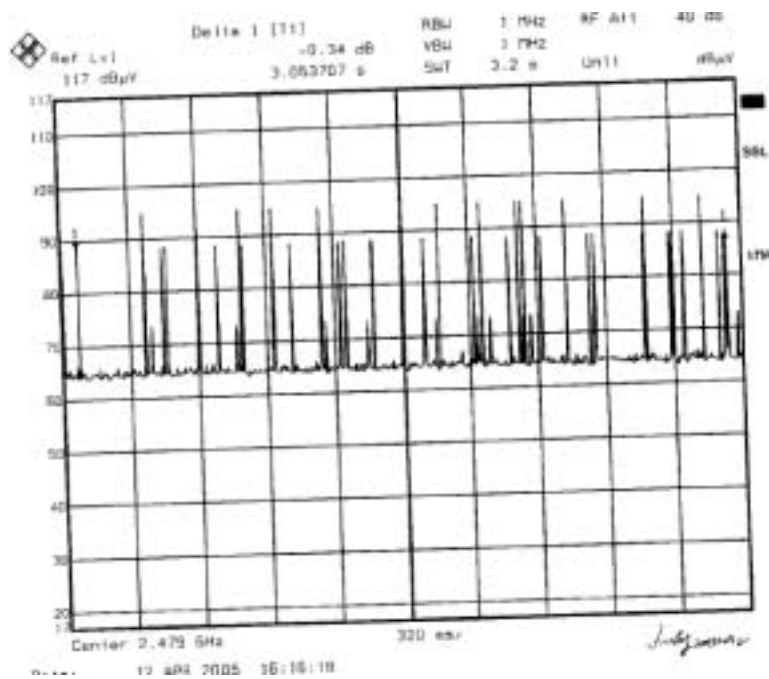
Pulse occupancy time middle channel



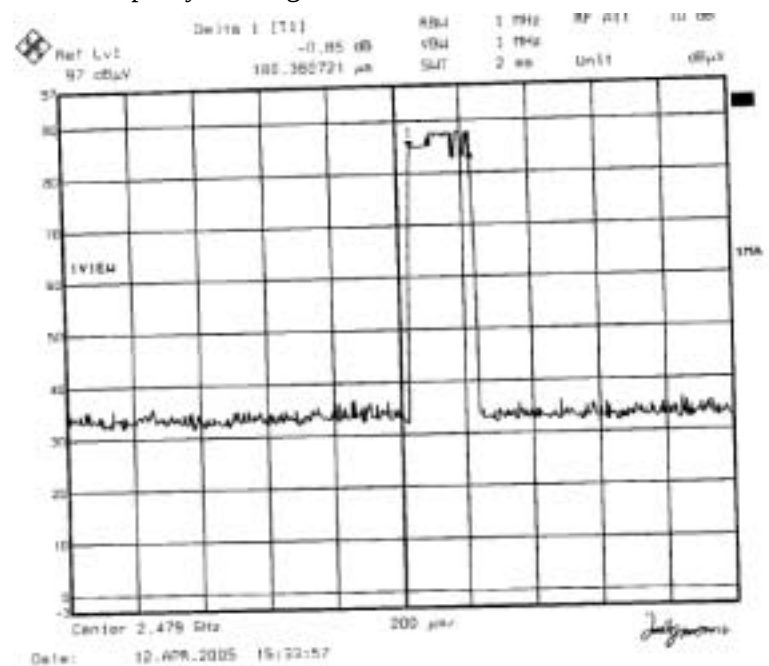
Time of Occupancy (Dwell Time) middle channel



Time of Occupancy (Dwell Time) high channel



Pulse occupancy time high channel



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

Standard Applicable

(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

(1) For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping 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 MHz band: 0.125 watts.

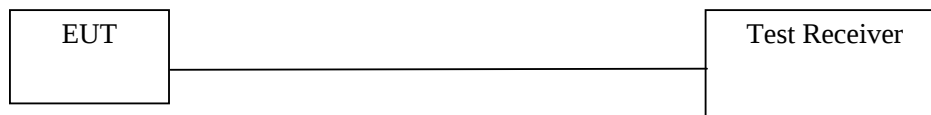
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Test Receiver	ESCI	100035	2004-9-15	2005-9-14

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

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the UFL port of EUT to a Peak Power Meter.



Test Data

Environmental Conditions

Temperature:	16° C
Relative Humidity:	85%
ATM Pressure:	1016 mbar

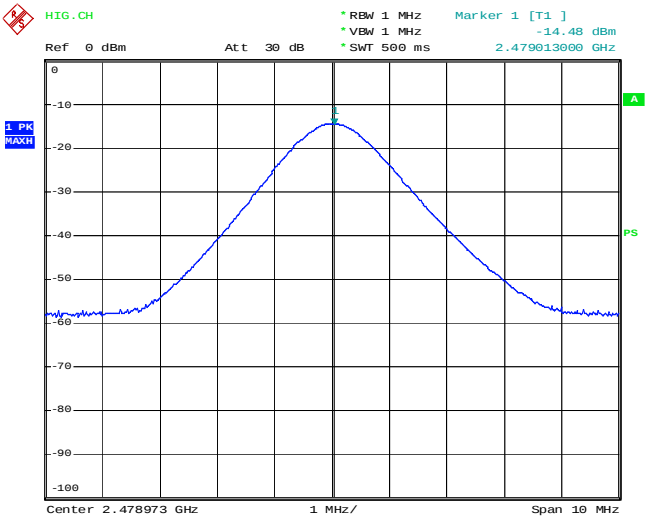
The testing was performed by Jandy Su on 2005-4-12

Test Result: Pass

The result has been complied with the 15.247(b)(1), see the following plot:

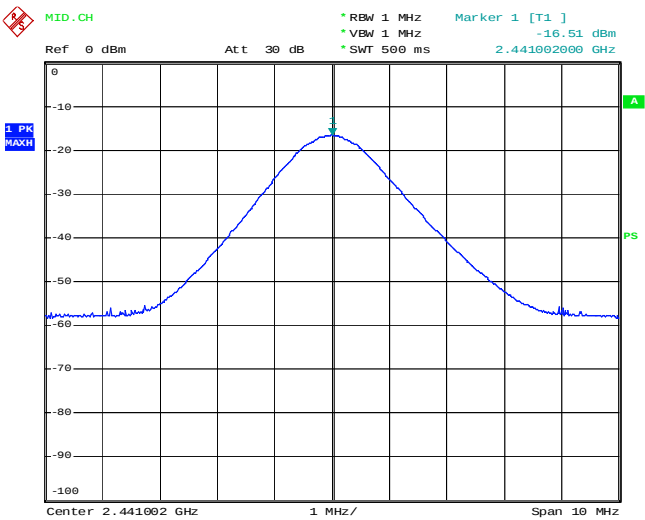
CHANNLE	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)
High Channel	2479.00	-14.48	30
Middle Channel	2441.00	-16.31	30
Low Channel	2402.00	-19.78	30

High Channel



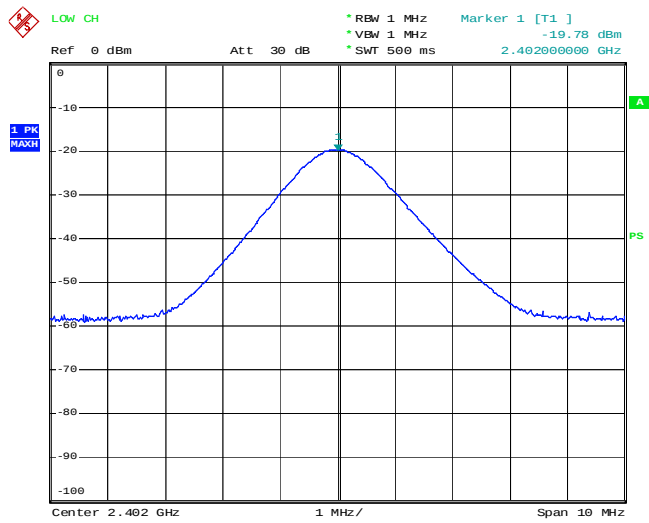
Date: 8.APR.2005 16:10:32

Middle Channel



Date: 8.APR.2005 16:04:23

Low Channel



Date: 8.APR.2005 16:06:03

§15.247(d)- BAND EDGES TESTING

Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2004-9-1	2005-8-31
Rohde & Schwarz	Test Receiver	ESCI	100035	2004-9-15	2005-9-14
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2004-4-19	2005-4-18
Sunol Sciences	System Controller	SC99V	041304-1	N/A	N/A
Thermax	Coaxial Cable	RGS-142	EC004	2004-9-1	2005-8-31
HP	Amplifier	8447D	2994A09795	2004-9-1	2005-8-31
Rohde & Schwarz	Test Receiver	ESCI	100028	2004-9-6	2005-9-5
Sunol Sciences	Bilog Antenna	JB1	A040904-1	2004-4-19	2005-4-18
Sunol Sciences	System Controller	SC99V	033004-1	N/A	N/A

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

Test Procedure

1. Check the calibration of the measuring instrument using 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. Start 2.4 G Hz, stop 2.4835 GHz, 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 frequency edge point amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the edge frequency.

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	59%
ATM Pressure:	1178mbar

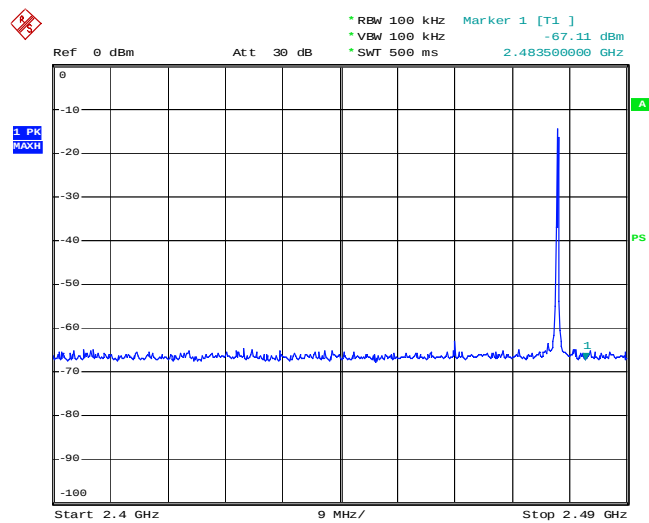
The testing was performed by Jandy Su on 2005-4-12

Test Result: Pass

The result has been complied with the 15.247(d), see the following plot:

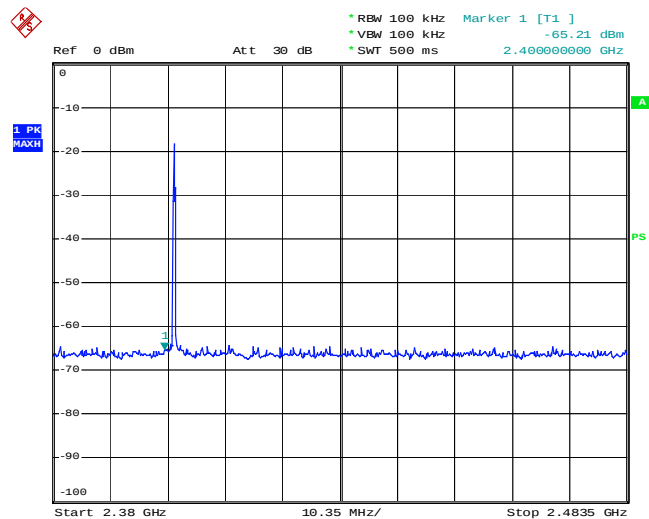
Frequency MHz	Emission dB μ V/m	Limit dB μ V/m
2483.50	39.89	54
2400.00	41.79	54

High Channel



Date: 8.APR.2005 16:11:42

Low Channel



Date: 8.APR.2005 16:13:41